Statistics

Bachelor of Arts (BA)

The undergraduate major at Berkeley provides a systematic and thorough grounding in applied and theoretical statistics as well as 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 or industry, or for further academic study in a wide variety of fields. The department has particular strength in Machine Learning, a key ingredient of the emerging field of Data Science. It is also very useful to combine studies of statistics and probability with other subjects. Our department excels at interdisciplinary science, and more than half of the department's undergraduate students are double or 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 apply in the semester they will complete their prerequisites. For applicants with prerequisites in progress, applications will be reviewed after the grades for all prerequisites are available, 2-3 weeks after finals. For applicants who have completed all prerequisites in a previous term, 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.

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

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 & 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.
4. The requirements below apply to freshmen entering Berkeley in Fall 2018, and transfer students entering in Fall 2020. Freshmen students admitted to Berkeley prior to Fall 2018 and transfer students admitted prior to Fall 2020 are required to complete the requirements as published in the 2017-18 Berkeley Academic Guide (http://guide.berkeley.edu/archive/).

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

Prerequisites

Students must earn a minimum 3.2 UC grade point average in the lower division math prerequisites with no lower than a C in each. [1]		
MATH 1A	Calculus	4
MATH 1B	Calculus	4
MATH 53	Multivariable Calculus	4
or MATH H53	Honors Multivariable Calculus	
or MATH N53	Multivariable Calculus	
or MATH W53	Multivariable Calculus	
MATH 54	Linear Algebra and Differential Equations	4
or MATH H54	Honors Linear Algebra and Differential Equations	
or MATH N54	Linear Algebra and Differential Equations	
A minimum C grade in one of the following:		
STAT/COMPSCI/DATA/INFO C8	Foundations of Data Science	4
or STAT 20	Introduction to Probability and Statistics	
A minimum B- grade in one of the following: [2]		
STAT 134	Concepts of Probability	4
or STAT C140	Probability for Data Science	
STAT 135	Concepts of Statistics	4

Upper Division Requirements (Nine Courses)

Core Statistics Courses (3)		
STAT 133	Concepts in Computing with Data	3
STAT 134	Concepts of Probability [3]	4
or STAT C140	Probability for Data Science	
STAT 135	Concepts of Statistics	4
Statistics Electives (3)		
Select three statistics electives from the following; at least one of the selections must have a lab:		10-12
STAT/DATA C102	Data, Inference, and Decisions	4
STAT 150	Stochastic Processes	3
STAT 151A	Linear Modelling: Theory and Applications (LAB COURSE)	4
STAT 152	Sampling Surveys (LAB COURSE)	4
STAT 153	Introduction to Time Series (LAB COURSE)	4
STAT 154	Modern Statistical Prediction and Machine Learning (LAB COURSE)	4
STAT 155	Game Theory	3
STAT 156	Causal Inference	4
STAT 157	Seminar on Topics in Probability and Statistics	3

STAT 158	The Design and Analysis of Experiments (LAB COURSE)	4
STAT 159	Reproducible and Collaborative Statistical Data Science (LAB COURSE)	4
Applied Cluster Courses (3)		
Select three applied cluster courses. See Cluster Course Information and Approved Cluster Courses below the Teaching Option requirements.		9-12

Upper Division Requirements: Teaching Option (Nine Courses)

Core Statistics Courses (3)		
STAT 133	Concepts in Computing with Data	3
STAT 134	Concepts of Probability [3]	4
or STAT C140	Probability for Data Science	
STAT 135	Concepts of Statistics	4
Statistics Electives (2)		
Select two of the following; at least one course must include a lab:		7-8
STAT/DATA C102	Data, Inference, and Decisions	4
STAT 150	Stochastic Processes	3
STAT 151A	Linear Modelling: Theory and Applications (LAB COURSE)	4
STAT 152	Sampling Surveys (LAB COURSE)	4
STAT 153	Introduction to Time Series (LAB COURSE)	4
STAT 154	Modern Statistical Prediction and Machine Learning (LAB COURSE)	4
STAT 155	Game Theory	3
STAT 156	Causal Inference	4
STAT 157	Seminar on Topics in Probability and Statistics	3
STAT 158	The Design and Analysis of Experiments (LAB COURSE)	4
STAT 159	Reproducible and Collaborative Statistical Data Science (LAB COURSE)	4
Teaching Track Cluster (4)		
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	Course Not Available	

Cluster Course Information

Two of the best reasons to study statistics are the immense variety of important and exciting real-world questions we can answer through careful data analysis, as well as the broad range of technical fields with close connections to statistics. No major is complete without encountering the fields that interface closely with statistics.

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 your own Cluster. The courses should have a unifying theme. Picking your own Cluster is a valuable exercise that gives you a chance to explore and refine your interests and to develop a coherent course of study. A pre-approved list has been provided. However, it is not exhaustive. Clusters may consist of courses from more than one department, but at least two must be approved courses from the same department. If students would like to use a course that is not on the list or select three courses from three different departments, the Head Undergraduate Faculty Adviser must approve the proposed cluster.

Economics and Business courses are treated as though they are in the same department for purposes of evaluating clusters. The same is true for courses in EE, CS, and EECS. Likewise, courses concerning social and ethical aspects of statistics including CYPLAN 101, INFO 188, PHILOS 121, and DATA C104 / HISTORY C184D / STS C1040are treated as though they are in the same department even if offered in different departments.

Cluster Guidelines
Courses must be: upper division courses, at least 3 units, and must be taken for a letter grade.

Courses with statistics prerequisites are often acceptable. Courses that are similar to Statistics courses are not acceptable. If an approved cluster course has a credit restriction with another approved course, both cannot be used for the applied cluster (refer to the Berkeley Academic Guide (http://guide.berkeley.edu/courses/) for credit restrictions, click on “read more” under the course description).

Content Criteria:
Generally, to be an acceptable cluster course, a course should meet at least one of the following three criteria:

1. The course centers on questions about ethical data analysis or experimental methodology.
2. The course is focused on a substantive area of natural sciences or social sciences, and includes a significant quantitative or data analysis component as part of the course requirements.
3. The course is in a related technical field like mathematics, computer science, engineering, or operations research.

Sample Clusters

Below is a list of sample clusters for students to consider if they would like an idea of courses to combine for their cluster based on a topic of interest.

- Economics and Finance: Econ 101A, Econ 101B and UGBA 103
- Math: Math 110, Math 104, and Math 128B
- Public Health/Biostatistics graduate school: Math 110, Pb Hlth 150A, and Pb Hlth 150B
- Public Policy: Pub Policy C103, Pub Pol C142/Econ C142/Pol Sci C131A, and Pb Hlth 126
- Social and Ethical Aspects of Statistics: CYPLAN 101, INFO 188, and DATA C104 / HISTORY C184D / STS C1040

Approved Cluster Courses

Of the three applied cluster courses required for the major, at least two must be approved courses from the same department. This is not an exhaustive list.

