

# 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. (<https://statistics.berkeley.edu/academics/undergrad/prospective/declare-major/>)

## 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. (<https://statistics.berkeley.edu/academics/undergrad/prospective/declare-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.

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

## Prerequisites

Students must earn a minimum 2.0 grade point average in the following prerequisites with no lower than a C in Math 53, Math 54, and Stat 20 / Data C8.

|                               |  |   |
|-------------------------------|--|---|
| 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        |   |
| STAT/COMPSCI/<br>DATA/INFO C8 | Foundations of Data Science                      | 4 |
| or STAT 20                    | Introduction to Probability and Statistics       |   |

## Upper Division Requirements (Nine Courses)

### Core Statistics Courses (3)

|              |                                      |   |
|--------------|--------------------------------------|---|
| STAT 133     | Concepts in Computing with Data      | 3 |
| STAT 134     | Concepts of Probability <sup>1</sup> | 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 0-12 selections must have a lab:

|                   |  |   |
|-------------------|--|---|
| STAT/DATA<br>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) <sup>2</sup> | 4 |
| STAT 155          | Game Theory <sup>6</sup>   | 3 |
| STAT 156          | Causal Inference   | 4 |
| STAT 157          | Seminar on Topics in Probability and Statistics                              | 3 |
| STAT 158          | Experimental Design (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 9-12 and Approved Cluster Courses below the Teaching Option requirements.

## Upper Division Requirements: Teaching Option (Nine Courses)

### Core Statistics Courses (3)

|          |   |   |
|----------|---|---|
| STAT 133 | Concepts in Computing with Data           | 3 |
| STAT 134 | Concepts of Probability <sup>1</sup>      | 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) <sup>2</sup> | 4   |
| STAT 155   | Game Theory <sup>6</sup>   | 3   |
| STAT 156   | Causal Inference   | 4   |
| STAT 157   | Seminar on Topics in Probability and Statistics                              | 3   |
| STAT 158   | Experimental Design (LAB COURSE)   | 4   |
| STAT 159   | Reproducible and Collaborative Statistical Data Science (LAB COURSE)         | 4   |

### Teaching Track Cluster (4)

|          |   |   |
|----------|---|---|
| MATH 110 | Abstract 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 C1040 are

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/<br>INTEG BI C187 | Course Not Available  | 3 |
| ANTHRO 127A                    | Bioarchaeology: Introduction to Skeletal Biology and Bioarchaeology     | 4 |
| ANTHRO 127B                    | Bioarchaeology: Reconstruction of Life in Bioarchaeology                | 4 |
| ANTHRO C129D/<br>INTEG BI C155 | Course Not Available  | 3 |

