Statistics

Bachelor of Arts (BA)

The undergraduate major at Berkeley provides a systematic and thorough grounding in applied and theoretical statistics and in probability. The quality and dedication of the teaching staff and faculty are extremely high. A major in Statistics from Berkeley is an excellent preparation for a career in science, in industry, or as a preparation for further academic study in a wide variety of fields. It is also very useful to combine studies of statistics and probability with other subjects. Facilitating such cross-fertilization is one of the strengths of the Department. Roughly half of the Department's undergraduate students are double or even triple majors.

Students interested in teaching statistics and mathematics in middle or high school should pursue the Teaching Option within the major. Students interested in teaching should also consider the Cal Teach Program (http://calteach.berkeley.edu) .

Declaring the Major

Students should submit an application in the semester they are completing their last prerequisite(s). For applicants with prerequisites in progress, applications will be reviewed after the grades for all prerequisites are available a 2-3 weeks after finals end. For applicants who have completed all prerequisites, applications will be reviewed and processed within a week.

For detailed information regarding the process of declaring the major, please see the Statistics Department website. (http://statistics.berkeley.edu/programs/undergrad/major/#HowtoDeclare)

Minor Program

The minor is for students who want to study a significant amount of Statistics and Probability at the upper division level. For information regarding the requirements, please see the Minor Requirements tab on this page.

Students may obtain the minor once they have completed both the lower division prerequisites and the 5 upper division requirements. Students will need to meet with the undergraduate faculty adviser and bring the following items with them:

- Minor application form (http://statistics.berkeley.edu/sites/default/files/uploads/minor_requirements_10-09.pdf)
- Copy of their transcript (an unofficial one will do)
- Petition for Confirmation of Minor Program completed (http://ls-advise.berkeley.edu/fp/00minor.pdf)

After meeting with the faculty adviser, students should bring their forms to the Course and Curriculum Officer.

In addition to the University, campus, and college requirements, listed on the College Requirements tab, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All courses taken to fulfill the major requirements below must be taken for graded credit, other than courses listed which are offered on a *Pass/No Pass* basis only. Other exceptions to this requirement are noted as applicable.
2. No more than one upper-division course may be used to simultaneously fulfill requirements for a student's major and minor programs, with the exception of minors offered outside of the College of Letters and Science.
3. A minimum grade point average (GPA) of 2.0 must be maintained in both upper- and lower-division courses used to fulfill the major requirements.

For information regarding residence requirements and unit requirements, please see the College Requirements tab.

For information regarding major requirements for the Teaching Option, please see below.

Lower-division Prerequisites

MATH 1A	Calculus	4
MATH 1B	Calculus	4
MATH 53	Multivariable Calculus	4
MATH 54	Linear Algebra and Differential Equations	4

Upper-division Requirements

STAT 133	Concepts in Computing with Data	3
STAT 134	Concepts of Probability [1]	3
STAT 135	Concepts of Statistics	4
Select three Statistics electives from the following; at least one of the selections must have a lab:		
STAT 150	Stochastic Processes	
STAT 151A	Linear Modelling: Theory and Applications	
or STAT 151B	Linear Modelling: Theory and Applications	
STAT 152	Sampling Surveys	
STAT 153	Introduction to Time Series	
STAT 154	Modern Statistical Prediction and Machine Learning	
STAT 155	Game Theory	
STAT 157	Seminar on Topics in Probability and Statistics	
STAT 158	The Design and Analysis of Experiments	
Select three applied cluster courses, at least 3 units: See below		

[1] Other non-Statistics UC Berkeley courses, such as IND ENG 172 Probability and Risk Analysis for Engineers, cannot be used to fulfill this requirement

Upper-division Requirements: Teaching Option

STAT 133	Concepts in Computing with Data	3
STAT 134	Concepts of Probability	3
STAT 135	Concepts of Statistics	4
Select two of the following; one course must include a lab:		8
STAT 150	Stochastic Processes	
STAT 151A	Linear Modelling: Theory and Applications	
STAT 151B	Linear Modelling: Theory and Applications	
STAT 152	Sampling Surveys	
STAT 153	Introduction to Time Series	

STAT 154	Modern Statistical Prediction and Machine Learning	
STAT 155	Game Theory	
STAT 157	Seminar on Topics in Probability and Statistics	
STAT 158	The Design and Analysis of Experiments	
MATH 110	Linear Algebra	4
MATH 113	Introduction to Abstract Algebra	4
MATH 151	Mathematics of the Secondary School Curriculum I	4
MATH 152	Mathematics of the Secondary School Curriculum II	4
or MATH 153	Mathematics of the Secondary School Curriculum III	