ANTHRO C100	Course Not Available	5
ANTHRO C103	Course Not Available	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 132A	Analysis of Archaeological Materials: Ceramics	4
ANTHRO 135	Paleoethnobotany: Archaeological Methods and Laboratory Techniques	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 128	Astronomy Data Science Laboratory	4
ASTRON 160	Stellar Physics	4
ASTRON C161	Relativistic Astrophysics and Cosmology	4
ASTRON C162	Planetary Astrophysics	4
BIO ENG 104	Biological Transport Phenomena	4
BIO ENG C112	Molecular Biomechanics and Mechanobiology of the Cell	4
BIO ENG C117	Structural Aspects of Biomaterials	4
BIO ENG C119	Orthopedic Biomechanics	4
BIO ENG C125	Introduction to Robotics	4
BIO ENG C125B	Robotic Manipulation and Interaction	4
BIO ENG 131	Introduction to Computational Molecular and Cell Biology	4
BIO ENG C136L	Laboratory in the Mechanics of Organisms	3
BIO ENG C137	Designing for the Human Body	4
BIO ENG 144	Introduction to Protein Informatics	4
BIO ENG C145L	Introductory Electronic Transducers Laboratory	3
BIO ENG C145M	Introductory Microcomputer Interfacing Laboratory	3
BIO ENG 147	Principles of Synthetic Biology	4
BIO ENG C165	Medical Imaging Signals and Systems	4
BIO ENG C181	The Berkeley Lectures on Energy: Energy from Biomass	3
CHM ENG 140	Introduction to Chemical Process Analysis	4
CHM ENG 141	Chemical Engineering Thermodynamics	4
CHM ENG C195A	The Berkeley Lectures on Energy: Energy from Biomass	3
CHEM C110L	General Biochemistry and Molecular Biology Laboratory	4
CHEM 120A	Physical Chemistry	3
CHEM 120B	Physical Chemistry	3
CHEM C130	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
CHEM C138	The Berkeley Lectures on Energy: Energy from Biomass	3
CY PLAN 101	Introduction to Urban Data Analytics	4
CY PLAN 118AC	The Urban Community	4
CY PLAN 119	Planning for Sustainability	4
CIV ENG 100	Elementary Fluid Mechanics	4
CIV ENG 103	Course Not Available	3
CIV ENG C106	Air Pollution	3
CIV ENG C116	Chemistry of Soils	3
CIV ENG C133	Engineering Analysis Using the Finite Element Method	3
CIV ENG 155	Transportation Systems Engineering	3
COG SCI C100	Basic Issues in Cognition	3
COG SCI C101	Cognitive Linguistics	4
COG SCI C102	Scientific Approaches to Consciousness	3
COG SCI C126	Perception	3
COG SCI C127	Cognitive Neuroscience	3
COG SCI 131	Computational Models of Cognition	4
COG SCI C140	Quantitative Methods in Linguistics	4
COG SCI C147	Course Not Available	3
COMPSCI C149	Course Not Available	4
COMPSCI 152	Computer Architecture and Engineering	4
COMPSCI 160	User Interface Design and Development	4
COMPSCI 161	Computer Security	4
COMPSCI 162	Operating Systems and System Programming	4
COMPSCI 164	Programming Languages and Compilers	4
COMPSCI 168	Introduction to the Internet: Architecture and Protocols	4
COMPSCI 169	Software Engineering	4
COMPSCI 169A	Introduction to Software Engineering	3
COMPSCI W169A	Software Engineering	3
COMPSCI 170	Efficient Algorithms and Intractable Problems	4
COMPSCI 172	Computability and Complexity	4
COMPSCI 176	Algorithms for Computational Biology	4
COMPSCI 182	Designing, Visualizing and Understanding Deep Neural Networks [4]	4
COMPSCI 184	Foundations of Computer Graphics	4
COMPSCI 186	Introduction to Database Systems	4
COMPSCI W186	Introduction to Database Systems	4
COMPSCI 188	Introduction to Artificial Intelligence	4
COMPSCI 189	Introduction to Machine Learning [4]	4
NOT COMPSCI/DATA/STAT C100		
DATA C104	Human Contexts and Ethics of Data - DATA/ History/STS	4
DATA C131A	Statistical Methods for Data Science	4
DATA 144	Data Mining and Analytics	3
DEMOG 110	Introduction to Population Analysis	3
DEMOG C126	Sex, Death, and Data	4
DEMOG C175	Economic Demography	4
DEMOG 180	Social Networks	4
DEMOG 260	Special Topics in Demography Seminar	1-4
EPS 101	Field Geology and Digital Mapping	4
EPS C129	Biometeorology	3
EPS 130	Strong Motion Seismology	3
EPS C146	Course Not Available	4
EPS C162	Planetary Astrophysics	4
EPS C180	Air Pollution	3

EPS C181	Atmospheric Physics and Dynamics	3
ECON 101A	Microeconomics (Math Intensive)	4
ECON 101B	Macroeconomics (Math Intensive)	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 131	Public Economics	4
ECON 136	Financial Economics [6]	4
ECON 138	Financial and Behavioral Economics	4
ECON 139	Asset Pricing and Portfolio Choice	4
ECON 141	Econometrics (Math Intensive)	4
ECON C142	Applied Econometrics and Public Policy	4
ECON 157	Health Economics	4
ECON C171	Development Economics	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 100	Course Not Available	
EL ENG 105	Microelectronic Devices and Circuits	4
EL ENG C106A	Introduction to Robotics	4
EL ENG C106B	Robotic Manipulation and Interaction	4
EL ENG 113	Power Electronics	4
EL ENG 117	Electromagnetic Fields and Waves	4
EL ENG 118	Introduction to Optical Engineering	4
EL ENG 120	Signals and Systems	4
EL ENG 121	Introduction to Digital Communication Systems	4
EL ENG 122	Introduction to Communication Networks	4
EL ENG 123	Digital Signal Processing	4
EL ENG 127	Course Not Available	
EL ENG C128	Feedback Control Systems	4
EL ENG 129	Course Not Available	3
EL ENG 130	Integrated-Circuit Devices	4
EL ENG 134	Fundamentals of Photovoltaic Devices	4
EL ENG 137A	Introduction to Electric Power Systems	4
EL ENG 137B	Introduction to Electric Power Systems	4
EL ENG 140	Linear Integrated Circuits	4
EL ENG 142	Integrated Circuits for Communications	4
EL ENG 143	Microfabrication Technology	4
EL ENG 144	Fundamental Algorithms for Systems Modeling, Analysis, and Optimization	4
EL ENG C145B	Medical Imaging Signals and Systems	4
EL ENG C145L	Introductory Electronic Transducers Laboratory	3
EL ENG C145M	Introductory Microcomputer Interfacing Laboratory	3
EL ENG C145O	Laboratory in the Mechanics of Organisms	3
EL ENG 147	Introduction to Microelectromechanical Systems (MEMS)	3
EL ENG C149	Course Not Available	4
ENE,RES C100	Energy and Society	4
ENE,RES 102	Quantitative Aspects of Global Environmental Problems	4
ENE,RES 131	Data, Environment and Society	4
ENE,RES 175	Water and Development	4
ENE,RES C176	Climate Change Economics	4
ENGIN 115	Course Not Available	4
ENGIN 117	Methods of Engineering Analysis	3
ENGIN 120	Principles of Engineering Economics [6]	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	Agricultural and Environmental Policy	4
ENVECON 142	Industrial Organization with Applications to Agriculture and Natural Resources	4
ENVECON 143	Economics of Innovation and Intellectual Property	4
ENVECON 145	Health and Environmental Economic Policy	4
ENVECON 147	Regulation of Energy and the Environment	4
ENVECON C151	Development Economics	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 C176	Climate Change Economics	4
ENVECON C181	International Trade	4
ENVECON C183	Forest Ecosystem Management	4
ESPM 100	Environmental Problem Solving	4
ESPM 102A	Course Not Available	4
ESPM 102C	Resource Management	4
ESPM 102D	Climate and Energy Policy	4
ESPM C103	Principles of Conservation Biology	4
ESPM C104	Modeling and Management of Biological Resources	4
ESPM C107	Biology and Geomorphology of Tropical Islands	13
ESPM 108A	Trees: Taxonomy, Growth, and Structures	3
ESPM 108B	Environmental Change Genetics	3
ESPM 111	Ecosystem Ecology	4
ESPM 112	Microbial Ecology	3
ESPM 114	Wildlife Ecology	3
ESPM 115C	Fish Ecology	3
ESPM 116B	Grassland and Woodland Ecology	4
ESPM 116C	Tropical Forest Ecology	3
ESPM 117	Urban Garden Ecosystems	4
ESPM 118	Agricultural Ecology	4
ESPM 120	Science of Soils	3