|               |  |   |                            |  |     |
|---------------|--|---|----------------------------|--|-----|
| ANTHRO 132A   | Analysis of Archaeological Materials: Ceramics                       | 4 | COG SCI C102               | Course Not Available   | 3   |
| ANTHRO 135    | Paleoethnobotany: Archaeological Methods and Laboratory Techniques   | 4 | COG SCI C126               | Perception   | 3   |
| ANTHRO 169B   | Research Theory and Methods in Socio-Cultural Anthropology           | 5 | COG SCI C127               | Cognitive Neuroscience   | 3   |
| ARCH 140      | Energy and Environment   | 4 | COG SCI 131                | Computational Models of Cognition  | 4   |
| ARCH 150      | Introduction to Structures   | 4 | COG SCI C140               | Quantitative Methods in Linguistics  | 4   |
| ARCH 154      | Design and Computer Analysis of Structure                            | 3 | COG SCI C147               | Course Not Available   | 3   |
| ASTRON 128    | Astronomy Data Science Laboratory                                    | 4 | COMPSCI C149               | Course Not Available   | 4   |
| ASTRON 160    | Stellar Physics  | 4 | COMPSCI 152                | Computer Architecture and Engineering                                      | 4   |
| ASTRON C161   | Relativistic Astrophysics and Cosmology                              | 4 | COMPSCI 160                | User Interface Design and Development                                      | 4   |
| ASTRON C162   | Planetary Astrophysics   | 4 | COMPSCI 161                | Computer Security  | 4   |
| BIO ENG 104   | Biological Transport Phenomena                                       | 4 | COMPSCI 162                | Operating Systems and System Programming                                   | 4   |
| BIO ENG C112  | Molecular Biomechanics and Mechanobiology of the Cell                | 4 | COMPSCI 164                | Programming Languages and Compilers  | 4   |
| BIO ENG C117  | Structural Aspects of Biomaterials                                   | 4 | COMPSCI 168                | Introduction to the Internet: Architecture and Protocols                   | 4   |
| BIO ENG C119  | Orthopedic Biomechanics  | 4 | COMPSCI 169                | Software Engineering   | 4   |
| BIO ENG C125  | Introduction to Robotics   | 4 | COMPSCI 169A               | Introduction to Software Engineering                                       | 4   |
| BIO ENG C125B | Robotic Manipulation and Interaction                                 | 4 | COMPSCI W169A              | Software Engineering   | 3   |
| BIO ENG 131   | Introduction to Computational Molecular and Cell Biology             | 4 | COMPSCI 170                | Efficient Algorithms and Intractable Problems                              | 4   |
| BIO ENG C136L | Laboratory in the Mechanics of Organisms                             | 3 | COMPSCI 172                | Computability and Complexity   | 4   |
| BIO ENG C137  | Designing for the Human Body   | 4 | COMPSCI 176                | Algorithms for Computational Biology                                       | 4   |
| BIO ENG 144   | Introduction to Protein Informatics                                  | 4 | COMPSCI 182                | Designing, Visualizing and Understanding Deep Neural Networks <sup>2</sup> | 4   |
| BIO ENG C145L | Introductory Electronic Transducers Laboratory                       | 3 | COMPSCI 184                | Foundations of Computer Graphics   | 4   |
| BIO ENG C145M | Introductory Microcomputer Interfacing Laboratory                    | 3 | COMPSCI 186                | Introduction to Database Systems   | 4   |
| BIO ENG 147   | Principles of Synthetic Biology                                      | 4 | COMPSCI W186               | Introduction to Database Systems   | 4   |
| BIO ENG C165  | Medical Imaging Signals and Systems                                  | 4 | COMPSCI 188                | Introduction to Artificial Intelligence                                    | 4   |
| BIO ENG C181  | The Berkeley Lectures on Energy: Energy from Biomass                 | 3 | COMPSCI 189                | Introduction to Machine Learning <sup>2</sup>                              | 4   |
| CHM ENG 140   | Introduction to Chemical Process Analysis                            | 4 | NOT COMPSCI/DATA/STAT C100 |  |     |
| CHM ENG 141   | Chemical Engineering Thermodynamics                                  | 4 | DATA 101                   | Data Engineering   | 4   |
| CHM ENG C195A | The Berkeley Lectures on Energy: Energy from Biomass                 | 3 | DATA C104                  | Human Contexts and Ethics of Data - DATA/History/STS                       | 4   |
| CHEM C110L    | General Biochemistry and Molecular Biology Laboratory                | 4 | DATA 144                   | Data Mining and Analytics  | 3   |
| CHEM 120A     | Physical Chemistry   | 3 | DEMOG 110                  | Introduction to Population Analysis  | 3   |
| CHEM 120B     | Physical Chemistry   | 3 | DEMOG C126                 | Sex, Death, and Data   | 4   |
| CHEM C130     | Biophysical Chemistry: Physical Principles and the Molecules of Life | 4 | DEMOG C175                 | Economic Demography  | 4   |
| CHEM C138     | The Berkeley Lectures on Energy: Energy from Biomass                 | 3 | DEMOG 180                  | Social Networks  | 4   |
| CY PLAN 101   | Introduction to Urban Data Analytics                                 | 4 | DEMOG 260                  | Special Topics in Demography Seminar                                       | 1-4 |
| CY PLAN 118AC | The Urban Community  | 4 | DIGHUM 150C                | Digital Humanities and Text and Language Analysis                          | 3   |
| CY PLAN 119   | Planning for Sustainability  | 4 | EPS 101                    | Field Geology and Digital Mapping  | 4   |
| CIV ENG 100   | Elementary Fluid Mechanics   | 4 | EPS 109                    | Computer Simulations with Jupyter Notebooks                                | 4   |
| CIV ENG 103   | Course Not Available   | 3 | EPS C129                   | Biometeorology   | 3   |
| CIV ENG C106  | Air Pollution  | 3 | EPS 130                    | Strong Motion Seismology   | 3   |
| CIV ENG C116  | Chemistry of Soils   | 3 | EPS C146                   | Course Not Available   | 4   |
| CIV ENG C133  | Engineering Analysis Using the Finite Element Method                 | 3 | EPS C162                   | Planetary Astrophysics   | 4   |
| CIV ENG 155   | Transportation Systems Engineering                                   | 3 | EPS C180                   | Air Pollution  | 3   |
| COG SCI C100  | Basic Issues in Cognition  | 3 | EPS C181                   | Atmosphere, Ocean, and Climate Dynamics                                    | 3   |
| COG SCI C101  | Cognitive Linguistics  | 4 | 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 C110                  | Game Theory in the Social Sciences <sup>6</sup>                            | 4   |