Cluster Course Information

The applied cluster is a chance to learn about areas in which Statistics can be applied and to learn specialized techniques not taught in the Statistics Department. Students need to design their own Applied Cluster. The courses should have a unifying theme. Picking their own applied cluster is a valuable exercise that gives students a chance to explore and refine their interests and to develop a coherent course of study. A pre-approved list has been provided below. However, it is not exhaustive. If students would like to use a course that is not on the list, the Undergraduate Major Faculty Adviser must approve it. Clusters may consist of courses from more than one department, but choices should reflect a theme, so that students study some area of application in breadth and depth. Cluster courses should meet the following criteria:

1. Courses must be upper-division courses and at least 3 units.
2. Courses in the biological and physical sciences, Chemistry, and Engineering are often acceptable.
3. Courses in social sciences must be quantitative.
4. Courses with statistics prerequisites are often acceptable.
5. Courses that are similar to courses offered in the Statistics department are not acceptable.
6. Courses that primarily teach how to use a particular software package are not acceptable.
7. Courses that focus on the use of spreadsheet software (e.g., UGBA 104 Analytic Decision Modeling Using Spreadsheets) are not acceptable.
8. Courses should be taken in the “home” department. For instance, economics classes should be taken in the economics or business department.
9. Seminars and Special topics courses require approval by the Undergraduate Faculty Adviser.

Approved Cluster Courses

Any three of the courses below may be used as a cluster. However, this is not an exhaustive list.

ANTHRO C103	Introduction to Human Osteology	6
ANTHRO 115	Introduction to Medical Anthropology	4
ANTHRO 121C	Historical Archaeology: Historical Artifact Identification and Analysis	4
ANTHRO C124C/ INTEGBI C187	Human Biogeography of the Pacific	3
ANTHRO 127A	Bioarchaeology: Introduction to Skeletal Biology and Bioarchaeology	4
ANTHRO 127B	Bioarchaeology: Reconstruction of Life in Bioarchaeology	4
ANTHRO C129D/ INTEGBI C155	Holocene Paleoecology: How Humans Changed the Earth	3
ANTHRO C129F	The Archaeology of Health and Disease	4
ANTHRO C131/ EPS C171	Geoarchaeological Science	4
ANTHRO 132A	Analysis of Archaeological Materials: Analysis of Archaeological Ceramics	4
ANTHRO 135	Paleoethnobotany: Archaeological Methods and Laboratory Techniques	4
ANTHRO 135B	Environmental Archaeology	4
ANTHRO 169B	Research Theory and Methods in Socio-Cultural Anthropology	5
ARCH 140	Energy and Environment	4
ARCH 150	Introduction to Structures	4
ARCH 154	Design and Computer Analysis of Structure	3
ASTRON: All courses that meet the above criteria		
BIO ENG: All courses that meet the above criteria		
CHM ENG: All courses that are at least 3 units		
CHEM: All courses that meet the above criteria		
CY PLAN 118AC	The Urban Community	4
CY PLAN 119	Planning for Sustainability	3
CIV ENG: All courses that meet the above criteria		
COG SCI C100	Basic Issues in Cognition	3
COG SCI C101	The Mind and Language	4
COG SCI C102	Scientific Approaches to Consciousness	3
COG SCI C110	Course Not Available	4
COG SCI C124	Course Not Available	3
COG SCI C126	Perception	3
COG SCI C131	Course Not Available	
COG SCI C140	Quantitative Methods in Linguistics	4
COG SCI C147	Language Disorders	3
COMP SCI: All courses that meet the above criteria, except COMPSCI 174		
DEMOG 110	Introduction to Population Analysis	3
DEMOG C175	Economic Demography	3
EPS: All courses that meet the above criteria, except EPS C100, EPS C120		
ECON 101A	Economic Theory--Micro	4
ECON 101B	Economic Theory--Macro	4
ECON C102	Natural Resource Economics	4
ECON C103	Introduction to Mathematical Economics	4
ECON 104	Advanced Microeconomic Theory	4
ECON 119	Psychology and Economics	4
ECON 121	Industrial Organization and Public Policy	4
ECON C125	Environmental Economics	4
ECON 126	Course Not Available	4
ECON 131	Public Economics	4
ECON 136	Financial Economics	4
or UGBA 103	Introduction to Finance	
ECON 138	Financial and Behavioral Economics	4
ECON 141	Econometric Analysis	4