ESPM 121	Development and Classification of Soils	3
ESPM C126	Animal Behavior	4
ESPM C128	Chemistry of Soils	3
ESPM C129	Biometeorology	3
ESPM 131	Soil Microbiology and Biogeochemistry	3
ESPM 132	Spider Biology	4
ESPM C138	Introduction to Comparative Virology	4
ESPM 140	General Entomology	4
ESPM 142	Insect Behavior	3
ESPM 144	Insect Physiology	3
ESPM C148	Pesticide Chemistry and Toxicology	3
ESPM C149	Course Not Available	4
ESPM 152	Global Change Biology	3
ESPM C159	Course Not Available	4
ESPM 165	International Rural Development Policy	4
ESPM 166	Course Not Available	4
ESPM 172	Remote Sensing of the Environment	3
ESPM 173	Introduction to Ecological Data Analysis	3
ESPM C177	GIS and Environmental Spatial Data Analysis	4
ESPM C180	Air Pollution	3
ESPM 181A	Fire Ecology	3
ESPM 182	Forest Operations Management	3
ESPM 183	Forest Ecosystem Management and Planning	4
ESPM C183	Forest Ecosystem Management	4
ESPM 185	Applied Forest Ecology	4
ESPM 186	Grassland and Woodland Management and Conservation	4
ESPM 187	Restoration Ecology	4
GEOG C136	Terrestrial Hydrology	4
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	3
GEOG C145	Course Not Available	4
GEOG 148	Course Not Available	4
GEOG 187	Geographic Information Analysis	4
GEOG C188	Geographic Information Systems	4
HISTORY C184D	Human Contexts and Ethics of Data - DATA/ History/STS	4
IND ENG 115	Industrial and Commercial Data Systems	3
IND ENG 130	Methods of Manufacturing Improvement	3
IND ENG 131	Course Not Available	
IND ENG 135	Applied Data Science with Venture Applications	3
IND ENG 142	Introduction to Machine Learning and Data Analytics [4]	3
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	Nonlinear and Discrete Optimization [8]	3
IND ENG 162	Linear Programming and Network Flows [8]	3
IND ENG 166	Decision Analytics	3
IND ENG 170	Industrial Design and Human Factors	3
IND ENG 221	Introduction to Financial Engineering	3
IND ENG 222	Financial Engineering Systems I	3
NOT Ind Eng 165, Ind Eng 171, Ind Eng 172 or Ind Eng 173		
INFO 154	Course Not Available	3
INFO 159	Natural Language Processing	4
INFO 188	Behind the Data: Humans and Values	3
INFO 213	User Interface Design and Development	4
INFO 232	Applied Behavioral Economics for Information Systems	3
INFO 247	Information Visualization and Presentation	4
INFO 253	Course Not Available	3
INFO 256	Applied Natural Language Processing	3
INFO 257	Database Management	3
INFO 271B	Quantitative Research Methods for Information Systems and Management	3
INFO 272	Qualitative Research Methods for Information Systems and Management	3
INTEGBI 102LF	Introduction to California Plant Life with Laboratory	4
INTEGBI 103LF	Invertebrate Zoology with Laboratory	5
INTEGBI 104LF	Natural History of the Vertebrates with Laboratory	5
INTEGBI 106A	Physical and Chemical Environment of the Ocean	4
INTEGBI C107L	Principles of Plant Morphology with Laboratory	4
INTEGBI C109	Evolution and Ecology of Development	3
INTEGBI C110L	Biology of Fungi with Laboratory	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	Organismal Microbiomes and Host-Pathogen Interactions	4
INTEGBI 119	Evaluating Scientific Evidence in Medicine	3
INTEGBI 123AL	Exercise and Environmental Physiology with Laboratory	5
INTEGBI C125L	Introduction to the Biomechanical Analysis of Human Movement	4
INTEGBI 128	Sports Medicine	3
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 C135L	Laboratory in the Mechanics of Organisms	3
INTEGBI 137	Human Endocrinology	4
INTEGBI 138	Comparative Endocrinology	4
INTEGBI 139	The Neurobiology of Stress	4
INTEGBI 140	Biology of Human Reproduction	4
INTEGBI C142L	Course Not Available	
INTEGBI C143A	Biological Clocks: Physiology and Behavior	3
INTEGBI C143B	Hormones and Behavior	3
INTEGBI C144	Animal Behavior	4
INTEGBI 146LF	Behavioral Ecology with Laboratory	5
INTEGBI 148	Comparative Animal Physiology	3
INTEGBI C149	Course Not Available	

INTEGBI 151	Plant Physiological Ecology	4
INTEGBI 152	Environmental Toxicology	4
INTEGBI 153	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 164	Human Genetics and Genomics	4
INTEGBI 166	Course Not Available	
INTEGBI 168L	Plants: Diversity and Evolution	4
INTEGBI 169	Evolutionary Medicine	4
INTEGBI 173LF	Mammalogy with Laboratory	5
INTEGBI 174LF	Ornithology with Laboratory	4
INTEGBI 175LF	Herpetology with Laboratory	4
INTEGBI 181L	Paleobotany - The 500-Million Year History of a Greening Planet	4
INTEGBI 183L	Evolution of the Vertebrates with Laboratory	4
INTEGBI 184L	Morphology of the Vertebrate Skeleton with Laboratory	4
INTEGBI C185L	Course Not Available	
INTEGBI C187	Human Biogeography of the Pacific	3
IAS C175	The Economics of Climate Change	4
IAS C176	Climate Change Economics	4
LD ARCH 122	Hydrology for Planners	4
LD ARCH C177	GIS and Environmental Spatial Data Analysis	4
LD ARCH C188	Geographic Information Systems	4
L & S C180U	Wealth and Poverty	4
LEGALST 123	Data, Prediction & Law	4
LINGUIS 100	Introduction to Linguistic Science	4
LINGUIS C105	Cognitive Linguistics	4
LINGUIS 110	Phonetics	4
LINGUIS 113	Experimental Phonetics	3
LINGUIS 140	Field Methods	3
LINGUIS C146	Language Acquisition	3
LINGUIS C147	Course Not Available	
LINGUIS C160	Quantitative Methods in Linguistics	4
MATH C103	Introduction to Mathematical Economics	4
MATH 104	Introduction to Analysis	4
MATH H104	Honors Introduction to Analysis	4
MATH 105	Second Course in Analysis	4
MATH 110	Linear Algebra [7]	4
MATH H110	Honors Linear Algebra [7]	4
MATH 113	Introduction to Abstract Algebra	4
MATH H113	Honors Introduction to Abstract Algebra	4
MATH 114	Second Course in Abstract Algebra	4
MATH 115	Introduction to Number Theory	4
MATH 116	Cryptography	4
MATH 118	Fourier Analysis, Wavelets, and Signal Processing	4
MATH 121A	Mathematical Tools for the Physical Sciences	4
MATH 121B	Mathematical Tools for the Physical Sciences	4
MATH 123	Ordinary Differential Equations	4
MATH 125A	Mathematical Logic	4
MATH 126	Introduction to Partial Differential Equations	4
MATH 127	Mathematical and Computational Methods in Molecular Biology	4
MATH 128A	Numerical Analysis	4
MATH 128B	Numerical Analysis	4
MATH 130	Groups and Geometries	4
MATH 135	Introduction to the Theory of Sets	4
MATH 136	Incompleteness and Undecidability	4
MATH 140	Metric Differential Geometry	4
MATH 141	Elementary Differential Topology	4
MATH 142	Elementary Algebraic Topology	4
MATH 143	Elementary Algebraic Geometry	4
MATH 170	Mathematical Methods for Optimization [8]	4
MATH 172	Combinatorics	4
MATH 185	Introduction to Complex Analysis	4
MATH H185	Honors Introduction to Complex Analysis	4
MATH 189	Mathematical Methods in Classical and Quantum Mechanics	4
MATH 221	Advanced Matrix Computations	4
MEC ENG 101	Introduction to Lean Manufacturing Systems	3
MEC ENG 102A	Course Not Available	4
MEC ENG 102B	Mechatronics Design	4
MEC ENG 104	Engineering Mechanics II	3
MEC ENG 106	Fluid Mechanics	3
MEC ENG 107	Course Not Available	3
MEC ENG 108	Mechanical Behavior of Engineering Materials	4
MEC ENG 109	Heat Transfer	3
MEC ENG 110	Introduction to Product Development	3
MEC ENG C115	Molecular Biomechanics and Mechanobiology of the Cell	4
MEC ENG C117	Structural Aspects of Biomaterials	4
MEC ENG 118	Introduction to Nanotechnology and Nanoscience	3
MEC ENG 119	Introduction to MEMS (Microelectromechanical Systems)	3
MEC ENG 120	Computational Biomechanics Across Multiple Scales	3
MEC ENG 122	Processing of Materials in Manufacturing	3
MEC ENG 130	Design of Planar Machinery	3
MEC ENG 131	Vehicle Dynamics and Control	4
MEC ENG 132	Dynamic Systems and Feedback	3
MEC ENG 133	Mechanical Vibrations	3
MEC ENG C134	Feedback Control Systems	4
MEC ENG 135	Design of Microprocessor-Based Mechanical Systems	4
MEC ENG 138	Introduction to Micro/Nano Mechanical Systems Laboratory	3
MEC ENG 140	Combustion Processes	3
MEC ENG 146	Energy Conversion Principles	3