|              |   |   |              |  |    |
|--------------|---|---|--------------|--|----|
| ECON 119     | Psychology and Economics  | 4 | ENGIN 117    | Methods of Engineering Analysis  | 3  |
| ECON 121     | Industrial Organization and Public Policy                               | 4 | ENGIN 120    | Principles of Engineering Economics <sup>4</sup>                               | 3  |
| ECON C125    | Environmental Economics   | 4 | ENVECON C101 | Environmental Economics  | 4  |
| ECON 131     | Public Economics  | 4 | ENVECON C102 | Natural Resource Economics   | 4  |
| ECON 136     | Financial Economics <sup>4</sup>  | 4 | ENVECON C115 | Modeling and Management of Biological Resources                                | 4  |
| ECON 138     | Financial and Behavioral Economics                                      | 4 | ENVECON 131  | Globalization and the Natural Environment                                      | 3  |
| ECON 139     | Asset Pricing and Portfolio Choice                                      | 4 | ENVECON 140A | Economics of Race, Agriculture, and the Environment                            | 3  |
| ECON 141     | Econometrics (Math Intensive)   | 4 | ENVECON 141  | Agricultural and Environmental Policy  | 4  |
| ECON C142    | Applied Econometrics and Public Policy                                  | 4 | ENVECON 142  | Industrial Organization with Applications to Agriculture and Natural Resources | 4  |
| ECON 157     | Health Economics  | 4 | ENVECON 143  | Economics of Innovation and Intellectual Property                              | 4  |
| ECON C171    | Development Economics   | 4 | ENVECON 145  | Health and Environmental Economic Policy                                       | 4  |
| ECON 174     | Global Poverty and Impact Evaluation                                    | 4 | ENVECON 147  | The Economics of the Clean Energy Transition                                   | 4  |
| ECON C175    | Economic Demography   | 3 | ENVECON C151 | Development Economics  | 4  |
|              | or ECON N175 Economic Demography  |   | ENVECON 152  | Advanced Topics in Development and International Trade                         | 3  |
| ECON C181    | International Trade   | 4 | ENVECON 153  | Population, Environment, and Development                                       | 3  |
| ECON 182     | International Monetary Economics  | 4 | ENVECON 154  | Economics of Poverty and Technology  | 3  |
| EL ENG 100   | Course Not Available  |   | ENVECON 161  | Advanced Topics in Environmental and Resource Economics                        | 4  |
| EL ENG 105   | Microelectronic Devices and Circuits                                    | 4 | ENVECON 162  | Economics of Water Resources   | 3  |
| EL ENG C106A | Introduction to Robotics  | 4 | ENVECON C175 | The Economics of Climate Change  | 4  |
| EL ENG C106B | Robotic Manipulation and Interaction                                    | 4 | ENVECON C176 | Climate Change Economics   | 4  |
| EL ENG 113   | Power Electronics   | 4 | ENVECON C181 | International Trade  | 4  |
| EL ENG 117   | Electromagnetic Fields and Waves  | 4 | ENVECON C183 | Forest Ecosystem Management  | 4  |
| EL ENG 118   | Introduction to Optical Engineering                                     | 4 | ESPM 100     | Environmental Problem Solving  | 4  |
| EL ENG 120   | Signals and Systems   | 4 | ESPM 102A    | Course Not Available   | 4  |
| EL ENG 121   | Introduction to Digital Communication Systems                           | 4 | ESPM 102C    | Resource Management  | 4  |
| EL ENG 122   | Introduction to Communication Networks                                  | 4 | ESPM 102D    | Climate and Energy Policy  | 4  |
| EL ENG 123   | Digital Signal Processing   | 4 | ESPM C103    | Principles of Conservation Biology   | 4  |
| EL ENG 127   | Course Not Available  |   | ESPM C104    | Modeling and Management of Biological Resources                                | 4  |
| EL ENG C128  | Feedback Control Systems  | 4 | ESPM C107    | Biology and Geomorphology of Tropical Islands                                  | 13 |
| EL ENG 129   | Course Not Available  | 3 | ESPM 108A    | Trees: Taxonomy, Growth, and Structures  | 3  |
| EL ENG 130   | Integrated-Circuit Devices  | 4 | ESPM 108B    | Environmental Change Genetics  | 3  |
| EL ENG 134   | Fundamentals of Photovoltaic Devices                                    | 4 | ESPM 111     | Ecosystem Ecology  | 4  |
| EL ENG 137A  | Introduction to Electric Power Systems                                  | 4 | ESPM 112     | Microbial Ecology  | 3  |
| EL ENG 137B  | Introduction to Electric Power Systems                                  | 4 | ESPM 114     | Wildlife Ecology   | 3  |
| EL ENG 140   | Linear Integrated Circuits  | 4 | ESPM 115C    | Fish Ecology   | 3  |
| EL ENG 142   | Integrated Circuits for Communications                                  | 4 | ESPM 116B    | Grassland and Woodland Ecology   | 4  |
| EL ENG 143   | Microfabrication Technology   | 4 | ESPM 116C    | Tropical Forest Ecology  | 3  |
| EL ENG 144   | Fundamental Algorithms for Systems Modeling, Analysis, and Optimization | 4 | ESPM 117     | Urban Garden Ecosystems  | 4  |
| EL ENG C145B | Medical Imaging Signals and Systems                                     | 4 | ESPM 118     | Agricultural Ecology   | 4  |
| EL ENG C145L | Introductory Electronic Transducers Laboratory                          | 3 | ESPM 120     | Science of Soils   | 3  |
| EL ENG C145M | Introductory Microcomputer Interfacing Laboratory                       | 3 | ESPM 121     | Development and Classification of Soils  | 3  |
| EL ENG C145O | Laboratory in the Mechanics of Organisms                                | 3 | ESPM C126    | Animal Behavior  | 4  |
| EL ENG 147   | Introduction to Microelectromechanical Systems (MEMS)                   | 3 | ESPM C128    | Chemistry of Soils   | 3  |
| EL ENG C149  | Course Not Available  | 4 | ESPM C129    | Biometeorology   | 3  |
| ENE,RES C100 | Energy and Society  | 4 | ESPM 131     | Soil Microbiology and Biogeochemistry  | 3  |
| ENE,RES 102  | Quantitative Aspects of Global Environmental Problems                   | 4 | ESPM 132     | Spider Biology   | 4  |
| ENE,RES 131  | Data, Environment and Society   | 4 | ESPM C138    | Introduction to Comparative Virology   | 4  |
| ENE,RES 175  | Water and Development   | 4 |              |  |    |
| ENE,RES C176 | Climate Change Economics  | 4 |              |  |    |
| ENGIN 115    | Course Not Available  | 4 |              |  |    |