ECON 174	Global Poverty and Impact Evaluation	4
ECON C175	Economic Demography	3
or ECON N175	Economic Demography	
ECON C181	International Trade	4
ECON 182	International Monetary Economics	4
EL ENG: All courses that meet the above criteria		
ENE,RES C100	Energy and Society	4
ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
ENE,RES C130	Course Not Available	4
ENE,RES 175	Water and Development	4
ENGIN 115	Engineering Thermodynamics	4
ENGIN 117	Methods of Engineering Analysis	3
ENGIN 120	Principles of Engineering Economics	3
ENVECON C101	Environmental Economics	4
ENVECON C102	Natural Resource Economics	4
ENVECON C115	Modeling and Management of Biological Resources	4
ENVECON 131	Globalization and the Natural Environment	3
ENVECON 140AC	Economics of Race, Agriculture, and the Environment	3
ENVECON 141	Course Not Available	4
ENVECON 142	Industrial Organization with Applications to Agriculture and Natural Resources	4
ENVECON 143	Economics of Innovation and Intellectual Property	3
ENVECON 145	Health and Environmental Economic Policy	3
ENVECON 147	Regulation of Energy and the Environment	4
ENVECON C151	Economic Development	4
ENVECON 152	Advanced Topics in Development and International Trade	3
ENVECON 153	Population, Environment, and Development	3
ENVECON 154	Economics of Poverty and Technology	3
ENVECON 161	Advanced Topics in Environmental and Resource Economics	4
ENVECON 162	Economics of Water Resources	3
ENVECON C175	The Economics of Climate Change	4
ENVECON C181	International Trade	4
ENVECON C183	Forest Ecosystem Management	4
ENV SCI 100	Introduction to the Methods of Environmental Science	4
ENV SCI 125	Environments of the San Francisco Bay Area	3
GEOG C139	Atmospheric Physics and Dynamics	3
GEOG 140A	Physical Landscapes: Process and Form	4
GEOG 142	Climate Dynamics	4
GEOG 143	Global Change Biogeochemistry	4
GEOG 144	Principles of Meteorology	3
GEOG C145	Geological Oceanography	4
GEOG 148	Biogeography	4
GEOG C188	Geographic Information Systems	4
IND ENG 115	Industrial and Commercial Data Systems	3
IND ENG 130	Methods of Manufacturing Improvement	3
IND ENG 131	Discrete Event Simulation	3
IND ENG 140	Course Not Available	
IND ENG 150	Production Systems Analysis	3
IND ENG 151	Service Operations Design and Analysis	3
IND ENG 153	Logistics Network Design and Supply Chain Management	3
IND ENG 160	Operations Research I	3
IND ENG 162	Linear Programming	3
IND ENG 166	Decision Analysis	3
IND ENG 170	Industrial Design and Human Factors	3
IND ENG 171	Technology Firm Leadership	3
INFO 114	User Experience Research	3
INFO 152	Mobile Application Design and Development	3
INTEGBI C101 & C101L	Course Not Available and Course Not Available	0
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103	Course Not Available	4
INTEGBI 104	Course Not Available	4
INTEGBI 106	Course Not Available	4
INTEGBI 106A	Physical and Chemical Environment of the Ocean	4
INTEGBI C107	Course Not Available	4
INTEGBI 113L	Paleobiological Perspectives on Ecology and Evolution	4
INTEGBI 115	Introduction to Systems in Biology and Medicine	4
INTEGBI 117 & 117LF	Medical Ethnobotany and Medical Ethnobotany Laboratory	4
INTEGBI 118	Host-Pathogen Interactions: A Trans-Discipline Outlook	4
INTEGBI 119	Evaluating Scientific Evidence in Medicine	3
INTEGBI 123A	Course Not Available	4
INTEGBI C125L	Introduction to the Biomechanical Analysis of Human Movement	4
INTEGBI 127 & 127L	Course Not Available and Motor Control with Laboratory	3
INTEGBI 128	Course Not Available	4
INTEGBI C129L	Human Physiological Assessment	3
INTEGBI 131	General Human Anatomy	3
INTEGBI 132	Survey of Human Physiology	4
INTEGBI 135	The Mechanics of Organisms	4
INTEGBI 137	Human Endocrinology	4
INTEGBI 138	Comparative Endocrinology	4
INTEGBI C139	Course Not Available	4
INTEGBI 140	Biology of Human Reproduction	4
INTEGBI C142L	Introduction to Human Osteology	6
INTEGBI C143A	Biological Clocks: Physiology and Behavior	3
INTEGBI C143B	Hormones and Behavior	3
INTEGBI C144	Animal Behavior	4
INTEGBI 146	Course Not Available	
INTEGBI 148	Comparative Animal Physiology	3
INTEGBI C149	Molecular Ecology	4
INTEGBI 151	Plant Physiological Ecology	4
INTEGBI 152	Environmental Toxicology	4
INTEGBI 153	Ecology	3
INTEGBI 153LF	Course Not Available	
INTEGBI 154	Plant Ecology	3