MEC ENG 150A	Solar-Powered Vehicles: Analysis, Design and Fabrication	3
MEC ENG 151	Advanced Heat Transfer	3
MEC ENG 163	Engineering Aerodynamics	3
MEC ENG 164	Marine Statics and Structures	3
MEC ENG 165	Ocean-Environment Mechanics	3
MEC ENG 167	Microscale Fluid Mechanics	3
MEC ENG 168	Mechanics of Offshore Systems	3
MEC ENG 170	Engineering Mechanics III	3
MEC ENG 173	Fundamentals of Acoustics	3
MEC ENG 175	Intermediate Dynamics	3
MEC ENG C176	Orthopedic Biomechanics	4
MEC ENG C178	Designing for the Human Body	4
MEC ENG C180	Engineering Analysis Using the Finite Element Method	3
MEC ENG 185	Introduction to Continuum Mechanics	3
MCELLBI 100B	Biochemistry: Pathways, Mechanisms, and Regulation	4
MCELLBI C100A	Biophysical Chemistry: Physical Principles and the Molecules of Life	4
MCELLBI 102	Survey of the Principles of Biochemistry and Molecular Biology	4
MCELLBI C103	Bacterial Pathogenesis	3
MCELLBI 104	Genetics, Genomics, and Cell Biology	4
MCELLBI 110	Molecular Biology: Macromolecular Synthesis and Cellular Function	4
MCELLBI C110L	General Biochemistry and Molecular Biology Laboratory	4
MCELLBI C112	General Microbiology	4
MCELLBI C114	Introduction to Comparative Virology	4
MCELLBI C116	Microbial Diversity	3
MCELLBI 130	Cell and Systems Biology	4
MCELLBI 132	Biology of Human Cancer	4
MCELLBI 133L	Physiology and Cell Biology Laboratory	4
MCELLBI C134	Chromosome Biology/Cytogenetics	3
MCELLBI 135A	Topics in Cell and Developmental Biology: Molecular Endocrinology	3
MCELLBI 136	Physiology	4
MCELLBI 137L	Physical Biology of the Cell	4
MCELLBI 140	General Genetics	4
MCELLBI 140L	Genetics Laboratory	4
MCELLBI 141	Developmental Biology	4
MCELLBI 143	Evolution of Genomes, Cells, and Development	3
MCELLBI C148	Microbial Genomics and Genetics	4
MCELLBI 149	The Human Genome	3
MCELLBI 150	Molecular Immunology	4
MCELLBI 150L	Immunology Laboratory	4
MCELLBI 160	Cellular and Molecular Neurobiology	4
MCELLBI 160L	Neurobiology Laboratory	4
MCELLBI 161	Circuit, Systems and Behavioral Neuroscience	4
MCELLBI 163L	Mammalian Neuroanatomy Lab	4
MCELLBI 165	Neurobiology of Disease	3
MCELLBI 166	Biophysical Neurobiology	3
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
MUSIC 109M	Music Cognition: The Mind Behind the Musical Ear	3
NUC ENG 100	Introduction to Nuclear Energy and Technology	3
NUC ENG 130	Analytical Methods for Non-proliferation	3
NUC ENG 175	Methods of Risk Analysis	3
NUSCTX 103	Nutrient Function and Metabolism	4
NUSCTX 110	Toxicology	4
NUSCTX C114	Pesticide Chemistry and Toxicology	3
NUSCTX 121	Computational Toxicology	3
NUSCTX C159	Course Not Available	4
PHILOS 121	Moral Questions of Data Science	4
PHILOS 128	Philosophy of Science	4
PHILOS 140A	Intermediate Logic	4
PHILOS 140B	Intermediate Logic	4
PHILOS 142	Philosophical Logic	4
PHILOS 143	Modal Logic	4
PHILOS 146	Philosophy of Mathematics	4
PHYS ED C129	Human Physiological Assessment	3
PHYS ED C165	Introduction to the Biomechanical Analysis of Human Movement	4
PHYSICS 105	Analytic Mechanics	4
PHYSICS 110A	Electromagnetism and Optics	4
PHYSICS 110B	Electromagnetism and Optics	4
PHYSICS 111A	Instrumentation Laboratory	4
PHYSICS 111B	Advanced Experimentation Laboratory (only when taken for 3 units)	3
PHYSICS 112	Introduction to Statistical and Thermal Physics	4
PHYSICS 129	Particle Physics	4
PHYSICS 130	Quantum and Nonlinear Optics	3
PHYSICS 137A	Quantum Mechanics	4
PHYSICS 137B	Quantum Mechanics	4
PHYSICS 138	Modern Atomic Physics	3
PHYSICS 139	Special Relativity and General Relativity	3
PHYSICS 141A	Solid State Physics	4
PHYSICS 141B	Solid State Physics	3
PHYSICS 142	Introduction to Plasma Physics	4
PHYSICS 151	Elective Physics: Special Topics	3
PHYSICS C161	Relativistic Astrophysics and Cosmology	4
PHYSICS 177	Principles of Molecular Biophysics	3
PLANTBI 101L	Experimental Plant Biology Laboratory	3
PLANTBI C103	Bacterial Pathogenesis	3
PLANTBI C107L	Principles of Plant Morphology with Laboratory	4
PLANTBI C109	Evolution and Ecology of Development	3
PLANTBI C110L	Biology of Fungi with Laboratory	4
PLANTBI C112	General Microbiology	4
PLANTBI 113	California Mushrooms	3
PLANTBI C114	Introduction to Comparative Virology	4
PLANTBI C116	Microbial Diversity	3
PLANTBI 120 & 120L	Biology of Algae and Laboratory for Biology of Algae	4