|  |  |   |                     |  |   |
|--|--|---|---------------------|--|---|
| ESPM 140   | General Entomology   | 4 | INFO 213            | Introduction to User Experience Design                               | 4 |
| ESPM 142   | Insect Behavior  | 3 | INFO 232            | Course Not Available   | 3 |
| ESPM 144   | Insect Physiology  | 3 | INFO 247            | Information Visualization and Presentation                           | 4 |
| ESPM C148  | Pesticide Chemistry and Toxicology                               | 3 | INFO 253            | Course Not Available   | 3 |
| ESPM C149  | Course Not Available   | 4 | INFO 256            | Applied Natural Language Processing                                  | 3 |
| ESPM 152   | Global Change Biology  | 3 | INFO 257            | Course Not Available   | 3 |
| ESPM C159  | Course Not Available   | 4 | INFO 271B           | Quantitative Research Methods for Information Systems and Management | 3 |
| ESPM 164   | GIS and Environmental Science                                    | 3 | INFO 272            | Qualitative Research Methods for Information Systems and Management  | 3 |
| ESPM 165   | International Rural Development Policy                           | 4 | INTEGBI 102LF       | Introduction to California Plant Life with Laboratory                | 4 |
| ESPM 166   | Course Not Available   | 4 | INTEGBI 103LF       | Invertebrate Zoology with Laboratory                                 | 5 |
| ESPM 172   | Remote Sensing of the Environment                                | 3 | INTEGBI 104LF       | Natural History of the Vertebrates with Laboratory                   | 5 |
| ESPM 173   | Introduction to Ecological Data Analysis                         | 3 | INTEGBI 106A        | Course Not Available   | 4 |
| ESPM C177  | GIS and Environmental Spatial Data Analysis                      | 4 | INTEGBI C107L       | Principles of Plant Morphology with Laboratory                       | 4 |
| ESPM C180  | Air Pollution  | 3 | INTEGBI C109        | Evolution and Ecology of Development                                 | 3 |
| ESPM 181A  | Fire Ecology   | 3 | INTEGBI C110L       | Biology of Fungi with Laboratory                                     | 4 |
| ESPM 182   | Forest Operations Management                                     | 3 | INTEGBI 113L        | Paleobiological Perspectives on Ecology and Evolution                | 4 |
| ESPM 183   | Forest Ecosystem Management and Planning                         | 4 | INTEGBI 115         | Course Not Available   |   |
| ESPM C183  | Forest Ecosystem Management                                      | 4 | INTEGBI 117 & 117LF | Medical Ethnobotany and Medical Ethnobotany Laboratory               | 4 |
| ESPM 185   | Applied Forest Ecology   | 4 | INTEGBI 118         | Organismal Microbiomes and Host-Pathogen Interactions                | 4 |
| ESPM 186   | Grassland and Woodland Management and Conservation               | 4 | INTEGBI 119         | Course Not Available   |   |
| ESPM 187   | Restoration Ecology  | 4 | INTEGBI 123AL       | Exercise and Environmental Physiology with Laboratory                | 5 |
| GEOG C136  | Terrestrial Hydrology  | 4 | INTEGBI C125L       | Introduction to the Biomechanical Analysis of Human Movement         | 4 |
| GEOG C139  | Atmosphere, Ocean, and Climate Dynamics                          | 3 | INTEGBI 128         | Sports Medicine  | 3 |
| GEOG 140A  | Physical Landscapes: Process and Form                            | 4 | INTEGBI C129L       | Human Physiological Assessment                                       | 3 |
| GEOG 142   | Global Climate Variability and Change                            | 4 | INTEGBI 131         | General Human Anatomy  | 3 |
| GEOG 143   | Global Change Biogeochemistry                                    | 3 | INTEGBI 132         | Human Physiology   | 4 |
| GEOG C145  | Course Not Available   | 4 | INTEGBI 134L        | Practical Genomics   | 4 |
| GEOG 148   | Course Not Available   | 4 | INTEGBI 135         | The Mechanics of Organisms   | 4 |
| GEOG 187   | Geographic Information Analysis                                  | 4 | INTEGBI C135L       | Laboratory in the Mechanics of Organisms                             | 3 |
| GEOG C188  | Geographic Information Science                                   | 4 | INTEGBI 137         | Human Endocrinology  | 4 |
| HISTORY C184D  | Human Contexts and Ethics of Data - DATA/History/STS             | 4 | INTEGBI 138         | Comparative Endocrinology  | 4 |
| IND ENG 115  | Industrial and Commercial Data Systems                           | 3 | INTEGBI 139         | The Neurobiology of Stress   | 4 |
| IND ENG 130  | Methods of Manufacturing Improvement                             | 3 | INTEGBI 140         | Biology of Human Reproduction  | 4 |
| IND ENG 131  | Course Not Available   |   | INTEGBI C142L       | Course Not Available   |   |
| IND ENG 135  | Applied Data Science with Venture Applications                   | 3 | INTEGBI C143A       | Biological Clocks: Physiology and Behavior                           | 3 |
| IND ENG 142  | Introduction to Machine Learning and Data Analytics <sup>2</sup> | 3 | INTEGBI C143B       | Course Not Available   |   |
| IND ENG 150  | Production Systems Analysis                                      | 3 | INTEGBI C144        | Animal Behavior  | 4 |
| IND ENG 151  | Service Operations Design and Analysis                           | 3 | INTEGBI 146LF       | Behavioral Ecology with Laboratory                                   | 5 |
| IND ENG 153  | Logistics Network Design and Supply Chain Management             | 3 | INTEGBI 148         | Comparative Animal Physiology  | 3 |
| IND ENG 160  | Nonlinear and Discrete Optimization <sup>5</sup>                 | 3 | INTEGBI C149        | Course Not Available   |   |
| IND ENG 162  | Linear Programming and Network Flows <sup>5</sup>                | 3 | INTEGBI 151         | Plant Physiological Ecology  | 4 |
| IND ENG 166  | Decision Analytics   | 3 | INTEGBI 152         | Course Not Available   |   |
| IND ENG 170  | Industrial Design and Human Factors                              | 3 | INTEGBI 153         | Course Not Available   |   |
| IND ENG 221  | Introduction to Financial Engineering                            | 3 | INTEGBI 154         | Plant Ecology  | 3 |
| IND ENG 222  | Financial Engineering Systems I                                  | 3 | INTEGBI C155        | Course Not Available   |   |
| NOT Ind Eng 165, Ind Eng 171, Ind Eng 172 or Ind Eng 173 |  |   | INTEGBI C156        | Principles of Conservation Biology                                   | 4 |
| INFO 154   | Course Not Available   | 3 |                     |  |   |
| INFO 159   | Natural Language Processing                                      | 4 |                     |  |   |
| INFO 188   | Behind the Data: Humans and Values                               | 3 |                     |  |   |