INTEGBI C155	Holocene Paleoecology: How Humans Changed the Earth	3
INTEGBI C156	Principles of Conservation Biology	4
INTEGBI 157LF	Ecosystems of California	4
INTEGBI 158LF	Biology and Geomorphology of Tropical Islands	13
INTEGBI 160	Evolution	4
INTEGBI 161	Population and Evolutionary Genetics	4
INTEGBI 162	Ecological Genetics	4
INTEGBI 163	Molecular and Genomic Evolution	3
INTEGBI 164	Human Genetics and Genomics	4
INTEGBI 165	Course Not Available	4
INTEGBI 166	Evolutionary Biogeography	4
INTEGBI 168 & 168L	Systematics of Vascular Plants and Systematics of Vascular Plants with Laboratory	6
INTEGBI 169	Evolutionary Medicine	4
INTEGBI 173LF	Mammalogy with Laboratory	5
INTEGBI 174LF	Ornithology with Laboratory	4
INTEGBI 175LF	Herpetology with Laboratory	4
INTEGBI 181	Course Not Available	4
INTEGBI 183	Course Not Available	4
INTEGBI 184 & 184L	Course Not Available and Morphology of the Vertebrate Skeleton with Laboratory	4
INTEGBI C185L	Human Paleontology	5
INTEGBI C187	Human Biogeography of the Pacific	3
ISF C101	Course Not Available	
LD ARCH 122	Environmental Science for Sustainable Development	4
LD ARCH 132	Computer Applications in Environmental Design	4
LD ARCH C188	Geographic Information Systems	4
L & S C140U	The Archaeology of Health and Disease	4
L & S 170AC	Crossroads of Earth Resources and Society	4
LINGUIS 100	Introduction to Linguistic Science	4
LINGUIS C109	Course Not Available	4
LINGUIS 110	Introduction to Phonetics and Phonology	4
LINGUIS 113	Experimental Phonetics	3
LINGUIS 140	Introduction to Field Methods	3
LINGUIS C147	Language Disorders	3
LINGUIS C160	Quantitative Methods in Linguistics	4
MATH: All courses that meet the above criteria		
MEC ENG: All courses that meet the above criteria		
MCELLBI: All courses that meet the above criteria		
MUSIC 108	Music Perception and Cognition	4
MUSIC 108M	Music Perception and Cognition	4
MUSIC 109	Music Cognition: The Mind Behind the Musical Ear	3
NUC ENG: All courses that meet the above criteria		
NUSCTX: All courses that meet the above criteria		
PHILOS 128	Philosophy of Science	4
PHILOS 140A	Intermediate Logic	4
PHILOS 140B	Intermediate Logic	4
PHILOS 142	Philosophical Logic	4
PHILOS 146	Philosophy of Mathematics	4
PHILOS 148	Course Not Available	4
PHYS ED C129	Human Physiological Assessment	3
PHYS ED C165	Introduction to the Biomechanical Analysis of Human Movement	4
PHYSICS: All courses that meet the above criteria		
PLANTBI: All courses of at least 3 units		
PLANTBI C102/ C102L	Course Not Available	4
PLANTBI 110 & 110L	Course Not Available and Course Not Available	0
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4
POL SCI C131A	Applied Econometrics and Public Policy	4
PSYCH 110	Introduction to Biological Psychology	3
PSYCH C112	Course Not Available	
PSYCH C113	Biological Clocks: Physiology and Behavior	3
PSYCH 114	Biology of Learning and Neural Plasticity	3
PSYCH C116	Hormones and Behavior	3
PSYCH 117	Human Neuropsychology	3
PSYCH 119	Course Not Available	3
PSYCH C120	Basic Issues in Cognition	3
PSYCH 121	Animal Cognition	3
PSYCH 122	Introduction to Human Learning and Memory	3
PSYCH C123	Course Not Available	
PSYCH C124	Course Not Available	
PSYCH 125	The Developing Brain	3
PSYCH C126	Perception	3
PSYCH C127	Cognitive Neuroscience	3
PSYCH C129	Scientific Approaches to Consciousness	3
PSYCH 130	Clinical Psychology	3
PSYCH 131	Developmental Psychopathology	3
PSYCH 133	Psychology of Sleep	3
PSYCH 140	Developmental Psychology	3
PSYCH 141	Development During Infancy	3
PSYCH C143	Language Acquisition	3
PSYCH 164	Social Cognition	3
PB HLTH C102	Bacterial Pathogenesis	3
PB HLTH 112	Global Health: A Multidisciplinary Examination	4
PB HLTH 126	Health Economics and Public Policy	3
PB HLTH C129	The Aging Human Brain	3
PB HLTH 140	Introduction to Risk and Demographic Statistics	4
PB HLTH 150A	Introduction to Epidemiology and Human Disease	4
PB HLTH 150B	Introduction to Environmental Health Sciences	3
PB HLTH 162A	Public Health Microbiology	3
PB HLTH C170B	Course Not Available	
PB HLTH C172	Course Not Available	4
PUB POL 101	Introduction to Public Policy Analysis	4
PUB POL 103	Wealth and Poverty	4
PUB POL C103	Wealth and Poverty	4
PUB POL C142	Applied Econometrics and Public Policy	4
PUB POL 184	Course Not Available	4
RHETOR 107	Rhetoric of Scientific Discourse	4
RHETOR 170	Rhetoric of Social Science	4