PLANTBI C124	The Berkeley Lectures on Energy: Energy from Biomass	3
PLANTBI C134	Chromosome Biology/Cytogenetics	3
PLANTBI 135	Physiology and Biochemistry of Plants	3
PLANTBI C148	Microbial Genomics and Genetics	4
PLANTBI 150	Plant Cell Biology	3
PLANTBI 160	Plant Molecular Genetics	3
PLANTBI 165	Plant-Microbe Interactions	3
PLANTBI 185	Techniques in Light Microscopy	3
PLANTBI 190	Special Topics in Plant and Microbial Biology (only when taken for 3-4 units)	3-4
POL SCI C131A	Applied Econometrics and Public Policy	4
POL SCI 133	Selected Topics in Quantitative Methods	4
PSYCH 110	Introduction to Biological Psychology	3
PSYCH C113	Biological Clocks: Physiology and Behavior	3
PSYCH 114	Biology of Learning	3
PSYCH C116	Hormones and Behavior	3
PSYCH 117	Human Neuropsychology	3
PSYCH C120	Basic Issues in Cognition	3
PSYCH 121	Animal Cognition	3
PSYCH 122	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 150	Psychology of Personality	3
PSYCH 164	Social Cognition	3
PB HLTH C102	Course Not Available	
PB HLTH 112	Global Health: A Multidisciplinary Examination	4
PB HLTH 126	Health Economics and Public Policy	3
PB HLTH 129	The Aging Human Brain	3
PB HLTH 150A	Introduction to Epidemiology and Human Disease	4
PB HLTH 150B	Human Health and the Environment in a Changing World	3
PB HLTH 162A	Public Health Microbiology	4
PB HLTH 170B	Course Not Available	3
PB HLTH 250A	Epidemiologic Methods I	3
PB HLTH 252B	Infectious Disease Modeling (only when taken for 3-4 units)	3-4
NOT Pb Hlth 141, 142, 142AB, W142, or 145		
PUB POL 101	Introduction to Public Policy Analysis	4
PUB POL C103	Wealth and Poverty	4
PUB POL C142	Applied Econometrics and Public Policy	4
PUB POL C184	Energy and Society	4
RHETOR 107	Rhetoric of Scientific Discourse	4
RHETOR 170	Rhetoric of Social Science	4
STS C104D	Human Contexts and Ethics of Data - DATA/ History/STS	4
SOCIOL 105	Research Design and Sociological Methods	5
SOCIOL 106	Quantitative Sociological Methods	4
SOCIOL 108	Advanced Methods: In-depth Interviewing	4
UGBA 101A	Microeconomic Analysis for Business Decisions	3
UGBA 101B	Macroeconomic Analysis for Business Decisions	3
UGBA 102A	Financial Accounting [5]	3
UGBA 102B	Managerial Accounting [5]	3
UGBA 103	Introduction to Finance [6]	4
UGBA 106	Marketing [5]	3
UGBA 118	International Trade	3
UGBA 119	Course Not Available	
UGBA 120AA	Intermediate Financial Accounting 1	4
UGBA 120AB	Intermediate Financial Accounting 2	4
UGBA 120B	Advanced Financial Accounting	4
UGBA 122	Financial Information Analysis	4
UGBA 126	Auditing	4
UGBA 131	Corporate Finance and Financial Statement Analysis	3
UGBA 131A	Corporate Strategy and Valuation	3
UGBA 132	Financial Institutions and Markets	3
UGBA 133	Investments	3
UGBA 134	Introduction to Financial Engineering	3
UGBA 136F	Behavioral Finance	3
UGBA 141	Production and Operations Management	2-3
UGBA 160	Customer Insights	3
UGBA 161	Market Research: Tools and Techniques for Data Collection and Analysis	3
UGBA 162	Brand Management and Strategy	3
UGBA 165	Advertising Strategy	3
UGBA 169	Pricing	3
UGBA 180	Introduction to Real Estate and Urban Land Economics	3
UGBA 183	Introduction to Real Estate Finance	3
UGBA 184	Urban and Real Estate Economics	3

1 Students who have completed any of the math prerequisites at a non-UC institution should look at the Statistics Major Frequently Asked Questions (http://statistics.berkeley.edu/programs/undergrad/major/faq/) on the Statistics Department website.

2 No more than one course repeated between STAT 134 (or STAT C140) and STAT 135.

3 Other non-statistics UC Berkeley courses, such as IND ENG 172, cannot be used to fulfill this requirement.

4 Due to overlap of course content, only one course from STAT 154, COMPSCI 182, COMPSCI 189, and IND ENG 142 can be used to satisfy Statistics major requirements.

5 Students may use UGBA 102A and/or UGBA 102B for their cluster, but may NOT use UC Berkeley Extension's XB102A nor XB102B since, effective Spring 2014, the Haas School of Business no longer deems them equivalent (see http://www.haas.berkeley.edu/Undergrad/ugbacourses.html).

[6] Due to overlap of course content, only one course from ECON 136, ENGIN 120 and UGBA 103 can be used to satisfy Statistics major requirements.

[7] If MATH 110 or MATH H110 has been used to satisfy the math prerequisite requirement, course cannot be used for the applied cluster.

[8] MATH 170 cannot be combined with either IND ENG 160 or IND ENG 162.

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 minors must be declared no later than one semester before a student's Expected Graduation Term (EGT). If the semester before EGT is fall or spring, the deadline is the last day of RRR week. If the semester before EGT is summer, the deadline is the final Friday of Summer Sessions. To declare a minor, contact the department advisor for information on requirements, and the declaration process.
2. All courses taken to fulfill the minor requirements below must be taken for graded credit.
3. A minimum of three of the upper division courses taken to fulfill the minor requirements must be completed at UC Berkeley.
4. A minimum grade point average (GPA) of 2.0 is required for courses used to fulfill the minor requirements.
5. Courses used to fulfill the minor requirements may be applied toward the Seven-Course Breadth requirement, for Letters & Science students.
6. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
7. 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 & Science adviser.
8. 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
or MATH N1A	Calculus	
MATH 1B	Calculus	4
or MATH N1B	Calculus	
or MATH H1B	Honors Calculus	
MATH 53	Multivariable Calculus	4
or MATH H53	Honors Multivariable Calculus	
or MATH N53	Multivariable Calculus	
or MATH W53	Multivariable Calculus	
MATH 54	Linear Algebra and Differential Equations	4
or MATH H54	Honors Linear Algebra and Differential Equations	
or MATH N54	Linear Algebra and Differential Equations	
Upper Division Requirements		
STAT 134	Concepts of Probability	4
or STAT C140	Probability for Data Science	
STAT 135	Concepts of Statistics	4
Select three statistics electives from the following; at least one of the selections must have a lab:		
STAT C102	Data, Inference, and Decisions	4
STAT 150	Stochastic Processes	3
STAT 151A	Linear Modelling: Theory and Applications (LAB COURSE)	4
STAT 152	Sampling Surveys (LAB COURSE)	4
STAT 153	Introduction to Time Series (LAB COURSE)	4
STAT 154	Modern Statistical Prediction and Machine Learning (LAB COURSE)	4
STAT 155	Game Theory	3
STAT 156	Causal Inference	4
STAT 157	Seminar on Topics in Probability and Statistics	3
STAT 158	The Design and Analysis of Experiments (LAB COURSE)	4
STAT 159	Reproducible and Collaborative Statistical Data Science (LAB COURSE)	4

Undergraduate students must fulfill the following requirements in addition to those required by their major program.

For detailed lists of courses that fulfill college requirements, please review the College of Letters & Sciences (http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/) page in this Guide. For College advising appointments, please visit the L&S Advising (https://lsadvising.berkeley.edu/home/) Pages.