|               |   |   |              |   |   |
|---------------|---|---|--------------|---|---|
| INTEGBI 157LF | Ecosystems of California  | 4 | MATH 127     | Mathematical and Computational Methods in Molecular Biology | 4 |
| INTEGBI 158LF | Course Not Available  |   | MATH 128A    | Numerical Analysis  | 4 |
| INTEGBI 160   | Course Not Available  |   | MATH 128B    | Numerical Analysis  | 4 |
| INTEGBI 161   | Population and Evolutionary Genetics                            | 4 | MATH 130     | Groups and Geometries                                       | 4 |
| INTEGBI 162   | Ecological Genetics   | 4 | MATH 135     | Introduction to the Theory of Sets                          | 4 |
| INTEGBI 164   | Human Genetics and Genomics                                     | 4 | MATH 136     | Incompleteness and Undecidability                           | 4 |
| INTEGBI 166   | Course Not Available  |   | MATH 140     | Metric Differential Geometry                                | 4 |
| INTEGBI 168L  | Plants: Diversity and Evolution                                 | 4 | MATH 141     | Elementary Differential Topology                            | 4 |
| INTEGBI 169   | Evolutionary Medicine   | 4 | MATH 142     | Elementary Algebraic Topology                               | 4 |
| INTEGBI 173LF | Mammalogy with Laboratory                                       | 5 | MATH 143     | Elementary Algebraic Geometry                               | 4 |
| INTEGBI 174LF | Ornithology with Laboratory                                     | 4 | MATH 170     | Mathematical Methods for Optimization <sup>5</sup>          | 4 |
| INTEGBI 175LF | Herpetology with Laboratory                                     | 4 | MATH 172     | Combinatorics   | 4 |
| INTEGBI 181L  | Paleobotany - The 500-Million Year History of a Greening Planet | 4 | MATH 185     | Introduction to Complex Analysis                            | 4 |
| INTEGBI 183L  | Course Not Available  | 4 | MATH H185    | Honors Introduction to Complex Analysis                     | 4 |
| INTEGBI 184L  | Morphology of the Vertebrate Skeleton with Laboratory           | 4 | MATH 189     | Mathematical Methods in Classical and Quantum Mechanics     | 4 |
| INTEGBI C185L | Course Not Available  |   | MATH 221     | Advanced Matrix Computations                                | 4 |
| INTEGBI C187  | Course Not Available  | 3 | MEC ENG 101  | Introduction to Lean Manufacturing Systems                  | 3 |
| IAS C175      | The Economics of Climate Change                                 | 4 | MEC ENG 102A | Course Not Available  | 4 |
| IAS C176      | Climate Change Economics  | 4 | MEC ENG 102B | Mechatronics Design   | 4 |
| LD ARCH 122   | Hydrology for Planners  | 4 | MEC ENG 104  | Engineering Mechanics II                                    | 3 |
| LD ARCH C177  | GIS and Environmental Spatial Data Analysis                     | 4 | MEC ENG 106  | Fluid Mechanics   | 3 |
| LD ARCH C188  | Geographic Information Science                                  | 4 | MEC ENG 107  | Course Not Available  | 3 |
| L & S C180U   | Wealth and Poverty  | 4 | MEC ENG 108  | Mechanical Behavior of Engineering Materials                | 4 |
| LEGALST 123   | Data, Prediction & Law  | 4 | MEC ENG 109  | Heat Transfer   | 3 |
| LINGUIS 100   | Introduction to Linguistic Science                              | 4 | MEC ENG 110  | Introduction to Product Development                         | 3 |
| LINGUIS C105  | Cognitive Linguistics   | 4 | MEC ENG C115 | Molecular Biomechanics and Mechanobiology of the Cell       | 4 |
| LINGUIS 110   | Phonetics   | 4 | MEC ENG C117 | Structural Aspects of Biomaterials                          | 4 |
| LINGUIS 113   | Experimental Phonetics  | 3 | MEC ENG 118  | Introduction to Nanotechnology and Nanoscience              | 3 |
| LINGUIS 140   | Field Methods   | 3 | MEC ENG 119  | Introduction to MEMS (Microelectromechanical Systems)       | 3 |
| LINGUIS C146  | Language Acquisition  | 3 | MEC ENG 120  | Computational Biomechanics Across Multiple Scales           | 3 |
| LINGUIS C147  | Course Not Available  |   | MEC ENG 122  | Processing of Materials in Manufacturing                    | 3 |
| LINGUIS C160  | Quantitative Methods in Linguistics                             | 4 | MEC ENG 130  | Design of Planar Machinery                                  | 3 |
| MATH C103     | Introduction to Mathematical Economics                          | 4 | MEC ENG 131  | Vehicle Dynamics and Control                                | 4 |
| MATH 104      | Introduction to Analysis  | 4 | MEC ENG 132  | Dynamic Systems and Feedback                                | 3 |
| MATH H104     | Honors Introduction to Analysis                                 | 4 | MEC ENG 133  | Mechanical Vibrations                                       | 3 |
| MATH 105      | Second Course in Analysis                                       | 4 | MEC ENG C134 | Feedback Control Systems                                    | 4 |
| MATH 110      | Abstract Linear Algebra   | 4 | MEC ENG 135  | Design of Microprocessor-Based Mechanical Systems           | 4 |
| MATH H110     | Honors Linear Algebra   | 4 | MEC ENG 138  | Introduction to Micro/Nano Mechanical Systems Laboratory    | 3 |
| MATH 113      | Introduction to Abstract Algebra                                | 4 | MEC ENG 140  | Combustion Processes  | 3 |
| MATH H113     | Honors Introduction to Abstract Algebra                         | 4 | MEC ENG 146  | Energy Conversion Principles                                | 3 |
| MATH 114      | Second Course in Abstract Algebra                               | 4 | MEC ENG 150A | Solar-Powered Vehicles: Analysis, Design and Fabrication    | 3 |
| MATH 115      | Introduction to Number Theory                                   | 4 | MEC ENG 151  | Advanced Heat Transfer                                      | 3 |
| MATH 116      | Cryptography  | 4 | MEC ENG 163  | Engineering Aerodynamics                                    | 3 |
| MATH 118      | Fourier Analysis, Wavelets, and Signal Processing               | 4 | MEC ENG 164  | Marine Statics and Structures                               | 3 |
| MATH 121A     | Mathematical Tools for the Physical Sciences                    | 4 | MEC ENG 165  | Ocean-Environment Mechanics                                 | 3 |
| MATH 121B     | Mathematical Tools for the Physical Sciences                    | 4 |              |   |   |
| MATH 123      | Ordinary Differential Equations                                 | 4 |              |   |   |
| MATH 124      | Programming for Mathematical Applications                       | 4 |              |   |   |
| MATH 125A     | Mathematical Logic  | 4 |              |   |   |
| MATH 126      | Introduction to Partial Differential Equations                  | 4 |              |   |   |