SOCIOL 105	Research Design and Sociological Methods	5
SOCIOL 106	Quantitative Sociological Methods	4
SOCIOL 107A	Course Not Available	
SOCIOL 107B	Course Not Available	
UGBA 101A	Microeconomic Analysis for Business Decisions	3
UGBA 101B	Macroeconomic Analysis for Business Decisions	3
UGBA 102A	Introduction to Financial Accounting	3
UGBA 102B	Introduction to Managerial Accounting	3
UGBA 106	Marketing	3
UGBA 113	Managerial Economics	3
UGBA 118	International Trade	3
UGBA 119	Leading Strategy Implementation	3
UGBA 120A	Course Not Available	
UGBA 120B	Advanced Financial Accounting	4
UGBA 122	Financial Information Analysis	3
UGBA 126	Auditing	4
UGBA 131	Corporate Finance and Financial Statement Analysis	3
UGBA 132	Financial Institutions and Markets	3
UGBA 133	Investments	3
UGBA 136F	Behavioral Finance	3
UGBA 141	Production and Operations Management	3
UGBA 160	Consumer Behavior	3
UGBA 161	Marketing Research: Tools and Techniques for Data Collection and Analysis	3
UGBA 162	Brand Management and Strategy	3
UGBA 165	Advertising Strategy	3
UGBA 180	Introduction to Real Estate and Urban Land Economics	3

Students who have a strong interest in an area of study outside their major often decide to complete a minor program. These programs have set requirements and are noted officially on the transcript in the memoranda section, but they are not noted on diplomas.

General Guidelines

1. All courses taken to fulfill the minor requirements below must be taken for graded credit.
2. A minimum of three of the upper-division courses taken to fulfill the minor requirements must be completed at UC Berkeley.
3. A minimum grade point average (GPA) of 2.0 is required for courses used to fulfill the minor requirements.
4. Courses used to fulfill the minor requirements may be applied toward the Seven-Course Breadth Requirement, for Letters and Science students.
5. No more than one upper-division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
6. All minor requirements must be completed prior to the last day of finals during the semester in which the student plans to graduate. Students who cannot finish all courses required for the minor by that time should see a College of Letters and Science adviser.
7. All minor requirements must be completed within the unit ceiling. (For further information regarding the unit ceiling, please see the College Requirements tab.)

Requirements

Lower-division Prerequisites		
MATH 1A	Calculus	4
MATH 1B	Calculus	4
MATH 53	Multivariable Calculus	4
MATH 54	Linear Algebra and Differential Equations	4
Upper-division Requirements		
Select one of the following:		
STAT 101 & STAT 102	Course Not Available and Course Not Available	
STAT 134 & STAT 135	Concepts of Probability and Concepts of Statistics	
Electives: Select three courses from the following, one course must have a lab:		
STAT 150	Stochastic Processes	
STAT 151A	Linear Modelling: Theory and Applications	
or STAT 151B	Linear Modelling: Theory and Applications	
STAT 152	Sampling Surveys	
STAT 153	Introduction to Time Series	
STAT 154	Modern Statistical Prediction and Machine Learning	
STAT 155	Game Theory	
STAT 157	Seminar on Topics in Probability and Statistics	
STAT 158	The Design and Analysis of Experiments	

Undergraduate students in the College of Letters and Science must fulfill the following requirements in addition to those required by their major program.

For detailed lists of courses that fulfill college requirements, please see the College of Letters and Sciences (http://guide.berkeley.edu/archive/2014-15/undergraduate/colleges-schools/letters-science) page in this bulletin.

Entry Level Writing

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing Requirement. Fulfillment of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley.

American History and American Institutions

The American History and Institutions requirements are based on the principle that a U.S. resident graduated from an American university should have an understanding of the history and governmental institutions of the United States.

American Cultures

American Cultures is the one requirement that all undergraduate students at Cal need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture of the United States. AC courses offer students

opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

Quantitative Reasoning

The Quantitative Reasoning requirement is designed to ensure that students graduate with basic understanding and competency in math, statistics, or computer science. The requirement may be satisfied by exam or by taking an approved course.

Foreign Language

The Foreign Language requirement may be satisfied by demonstrating proficiency in reading comprehension, writing, and conversation in a foreign language equivalent to the second semester college level, either by passing an exam or by completing approved course work.