University of California Requirements

Entry Level Writing **(**http://writing.berkeley.edu/node/78/**)**

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 **(**http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/american-history-institutions-requirement/**)**

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

Berkeley Campus Requirement

American Cultures **(**http://americancultures.berkeley.edu/students/courses/**)**

All undergraduate students at Cal need to take and pass this course 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.

College of Letters & Science Essential Skills Requirements

Quantitative Reasoning **(**http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/quantitative-reasoning-requirement/**)**

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 **(**http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/foreign-language-requirement/**)**

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 **(**http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/reading-composition-requirement/**)**

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

College of Letters & Science 7 Course Breadth Requirements

Breadth Requirements **(**http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/#breadthrequirementstext**)**

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
- 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 & 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 UC Extension during your senior year. In these cases, you should make an appointment to meet 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 BA 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), Berkeley Summer Abroad, 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 UCEAP 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

Major Maps help undergraduate students discover academic, co-curricular, and discovery opportunities at UC Berkeley based on intended major or field of interest. Developed by the Division of Undergraduate Education in collaboration with academic departments, these experience maps will help you:

- **Explore** your major and gain a better understanding of your field of study

- **Connect** with people and programs that inspire and sustain your creativity, drive, curiosity and success
- **Discover** opportunities for independent inquiry, enterprise, and creative expression
- **Engage** locally and globally to broaden your perspectives and change the world
- **Reflect** on your academic career and prepare for life after Berkeley

Use the major map below as a guide to planning your undergraduate journey and designing your own unique Berkeley experience.

View the Statistics Major Map PDF. **(**https://vcue.berkeley.edu/sites/default/files/statistics.pdf**)**

Statistics

Expand all course descriptions [+]Collapse all course descriptions [-]

STAT 0PX Preparatory Statistics 1 Unit

Terms offered: Summer 2016 10 Week Session, Summer 2015 10 Week Session, Summer 2014 10 Week Session
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.
Preparatory Statistics: Read More [+]
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

Preparatory Statistics: Read Less [-]

STAT 2 Introduction to Statistics 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
Population and variables. Standard measures of location, spread and association. Normal approximation. Regression. Probability and sampling. Interval estimation. Some standard significance tests.
Introduction to Statistics: Read More [+]
Rules & Requirements

Credit Restrictions: Students will receive no credit for STAT 2 after completing STAT W21, STAT 20, STAT 21, STAT 25, STAT S2, STAT 21X, STAT N21, STAT 5, or STAT 2X.

Hours & Format

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

Summer:
6 weeks - 7.5 hours of lecture and 5 hours of laboratory per week
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.

Introduction to Statistics: Read Less [-]

STAT C8 Foundations of Data Science 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022, Fall 2021, Summer 2021 8 Week Session, Fall 2020
Foundations of data science from three perspectives: inferential thinking, computational thinking, and real-world relevance. Given data arising from some real-world phenomenon, how does one analyze that data so as to understand that phenomenon? The course teaches critical concepts and skills in computer programming and statistical inference, in conjunction with hands-on analysis of real-world datasets, including economic data, document collections, geographical data, and social networks. It delves into social and legal issues surrounding data analysis, including issues of privacy and data ownership.
Foundations of Data Science: Read More [+]
Rules & Requirements

Prerequisites: This course may be taken on its own, but students are encouraged to take it concurrently with a data science connector course (numbered 88 in a range of departments)

Credit Restrictions: Students will receive no credit for DATA C8\COMPSCI C8\INFO C8\STAT C8 after completing COMPSCI 8, or DATA 8. A deficient grade in DATA C8\COMPSCI C8\INFO C8\STAT C8 may be removed by taking COMPSCI 8, COMPSCI 8, or DATA 8.

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.

Formerly known as: Computer Science C8/Statistics C8/Information C8

Also listed as: COMPSCI C8/DATA C8/INFO C8

Foundations of Data Science: Read Less [-]

STAT 20 Introduction to Probability and Statistics 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Introduction to Probability and Statistics: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 1A, Mathematics 16A, Mathematics 10A/10B, or consent of instructor.,One semester of calculus

Credit Restrictions: Students will receive no credit for STAT 20 after completing STAT W21, STAT 2, STAT 5, STAT 21, STAT N21, STAT 2X, STAT S20, STAT 21X, or STAT 25. A deficient grade in STAT 20 may be removed by taking STAT W21, STAT 21, or STAT N21.,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.

Introduction to Probability and Statistics: Read Less [-]

STAT 20 Introduction to Probability and Statistics 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Introduction to Probability and Statistics: Read More [+]
Rules & Requirements

Prerequisites: Mathematics 1A, Mathematics 16A, Mathematics 10A/10B, or consent of instructor.,One semester of calculus

Credit Restrictions: Students will receive no credit for STAT 20 after completing STAT W21, STAT 2, STAT 5, STAT 21, STAT N21, STAT 2X, STAT S20, STAT 21X, or STAT 25. A deficient grade in STAT 20 may be removed by taking STAT W21, STAT 21, or STAT N21.,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.

Introduction to Probability and Statistics: Read Less [-]

STAT 21 Introductory Probability and Statistics for Business 4 Units

Terms offered: Summer 2022 8 Week Session, Fall 2016, Fall 2015
Descriptive statistics, probability models and related concepts, sample surveys, estimates, confidence intervals, tests of significance, controlled experiments vs. observational studies, correlation and regression.
Introductory Probability and Statistics for Business: Read More [+]
Rules & Requirements

Prerequisites: One semester of calculus

Credit Restrictions: Students will receive no credit for STAT 21 after completing STAT 20, STAT W21, STAT 25, STAT 2X, STAT 21X, STAT S21, STAT 5, STAT 2, or STAT N21. A deficient grade in STAT 21 may be removed by taking STAT 20, STAT W21, or STAT N21.

Hours & Format

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

Summer: 8 weeks - 7.5 hours of lecture per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

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

Introductory Probability and Statistics for Business: Read Less [-]

STAT W21 Introductory Probability and Statistics for Business 4 Units

Terms offered: Summer 2021 8 Week Session, Summer 2020 8 Week Session, Summer 2019 8 Week Session
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.
Introductory Probability and Statistics for Business: Read More [+]
Rules & Requirements

Prerequisites: One semester of calculus

Credit Restrictions: Students will receive no credit for Statistics W21 after completing Statistics 2, 20, 21, N21 or 25. A deficient grade in Statistics 21, N21 maybe removed by taking Statistics W21.

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

Introductory Probability and Statistics for Business: Read Less [-]

STAT 24 Freshman Seminars 1 Unit

Terms offered: Spring 2021, Fall 2016, Fall 2003
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley seminars are offered in all campus departments, and topics vary from department to department and semester to semester. Enrollment limited to 15 freshmen.
Freshman Seminars: Read More [+]
Rules & Requirements

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

Hours & Format

Fall and/or spring: 15 weeks - 1 hour 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.

Freshman Seminars: Read Less [-]

STAT 33A Introduction to Programming in R 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2021
An introduction to the R statistical software for students with minimal prior experience with programming. This course prepares students for data analysis with R. The focus is on the computational model that underlies the R language with the goal of providing a foundation for coding. Topics include data types and structures, such as vectors, data frames and lists; the REPL evaluation model; function calls, argument matching, and environments; writing simple functions and control flow. Tools for reading, analyzing, and plotting data are covered, such as data input/output, reshaping data, the formula language, and graphics models.
Introduction to Programming in R: Read More [+]
Rules & Requirements

Credit Restrictions: Students will receive no credit for STAT 33A after completing STAT 33B, or STAT 133. A deficient grade in STAT 33A may be removed by taking STAT 33B, or STAT 133.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 1 hour of laboratory per week

Summer: 6 weeks - 2 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.