|               |  |   |               |   |   |
|---------------|--|---|---------------|---|---|
| MEC ENG 167   | Microscale Fluid Mechanics   | 3 | NUC ENG 175   | Methods of Risk Analysis  | 3 |
| MEC ENG 168   | Mechanics of Offshore Systems  | 3 | NUSCTX 103    | Nutrient Function and Metabolism                                  | 4 |
| MEC ENG 170   | Engineering Mechanics III  | 3 | NUSCTX 110    | Toxicology  | 4 |
| MEC ENG 173   | Fundamentals of Acoustics  | 3 | NUSCTX C114   | Pesticide Chemistry and Toxicology                                | 3 |
| MEC ENG 175   | Intermediate Dynamics  | 3 | NUSCTX 121    | Computational Toxicology  | 3 |
| MEC ENG C176  | Orthopedic Biomechanics  | 4 | NUSCTX C159   | Course Not Available  | 4 |
| MEC ENG C178  | Designing for the Human Body   | 4 | PHILOS 121    | Moral Questions of Data Science                                   | 4 |
| MEC ENG C180  | Engineering Analysis Using the Finite Element Method                 | 3 | PHILOS 128    | Philosophy of Science   | 4 |
| MEC ENG 185   | Introduction to Continuum Mechanics                                  | 3 | PHILOS 140A   | Intermediate Logic  | 4 |
| MCELLBI 100B  | Biochemistry: Pathways, Mechanisms, and Regulation                   | 4 | PHILOS 140B   | Intermediate Logic  | 4 |
| MCELLBI C100A | Biophysical Chemistry: Physical Principles and the Molecules of Life | 4 | PHILOS 142    | Philosophical Logic   | 4 |
| MCELLBI 102   | Survey of the Principles of Biochemistry and Molecular Biology       | 4 | PHILOS 143    | Modal Logic   | 4 |
| MCELLBI C103  | Bacterial Pathogenesis   | 3 | PHILOS 146    | Philosophy of Mathematics   | 4 |
| MCELLBI 104   | Genetics, Genomics, and Cell Biology                                 | 4 | PHYS ED C129  | Human Physiological Assessment                                    | 3 |
| MCELLBI 110   | Molecular Biology: Macromolecular Synthesis and Cellular Function    | 4 | PHYS ED C165  | Introduction to the Biomechanical Analysis of Human Movement      | 4 |
| MCELLBI C110L | General Biochemistry and Molecular Biology Laboratory                | 4 | PHYSICS 105   | Analytic Mechanics  | 4 |
| MCELLBI C112  | General Microbiology   | 4 | PHYSICS 110A  | Electromagnetism and Optics                                       | 4 |
| MCELLBI C114  | Introduction to Comparative Virology                                 | 4 | PHYSICS 110B  | Electromagnetism and Optics                                       | 4 |
| MCELLBI C116  | Microbial Diversity  | 3 | PHYSICS 111A  | Instrumentation Laboratory  | 4 |
| MCELLBI 130   | Course Not Available   | 4 | PHYSICS 111B  | Advanced Experimentation Laboratory (only when taken for 3 units) | 3 |
| MCELLBI 132   | Biology of Human Cancer  | 4 | PHYSICS 112   | Introduction to Statistical and Thermal Physics                   | 4 |
| MCELLBI 133L  | Physiology and Cell Biology Laboratory                               | 4 | PHYSICS 129   | Particle Physics  | 4 |
| MCELLBI C134  | Genome Organization and Nuclear Dynamics                             | 3 | PHYSICS 130   | Quantum and Nonlinear Optics                                      | 3 |
| MCELLBI 135A  | Topics in Cell and Developmental Biology: Molecular Endocrinology    | 3 | PHYSICS 137A  | Quantum Mechanics   | 4 |
| MCELLBI 136   | Physiology   | 4 | PHYSICS 137B  | Quantum Mechanics   | 4 |
| MCELLBI 137L  | Physical Biology of the Cell   | 4 | PHYSICS 138   | Modern Atomic Physics   | 3 |
| MCELLBI 140   | General Genetics   | 4 | PHYSICS 139   | Special Relativity and General Relativity                         | 3 |
| MCELLBI 140L  | Genetics Laboratory  | 4 | PHYSICS 141A  | Solid State Physics   | 4 |
| MCELLBI 141   | Developmental Biology  | 4 | PHYSICS 141B  | Solid State Physics   | 3 |
| MCELLBI 143   | Evolution of Genomes, Cells, and Development                         | 3 | PHYSICS 142   | Introduction to Plasma Physics                                    | 4 |
| MCELLBI C148  | Microbial Genomics and Genetics                                      | 4 | PHYSICS 151   | Elective Physics: Special Topics                                  | 3 |
| MCELLBI 149   | The Human Genome   | 3 | PHYSICS C161  | Relativistic Astrophysics and Cosmology                           | 4 |
| MCELLBI 150   | Molecular Immunology   | 4 | PHYSICS 177   | Principles of Molecular Biophysics                                | 3 |
| MCELLBI 150L  | Immunology Laboratory  | 4 | PLANTBI 101L  | Experimental Plant Biology Laboratory                             | 3 |
| MCELLBI 160   | Cellular and Molecular Neurobiology                                  | 4 | PLANTBI C103  | Bacterial Pathogenesis  | 3 |
| MCELLBI 160L  | Neurobiology Laboratory  | 4 | PLANTBI C107L | Principles of Plant Morphology with Laboratory                    | 4 |
| MCELLBI 161   | Course Not Available   | 4 | PLANTBI C109  | Evolution and Ecology of Development                              | 3 |
| MCELLBI 163L  | Course Not Available   | 4 | PLANTBI C110L | Biology of Fungi with Laboratory                                  | 4 |
| MCELLBI 165   | Course Not Available   | 3 | PLANTBI C112  | General Microbiology  | 4 |
| MCELLBI 166   | Biophysical Neurobiology   | 3 | PLANTBI 113   | California Mushrooms  | 3 |
| MUSIC 108     | Music Perception and Cognition                                       | 4 | PLANTBI C114  | Introduction to Comparative Virology                              | 4 |
| MUSIC 108M    | Music Perception and Cognition                                       | 4 | PLANTBI C116  | Microbial Diversity   | 3 |
| MUSIC 109     | Music Cognition: The Mind Behind the Musical Ear                     | 3 | PLANTBI 120   | Biology of Algae and Laboratory for Biology of Algae              | 4 |
| MUSIC 109M    | Music Cognition: The Mind Behind the Musical Ear                     | 3 | PLANTBI C124  | The Berkeley Lectures on Energy: Energy from Biomass              | 3 |
| NUC ENG 100   | Introduction to Nuclear Energy and Technology                        | 3 | PLANTBI C134  | Genome Organization and Nuclear Dynamics                          | 3 |
| NUC ENG 130   | Analytical Methods for Non-proliferation                             | 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   |
| POL SCI C135                              | Game Theory in the Social Sciences <sup>6</sup>                               | 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                                | Course Not Available  |     |
| 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 132                               | Artificial Intelligence for Health and Healthcare                             | 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 <sup>3</sup>   | 3   |
| UGBA 102B                                 | Managerial Accounting <sup>3</sup>  | 3   |
| UGBA 103                                  | Introduction to Finance <sup>4</sup>  | 4   |
| UGBA 106                                  | Marketing   | 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   |