Reading and Composition

In order to provide a solid foundation in reading, writing and critical thinking the College requires two semesters of lower division work in composition. Students must complete a first-level reading and composition course by the end of their second semester and a second-level course by the end of their fourth semester.

Breadth Requirements

The undergraduate breadth requirements provide Berkeley students with a rich and varied educational experience outside of their major program. As the foundation of a liberal arts education, breadth courses give students a view into the intellectual life of the University while introducing them to a multitude of perspectives and approaches to research and scholarship. Engaging students in new disciplines and with peers from other majors, the breadth experience strengthens interdisciplinary connections and context that prepares Berkeley graduates to understand and solve the complex issues of their day.

Unit Requirements

- 120 total units, including at least 60 L&S units
- Of the 120 units, 36 must be upper division units
- Of the 36 upper division units, 6 must be taken in courses offered outside your major department

Residence Requirements

For units to be considered in "residence," you must be registered in courses on the Berkeley campus as a student in the College of Letters and Science. Most students automatically fulfill the residence requirement by attending classes here for four years. In general, there is no need to be concerned about this requirement, unless you go abroad for a semester or year or want to take courses at another institution or through University Extension during your senior year. In these cases, you should make an appointment to see an adviser to determine how you can meet the Senior Residence Requirement.

Note: Courses taken through UC Extension do not count toward residence.

Senior Residence Requirement

After you become a senior (with 90 semester units earned toward your B.A. degree), you must complete at least 24 of the remaining 30 units in residence in at least two semesters. To count as residence, a semester must consist of at least 6 passed units. Intercampus Visitor, EAP, and UC Berkeley-Washington Program (UCDC) units are excluded.

You may use a Berkeley summer session to satisfy one semester of the Senior Residence Requirement, provided that you successfully complete 6 units of course work in the Summer Session and that you have been enrolled previously in the College.

Modified Senior Residence Requirement

Participants in the UC Education Abroad Program (EAP) or the UC Berkeley-Washington Program (UCDC) may meet a Modified Senior Residence Requirement by completing 24 (excluding EAP) of their final 60 semester units in residence. At least 12 of these 24 units must be completed after you have completed 90 units.

Upper Division Residence Requirement

You must complete in residence a minimum of 18 units of upper division courses (excluding EAP units), 12 of which must satisfy the requirements for your major.

Mission

Statisticians help to design data collection plans, analyze data appropriately and interpret and draw conclusions from those analyses. The central objective of the undergraduate major in Statistics is to equip students with consequently requisite quantitative skills that they can employ and build on in flexible ways.

Learning Goals for the Major

Majors are expected to learn concepts and tools for working with data and have experience in analyzing real data that goes beyond the content of a service course in statistical methods for non-majors. Majors should understand the following:

1. The fundamentals of probability theory
2. Statistical reasoning and inferential methods
3. Statistical computing
4. Statistical modeling and its limitations

Skills

Graduates should also have skills in the following:

1. Description, interpretation and exploratory analysis of data by graphical and other means
2. Effective communication

Statistics

STAT 0PX Preparatory Statistics 1 Unit
This course assists entering Freshman students with basic statistical concepts and problem solving. Designed for students who do not meet the prerequisites for 2. Offered through the Student Learning Center.
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Summer:
6 weeks - 5 hours of lecture and 4.5 hours of workshop per week
8 weeks - 5 hours of lecture and 4.5 hours of workshop per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Purves

STAT 2 Introduction to Statistics 4 Units
Population and variables. Standard measures of location, spread and association. Normal approximation. Regression. Probability and sampling. Binomial distribution. Interval estimation. Some standard significance tests.
Rules & Requirements

Credit Restrictions: Students who have taken 2X, 5, 20, 21, 21X, or 25 will receive no credit for 2.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 5 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 20 Introduction to Probability and Statistics 4 Units
For students with mathematical background who wish to acquire basic concepts. Relative frequencies, discrete probability, random variables, expectation. Testing hypotheses. Estimation. Illustrations from various fields.
Rules & Requirements

Prerequisites: One semester of calculus

Credit Restrictions: Students who have taken 2, 2X, 5, 21, 21X, or 25 will receive no credit for 20.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 21 Introductory Probability and Statistics for Business 4 Units
Descriptive statistics, probability models and related concepts, sample surveys, estimates, confidence intervals, tests of significance, controlled experiments vs. observational studies, correlation and regression.
Rules & Requirements

Prerequisites: One semester of calculus

Credit Restrictions: Students will receive no credit for Statistics 21 after completing Statistics 2, 2X, 5, 20, 21X or 25 . A deficency in Statistics N21 may be moved by taking 21.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 5 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT W21 Introductory Probability and Statistics for Business 4 Units
Reasoning and fallacies, descriptive statistics, probability models and related concepts, combinatorics, sample surveys, estimates, confidence intervals, tests of significance, controlled experiments vs. observational studies, correlation and regression.
Rules & Requirements

Prerequisites: One semester of calculus

Credit Restrictions: Students will receive no credit for Statistics W21 after taking Statistics 2, 20, or 25.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of web-based lecture per week

Summer: 8 weeks - 7.5 hours of web-based lecture per week

Online: This is an online course.