Introduction to Programming in R: Read Less [-]

STAT 33B Introduction to Advanced Programming in R 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2021
The course is designed primarily for those who are already familiar with programming in another language, such as python, and want to understand how R works, and for those who already know the basics of R programming and want to gain a more in-depth understanding of the language in order to improve their coding. The focus is on the underlying paradigms in R, such as functional programming, atomic vectors, complex data structures, environments, and object systems. The goal of this course is to better understand programming principles in general and to write better R code that capitalizes on the language's design.
Introduction to Advanced Programming in R: Read More [+]
Rules & Requirements

Prerequisites: Compsci 61A or equivalent programming background

Credit Restrictions: Students will receive no credit for STAT 33B after completing STAT 133. A deficient grade in STAT 33B may be removed by taking STAT 133.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 1 hour of laboratory per week

Summer: 6 weeks - 2 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.

Introduction to Advanced Programming in R: Read Less [-]

STAT 39D Freshman/Sophomore Seminar 2 - 4 Units

Terms offered: Fall 2008, Fall 2007
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.
Freshman/Sophomore Seminar: Read More [+]
Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit without restriction.

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.

Freshman/Sophomore Seminar: Read Less [-]

STAT C79 Societal Risks and the Law 3 Units

Terms offered: Spring 2013
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.
Societal Risks and the Law: Read More [+]
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

Societal Risks and the Law: Read Less [-]

STAT C88S Probability and Mathematical Statistics in Data Science 3 Units

Terms offered: Fall 2022
In this connector course we will state precisely and prove results discovered while exploring data in Data 8. Topics include: probability, conditioning, and independence; random variables; distributions and joint distributions; expectation, variance, tail bounds; Central Limit Theorem; symmetries in random permutations; prior and posterior distributions; probabilistic models; bias-variance tradeoff; testing hypotheses; correlation and the regression model.
Probability and Mathematical Statistics in Data Science: Read More [+]
Rules & Requirements

Prerequisites: Prerequisite: one semester of calculus at the level of Math 16A, Math 10A, or Math 1A. Corequisite or Prerequisite: Foundations of Data Science (COMPSCI C8 / DATA C8 / INFO C8 / STAT C8)

Credit Restrictions: Students will receive no credit for STAT 88 after completing STAT 134, STAT C140, STAT 135, or STAT 102.

Hours & Format

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

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

Additional Details

Subject/Course Level: Statistics/Undergraduate

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

Formerly known as: Statistics 88

Also listed as: DATA C88S

Probability and Mathematical Statistics in Data Science: Read Less [-]

STAT 89A Linear Algebra for Data Science 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
An introduction to linear algebra for data science. The course will cover introductory topics in linear algebra, starting with the basics; discrete probability and how prob- ability can be used to understand high-dimensional vector spaces; matrices and graphs as popular mathematical structures with which to model data (e.g., as models for term-document corpora, high-dimensional regression problems, ranking/classification of web data, adjacency properties of social network data, etc.); and geometric approaches to eigendecompositions, least-squares, principal components analysis, etc.
Linear Algebra for Data Science: Read More [+]
Rules & Requirements

Prerequisites: One year of calculus. Prerequisite or corequisite: Foundations of Data Science (COMPSCI C8 / INFO C8 / STAT C8)

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.

Linear Algebra for Data Science: Read Less [-]

STAT 94 Special Topics in Probability and Statistics 1 - 4 Units

Terms offered: Fall 2015
Topics will vary semester to semester.
Special Topics in Probability and Statistics: Read More [+]
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.

Special Topics in Probability and Statistics: Read Less [-]

STAT 97 Field Study in Statistics 1 - 3 Units

Terms offered: Fall 2015, Spring 2012
Supervised experience relevant to specific aspects of statistics in off-campus settings. Individual and/or group meetings with faculty.
Field Study in Statistics: Read More [+]

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

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.

Field Study in Statistics: Read Less [-]

STAT 98 Directed Group Study 1 - 3 Units

Terms offered: Spring 2022, Fall 2021, Spring 2021
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.
Directed Group Study: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

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.

Directed Group Study: Read Less [-]

STAT C100 Principles & Techniques of Data Science 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022, Fall 2021, Summer 2021 8 Week Session, Fall 2020
In this course, students will explore the data science lifecycle, including question formulation, data collection and cleaning, exploratory data analysis and visualization, statistical inference and prediction, and decision-making. This class will focus on quantitative critical thinking and key principles and techniques needed to carry out this cycle. These include languages for transforming, querying and analyzing data; algorithms for machine learning methods including regression, classification and clustering; principles behind creating informative data visualizations; statistical concepts of measurement error and prediction; and techniques for scalable data processing.
Principles & Techniques of Data Science: Read More [+]

Rules & Requirements

Prerequisites: COMPSCI C8 / DATA C8 / INFO C8 / STAT C8; and COMPSCI 61A, COMPSCI 88, or ENGIN 7; Corequisite: MATH 54 or EECS 16A

Credit Restrictions: Students will receive no credit for DATA C100\STAT C100\COMPSCI C100 after completing DATA 100. A deficient grade in DATA C100\STAT C100\COMPSCI C100 may be removed by taking DATA 100.

Hours & Format

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

Summer: 8 weeks - 6 hours of lecture, 2 hours of discussion, and 2 hours of laboratory per week

Additional Details

Subject/Course Level: Statistics/Undergraduate

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

Formerly known as: Statistics C100/Computer Science C100

Also listed as: COMPSCI C100/DATA C100

Principles & Techniques of Data Science: Read Less [-]

STAT C102 Data, Inference, and Decisions 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
This course develops the probabilistic foundations of inference in data science, and builds a comprehensive view of the modeling and decision-making life cycle in data science including its human, social, and ethical implications. Topics include: frequentist and Bayesian decision-making, permutation testing, false discovery rate, probabilistic interpretations of models, Bayesian hierarchical models, basics of experimental design, confidence intervals, causal inference, Thompson sampling, optimal control, Q-learning, differential privacy, clustering algorithms, recommendation systems and an introduction to machine learning tools including decision trees, neural networks and ensemble methods.
Data, Inference, and Decisions: Read More [+]

Rules & Requirements

Prerequisites: Mathematics 54 or Mathematics 110 or Statistics 89A or Physics 89 or both of Electrical Engineering and Computer Science 16A and Electrical Engineering and Computer Science 16B; Statistics/Computer Science C100; and any of Electrical Engineering and Computer Science 126, Statistics 140, Statistics 134, Industrial Engineering and Operations Research 172. Statistics 140 or Electrical Engineering and Computer Science 126 are preferred

Credit Restrictions: Students will receive no credit for DATA C102 after completing STAT 102, or DATA 102. A deficient grade in DATA C102 may be removed by taking STAT 102, STAT 102, or DATA 102.

Hours & Format

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

Additional Details

Subject/Course Level: Statistics/Undergraduate

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

Formerly known as: Statistics 102

Also listed as: DATA C102

Data, Inference, and Decisions: Read Less [-]

STAT C131A Statistical Methods for Data Science 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
This course teaches a broad range of statistical methods that are used to solve data problems. Topics include group comparisons and ANOVA, standard parametric statistical models, multivariate data visualization, multiple linear regression, logistic regression and classification, regression trees and random forests. An important focus of the course is on statistical computing and reproducible statistical analysis. The course and lab include hands-on experience in analyzing real world data from the social, life, and physical sciences. The R statistical language is used.
Statistical Methods for Data Science: Read More [+]

Rules & Requirements

Prerequisites: Statistics/Computer Science/Information C8 or Statistics 20; and Mathematics 1A, Mathematics 16A, or Mathematics 10A/10B. Strongly recommended corequisite: Statistics 33A or Statistics 133

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.