<sup>1</sup> Other non-statistics UC Berkeley courses, such as IND ENG 172 and EECS 126, cannot be used to fulfill this requirement.

<sup>2</sup> 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.

<sup>3</sup> 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>).

<sup>4</sup> 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.

<sup>5</sup> MATH 170 cannot be combined with either IND ENG 160 or IND ENG 162.

<sup>6</sup> Due to overlap of course content, students may not use STAT 155 and ECON C110 / POL SCI C135 for the major.

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.

#### General Guidelines

1. All minors must be declared before the first day of instruction of their Expected Graduation Term (EGT).



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 within the unit ceiling. (For further information regarding the unit ceiling, please see the College Requirements tab.)
8. 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.

## 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 (LAB COURSE)                          | 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  | Experimental Design (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://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/entry-level-writing-requirement/>)

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 in sequential order 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, or two years for transfer students. 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://ue.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 2024, Summer 2024 8 Week Session, Spring 2024

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 2024, Summer 2024 8 Week Session, Spring 2024, Fall 2023, Spring 2023, Fall 2022, 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 2024, Summer 2024 8 Week Session, Spring 2024  
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 2024, Summer 2024 8 Week Session, Spring 2024  
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 2024 8 Week Session, Summer 2023 8 Week Session, Summer 2022 8 Week Session

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 may be 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: Spring 2024, Fall 2023, Spring 2023

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: Spring 2024, Fall 2023, Spring 2023

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; evaluating 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: Spring 2024, Summer 2023 8 Week Session, Spring 2023, Fall 2022

In this connector course we will state precisely and prove results discovered while exploring data in Data C8. 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 DATA C88S after completing STAT 134, STAT 140, STAT 135, or DATA C102.