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: N21

STAT 39D Freshman/Sophomore Seminar 2 - 4 Units
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester.
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

STAT C79 Societal Risks and the Law 3 Units
Defining, perceiving, quantifying and measuring risk; identifying risks and estimating their importance; determining whether laws and regulations can protect us from these risks; examining how well existing laws work and how they could be improved; evaluting costs and benefits. Applications may vary by term. This course cannot be used to complete engineering unit or technical elective requirements for students in the College of Engineering.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Also listed as: COMPSCI C79/POL SCI C79

STAT 94 Special Topics in Probability and Statistics 1 - 4 Units
Topics will vary semester to semester.
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of lecture and 0-2 hours of discussion per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 97 Field Study in Statistics 1 - 3 Units
Supervised experience relevant to specific aspects of statistics in off-campus settings. Individual and/or group meetings with faculty.
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of fieldwork per week

Summer:
6 weeks - 2.5-7.5 hours of fieldwork per week
8 weeks - 1.5-5.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

STAT 98 Directed Group Study 1 - 3 Units
Must be taken at the same time as either Statistics 2 or 21. This course assists lower division statistics students with structured problem solving, interpretation and making conclusions.
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 2-3 hours of directed group study per week

Summer: 8 weeks - 4-6 hours of directed group study per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

STAT 100 Introduction to the SAS System for Data Analysis 1 Unit
The SAS system is useful for reading input data from a variety of sources and then performing a wide range of analyses and graphical displays with the data. Topics include accessing SAS on a variety of computer platforms; inputting raw data; managing SAS data sets; programming in SAS and in the SAS macro language. Emphasis on large data sets. Students are encouraged to bring in their own data. Students should have used at least one program, such as a word processor.
Hours & Format

Summer: 3 weeks - 5 hours of lecture per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Instructor: Spector

STAT 131A Introduction to Probability and Statistics for Life Scientists 4 Units
Ideas for estimation and hypothesis testing basic to applications, including an introduction to probability. Linear estimation and normal regression theory.
Rules & Requirements

Prerequisites: One semester of calculus or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 5 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 132 Practical Machine Learning 3 Units
Machine learning is a collection of topics in which the focus is on large-scale statistical problems where computational issues are paramount. The goal is often one of prediction or classification, where based on a set of labeled data it is desired to predict the lablels of unlabeled data. Machine learning algorithms also often focus on exploratory data analysis. This course will introduce core statistical machine learning algorithms in a non-mathematical way, emphasizing applied problem-solving.
Rules & Requirements

Prerequisites: Some prior exposure to basic probability and to linear algebra

Hours & Format

Summer: 8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

STAT 133 Concepts in Computing with Data 3 Units
An introduction to computationally intensive applied statistics. Topics will include organization and use of databases, visualization and graphics, statistical learning and data mining, model validation procedures, and the presentation of results.
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 10 weeks - 4 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 134 Concepts of Probability 3 Units
An introduction to probability, emphasizing concepts and applications. Conditional expectation, independence, laws of large numbers. Discrete and continuous random variables. Central limit theorem. Selected topics such as the Poisson process, Markov chains, characteristic functions.
Rules & Requirements

Prerequisites: One year of calculus

Credit Restrictions: Students will not receive credit for 134 after taking 101 or 201A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Summer: 8 weeks - 5 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 135 Concepts of Statistics 4 Units
A comprehensive survey course in statistical theory and methodology. Topics include descriptive statistics, maximum likelihood estimation, non-parametric methods, introduction to optimality, goodness-of-fit tests, analysis of variance, bootstrap and computer-intensive methods and least squares estimation. The laboratory includes computer-based data-analytic applications to science and engineering.
Rules & Requirements

Prerequisites: Statistics 134 and linear algebra (Mathematics 54 or equivalent). Statistics 133 strongly recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 150 Stochastic Processes 3 Units
Random walks, discrete time Markov chains, Poisson processes. Further topics such as: continuous time Markov chains, queueing theory, point processes, branching processes, renewal theory, stationary processes, Gaussian processes.
Rules & Requirements