Formerly known as: Statistics 131A

Also listed as: DATA C131A

Statistical Methods for Data Science: Read Less [-]

STAT 133 Concepts in Computing with Data 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Concepts in Computing with Data: Read More [+]

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.

Concepts in Computing with Data: Read Less [-]

STAT 134 Concepts of Probability 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Concepts of Probability: Read More [+]

Rules & Requirements

Prerequisites: One year of calculus

Credit Restrictions: Students will not receive credit for 134 after taking 140 or 201A.

Hours & Format

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

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

Additional Details

Subject/Course Level: Statistics/Undergraduate

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

Concepts of Probability: Read Less [-]

STAT 135 Concepts of Statistics 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Concepts of Statistics: Read More [+]

Rules & Requirements

Prerequisites: STAT 134 or STAT 140; and MATH 54, EL ENG 16A, STAT 89A, MATH 110 or equivalent linear algebra. Strongly recommended corerequisite: STAT 133

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.

Concepts of Statistics: Read Less [-]

STAT C140 Probability for Data Science 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021, Spring 2021
An introduction to probability, emphasizing the combined use of mathematics and programming to solve problems. Random variables, discrete and continuous families of distributions. Bounds and approximations. Dependence, conditioning, Bayes methods. Convergence, Markov chains. Least squares prediction. Random permutations, symmetry, order statistics. Use of numerical computation, graphics, simulation, and computer algebra.
Probability for Data Science: Read More [+]

Objectives & Outcomes

Course Objectives: The emphasis on simulation and the bootstrap in Data 8 gives students a concrete sense of randomness and sampling variability. Stat 140 will capitalize on this, abstraction and computation complementing each other throughout.

The syllabus has been designed to maintain a mathematical level at least equal to that in Stat 134. So Stat 140 will start faster than Stat 134 (due to the Data 8 prerequisite), avoid approximations that are unnecessary when SciPy is at hand, and replace some of the routine calculus by symbolic math done in SymPy. This will create time for a unit on the convergence and reversibility of Markov Chains as well as added focus on conditioning and Bayes methods.
With about a thousand students a year taking Foundations of Data Science (Stat/CS/Info C8, a.k.a. Data 8), there is considerable demand for follow-on courses that build on the skills acquired in that class. Stat 140 is a probability course for Data 8 graduates who have also had a year of calculus and wish to go deeper into data science.

Student Learning Outcomes: Understand the difference between math and simulation, and appreciate the power of both
Use a variety of approaches to problem solving
Work with probability concepts algebraically, numerically, and graphically

Rules & Requirements

Prerequisites: Statistics/Computer Science/Information C8, or Statistics/Computer Science C100, or both Stat 20 and Computer Science 61A; and one year of calculus at the level of Mathematics 1A-1B or higher. Corequisite: Mathematics 54, Electrical Engineering 16A, Statistics 89A, Mathematics 110 or equivalent linear algebra

Credit Restrictions: Students will receive no credit for STAT C140 after completing STAT 134. A deficient grade in STAT C140 may be removed by taking STAT 134.

Hours & Format

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

Additional Details

Subject/Course Level: Statistics/Undergraduate

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

Formerly known as: Statistics 140

Also listed as: DATA C140

Probability for Data Science: Read Less [-]

STAT 150 Stochastic Processes 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Stochastic Processes: Read More [+]
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.

Stochastic Processes: Read Less [-]

STAT 151A Linear Modelling: Theory and Applications 4 Units

Terms offered: Fall 2022, Fall 2021, Spring 2021
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.
Linear Modelling: Theory and Applications: Read More [+]
Rules & Requirements

Prerequisites: STAT 102 or STAT 135. STAT 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.

Linear Modelling: Theory and Applications: Read Less [-]

STAT 152 Sampling Surveys 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
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.
Sampling Surveys: Read More [+]
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.

Sampling Surveys: Read Less [-]

STAT 153 Introduction to Time Series 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Introduction to Time Series: Read More [+]
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.

Introduction to Time Series: Read Less [-]

STAT 154 Modern Statistical Prediction and Machine Learning 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Modern Statistical Prediction and Machine Learning: Read More [+]

Rules & Requirements

Prerequisites: Mathematics 53 or equivalent; Mathematics 54, Electrical Engineering 16A, Statistics 89A, Mathematics 110 or equivalent linear algebra; Statistics 135 or equivalent; experience with some programming language. Recommended prerequisite: Mathematics 55 or equivalent exposure to counting arguments

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.

Modern Statistical Prediction and Machine Learning: Read Less [-]

STAT 155 Game Theory 3 Units

Terms offered: Fall 2022, Spring 2022, Summer 2021 8 Week Session
General theory of zero-sum, two-person games, including games in extensive form and continuous games, and illustrated by detailed study of examples.
Game Theory: Read More [+]

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.

Game Theory: Read Less [-]

STAT 156 Causal Inference 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
This course will focus on approaches to causal inference using the potential outcomes framework. It will also use causal diagrams at an intuitive level. The main topics are classical randomized experiments, observational studies, instrumental variables, principal stratification and mediation analysis. Applications are drawn from a variety of fields including political science, economics, sociology, public health, and medicine. This course is a mix of statistical theory and data analysis. Students will be exposed to statistical questions that are relevant to decision and policy making.
Causal Inference: Read More [+]

Rules & Requirements

Prerequisites: Statistics 135

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.

Causal Inference: Read Less [-]

STAT 157 Seminar on Topics in Probability and Statistics 3 Units

Terms offered: Spring 2022, Fall 2020, Spring 2020
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.
Seminar on Topics in Probability and Statistics: Read More [+]

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 instructor consent.

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.

Seminar on Topics in Probability and Statistics: Read Less [-]

STAT 158 The Design and Analysis of Experiments 4 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019
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.
The Design and Analysis of Experiments: Read More [+]
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.

The Design and Analysis of Experiments: Read Less [-]

STAT 159 Reproducible and Collaborative Statistical Data Science 4 Units

Terms offered: Spring 2022, Spring 2021, Fall 2018
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.
Reproducible and Collaborative Statistical Data Science: Read More [+]
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.

Reproducible and Collaborative Statistical Data Science: Read Less [-]

STAT H195 Special Study for Honors Candidates 1 - 4 Units

Terms offered: Spring 2015, Fall 2014, Fall 2010
Special Study for Honors Candidates: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

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.

Special Study for Honors Candidates: Read Less [-]

STAT 197 Field Study in Statistics 0.5 - 3 Units

Terms offered: Fall 2021, Fall 2020, Spring 2017
Supervised experience relevant to specific aspects of statistics in on-campus or off-campus settings. Individual and/or group meetings with faculty.
Field Study in Statistics: Read More [+]
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 without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-9 hours of fieldwork per week

Summer:
6 weeks - 3-22 hours of fieldwork per week
8 weeks - 2-16 hours of fieldwork per week
10 weeks - 2-12 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.

Field Study in Statistics: Read Less [-]

STAT 198 Directed Study for Undergraduates 1 - 3 Units

Terms offered: Spring 2022, Fall 2021, Spring 2021
Special tutorial or seminar on selected topics.
Directed Study for Undergraduates: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

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.

Directed Study for Undergraduates: Read Less [-]

STAT 199 Supervised Independent Study and Research 1 - 3 Units

Terms offered: Fall 2019, Fall 2018, Spring 2017
Supervised Independent Study and Research: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 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
10 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.

Supervised Independent Study and Research: Read Less [-]