### 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 probability 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: Fall 2023, Spring 2023, Fall 2022

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 2024, Summer 2024 8 Week Session, Spring 2024, Summer 2023 8 Week Session, Fall 2022, Fall 2021, 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 with a C- or better, or Pass; and COMPSCI 61A, COMPSCI/DATA C88C, or ENGIN 7 with a C- or better, or Pass; Corequisite: MATH 54, 56 or EECS 16A (C- or better, or Pass, required if completed prior to Data C100)

**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 - 3-3 hours of lecture, 1-1 hours of discussion, and 0-1 hours of laboratory per week

**Summer:** 8 weeks - 6-6 hours of lecture, 2-2 hours of discussion, and 0-2 hours of laboratory per week

### Additional Details

**Subject/Course Level:** Statistics/Undergraduate

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

**Instructors:** Gonzalez, Nourozi, Perez, Yan

**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 2024, Spring 2024, Fall 2023

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:** Math 54 or 56 or 110 or Stat 89A or Physics 89 or both of EECS 16A and 16B with a C- or better, or Pass; Data/Stat/CompSci C100 with a C- or better, or Pass; and any of EECS 126, Data/Stat C140, Stat 134, IndEng 172, Math 106 with a C- or better, or Pass. Data/Stat C140 or EECS 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 2024, Fall 2023, Spring 2023

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 2024, Spring 2024, Fall 2023

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 2024, Summer 2024 8 Week Session, Spring 2024

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 2024, Summer 2024 8 Week Session, Spring 2024

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 corequisite: 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 2024, Spring 2024, Fall 2023, Spring 2023

An introduction to probability, emphasizing the combined use of mathematics and programming. Discrete and continuous families of distributions. Bounds and approximations. Transforms and convergence. Markov chains and Markov Chain Monte Carlo. Dependence, conditioning, Bayesian methods. Maximum likelihood, least squares prediction, the multivariate normal, and multiple regression. Random permutations, symmetry, and order statistics. Use of numerical computation, graphics, simulation, and computer algebra.

Probability for Data Science: Read More [+]

### Objectives & Outcomes

**Course Objectives:** Data/Stat C140 is a probability course for Data C8 graduates who have taken more mathematics and wish to go deeper into data science. The emphasis on simulation and the bootstrap in Data C8 gives students a concrete sense of randomness and sampling variability. Data/Stat C140 capitalizes on this, abstraction and computation complementing each other throughout. Topics in statistical theory are included to allow students to proceed to modeling and statistical learning classes without taking a further semester of mathematical statistics.

**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:** DATA/COMPSCI/INFO/STAT C8, or both STAT 20 and one of COMPSCI 61A or COMPSCI/DATA C88C with C- or better, or Pass; and one year of calculus at the level of MATH 1A-1B or higher, with C- or better, or Pass. Corequisite: MATH 54, MATH 56, EECS 16B, MATH 110 or equivalent linear algebra (C- or better, or Pass, required if completed prior to enrollment in Data/Stat C140)

**Credit Restrictions:** Students will receive no credit for STAT C140 after completing STAT 134, or EECS 126.

### Hours & Format

#### Fall and/or spring:

15 weeks - 3-3 hours of lecture, 1-1 hours of discussion, 1-1 hours of supplement, and 0-1 hours of voluntary per week  
15 weeks - 3-3 hours of lecture, 2-2 hours of discussion, 0-0 hours of supplement, and 0-1 hours of voluntary 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 2024, Spring 2024, Fall 2023

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 2024, Spring 2024, Fall 2023

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 2024, Spring 2024, Fall 2023

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 2024, Spring 2024, Fall 2023

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, the combination of Data/Stat C140 and Data/Stat/CompSci C100, 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 2024, Summer 2024 8 Week Session, Spring 2024

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 2024, Fall 2023, Fall 2022

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 2024, Fall 2023, Spring 2023

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 Experimental Design 4 Units

Terms offered: Fall 2023, Spring 2023, Spring 2021

This course will review the statistical foundations of randomized experiments and study principles for addressing common setbacks in experimental design and analysis in practice. We will cover the notion of potential outcomes for causal inference and the Fisherian principles for experimentation (randomization, blocking, and replications). We will also cover experiments with complex structures (clustering in units, factorial design, hierarchy in treatments, sequential assignment, etc). We will also address practical complications in experiments, including noncompliance, missing data, and measurement error.

Experimental Design: Read More [+]

### Rules & Requirements

**Prerequisites:** Statistics 134 and Statistics 135 and experience with Software R, or consent of instructor

### 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.

Experimental Design: Read Less [-]

## STAT 159 Reproducible and Collaborative Statistical Data Science 4 Units

Terms offered: Spring 2023, Spring 2022, Spring 2021

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 165 Forecasting 3 Units

Terms offered: Spring 2024

Forecasting has been used to predict elections, climate change, and the spread of COVID-19. Poor forecasts led to the 2008 financial crisis. In our daily lives, good forecasting ability can help us plan our work, be on time to events, and make informed career decisions. This practically-oriented class will provide students with tools to make good forecasts, including Fermi estimates, calibration training, base rates, scope sensitivity, and power laws.

Forecasting: Read More [\[+\]](#)

### Objectives & Outcomes

**Course Objectives:** Discuss several historical instances of successful and unsuccessful forecasts.

Practice making forecasts about our own lives, about current events, and about scientific progress

**Student Learning Outcomes:** Formulate questions that are relevant to their own life or work.

Identify well-defined versus poorly-defined forecasting questions.

Provide forecasts that are well-calibrated.

Understand common forecasting pitfalls, such as improper independence assumptions, and how to identify and guard against them.

Understand how forecasts evolve across time in response to new information.

Use forecasts to inform decisions.

Utilize a variety of forecasting tools, such as base rates, to improve their forecasts.

Utilize and filter data across a variety of sources to inform their forecasts.

Work in teams to improve forecasts.

### Rules & Requirements

**Prerequisites:** Stat 134, Data/Stat C140, EECS 126, Math 106, IND ENG 172, or equivalent; and familiarity with Python; or consent of instructor. Strongly Recommended: Compsci 61A, Data/Compsci C88C, or equivalent

### 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. Alternative to final exam.

Forecasting: 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: Fall 2024, Spring 2024, Fall 2023

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 [-]