Prerequisites: 101 or 103A or 134

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 151A Linear Modelling: Theory and Applications 4 Units
A coordinated treatment of linear and generalized linear models and their application. Linear regression, analysis of variance and covariance, random effects, design and analysis of experiments, quality improvement, log-linear models for discrete multivariate data, model selection, robustness, graphical techniques, productive use of computers, in-depth case studies.
Rules & Requirements

Prerequisites: 102 or 135. 133 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 151B Linear Modelling: Theory and Applications 4 Units
A coordinated treatment of linear and generalized linear models and their application. Linear regression, analysis of variance and covariance, random effects, design and analysis of experiments, quality improvement, log-linear models for discrete multivariate data, model selection, robustness, graphical techniques, productive use of computers, in-depth case studies.
Rules & Requirements

Prerequisites: 102 or 135. 133 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 152 Sampling Surveys 4 Units
Theory and practice of sampling from finite populations. Simple random, stratified, cluster, and double sampling. Sampling with unequal probabilities. Properties of various estimators including ratio, regression, and difference estimators. Error estimation for complex samples.
Rules & Requirements

Prerequisites: 101 or 134. 133 and 135 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 153 Introduction to Time Series 4 Units
An introduction to time series analysis in the time domain and spectral domain. Topics will include: estimation of trends and seasonal effects, autoregressive moving average models, forecasting, indicators, harmonic analysis, spectra.
Rules & Requirements

Prerequisites: 101, 134 or consent of instructor. 133 or 135 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 154 Modern Statistical Prediction and Machine Learning 4 Units
Theory and practice of statistical prediction. Contemporary methods as extensions of classical methods. Topics: optimal prediction rules, the curse of dimensionality, empirical risk, linear regression and classification, basis expansions, regularization, splines, the bootstrap, model selection, classification and regression trees, boosting, support vector machines. Computational efficiency versus predictive performance. Emphasis on experience with real data and assessing statistical assumptions.
Rules & Requirements

Prerequisites: Mathematics 53 and 54 or equivalents; Statistics 135 or equivalent; experience with some programming language. Mathematics 55 or equivalent exposure to counting arguments is recommended but not required

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Summer: 10 weeks - 4.5 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 155 Game Theory 3 Units
General theory of zero-sum, two-person games, including games in extensive form and continuous games, and illustrated by detailed study of examples.
Rules & Requirements

Prerequisites: 101 or 134

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 157 Seminar on Topics in Probability and Statistics 3 Units
Substantial student participation required. The topics to be covered each semester that the course may be offered will be announced by the middle of the preceding semester; see departmental bulletins. Recent topics include: Bayesian statistics, statistics and finance, random matrix theory, high-dimensional statistics.
Rules & Requirements

Prerequisites: Mathematics 53-54, Statistics 134, 135. Knowledge of scientific computing environment (R or Matlab) often required. Prerequisites might vary with instructor and topics

Repeat rules: Course may be repeated for credit with consent of instructor. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 158 The Design and Analysis of Experiments 4 Units
An introduction to the design and analysis of experiments. This course covers planning, conducting, and analyzing statistically designed experiments with an emphasis on hands-on experience. Standard designs studied include factorial designs, block designs, latin square designs, and repeated measures designs. Other topics covered include the principles of design, randomization, ANOVA, response surface methodoloy, and computer experiments.
Rules & Requirements

Prerequisites: Statistics 134 and 135 or consent of instructor. Statistics 135 may be taken concurrently. Statistics 133 is recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

STAT 159 Reproducible and Collaborative Statistical Data Science 4 Units
A project-based introduction to statistical data analysis. Through case studies, computer laboratories, and a term project, students will learn practical techniques and tools for producing statistically sound and appropriate, reproducible, and verifiable computational answers to scientific questions. Course emphasizes version control, testing, process automation, code review, and collaborative programming. Software tools may include Bash, Git, Python, and LaTeX.
Rules & Requirements

Prerequisites: Statistics 133, Statistics 134, and Statistics 135 (or equivalent)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

STAT H195 Special Study for Honors Candidates 1 - 4 Units
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

STAT 197 Field Study in Statistics 1 - 3 Units
Supervised experience relevant to specific aspects of statistics in off-campus settings. Individual and/or group meetings with faculty.
Rules & Requirements

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of fieldwork per week

Summer:
8 weeks - 2-6 hours of fieldwork per week
10 weeks - 1.5-4.5 hours of fieldwork per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

STAT 198 Directed Study for Undergraduates 1 - 3 Units
Special tutorial or seminar on selected topics.
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of directed group study per week

Summer:
6 weeks - 2.5-7.5 hours of directed group study per week
8 weeks - 1.5-5.5 hours of directed group study per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

STAT 199 Supervised Independent Study and Research 1 - 3 Units
Rules & Requirements

Repeat rules: Course may be repeated for credit. Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-4 hours of independent study per week
8 weeks - 1-3 hours of independent study per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.