# Data Science

## Bachelor of Arts (BA)

The Data Science Major degree program combines computational and inferential reasoning to draw conclusions based on data about some aspect of the real world. Data scientists come from all walks of life, all areas of study, and all backgrounds. They share an appreciation for the practical use of mathematical and scientific thinking and the power of computing to understand and solve problems for business, research, and societal impact.

The Data Science Major will equip students to draw sound conclusions from data in context, using knowledge of statistical inference, computational processes, data management strategies, domain knowledge, and theory. Students will learn to carry out analyses of data through the full cycle of the investigative process in scientific and practical contexts. Students will gain an understanding of the human and ethical implications of data analytics and integrate that knowledge in designing and carrying out their work.

The Data Science major requirements include DATA C8 and DATA C100, the core lower-division and upper-division elements of the major, along with courses from each of the following requirement groups:

- Foundations in Mathematics and Computing
- Computational and Inferential Depth
- Modeling, Learning and Decision Making
- Probability
- Human Contexts and Ethics
- Domain Emphasis

All students will select a Domain Emphasis, a cluster of one lower division course and two upper division courses, that brings them into the context of a domain and allows them to build bridges with data science.

## Minor Program

The Minor in Data Science at UC Berkeley aims to provide students with practical knowledge of the methods and techniques of data analysis, as well as the ability to think critically about the construction and implications of data analysis and models. The minor will empower students across the wide array of campus disciplines with a working knowledge of statistics, probability, and computation that allow students not just to participate in data science projects, but to design and carry out rigorous computational and inferential analysis for their field of interest. Check the Data Science Minor program website (https://data.berkeley.edu/academics/data-science-undergraduate-studies/data-science-minor/) for details.

In addition to the University, campus, and college requirements, students must fulfill the below requirements specific to the major program. Please check the Data Science program website (https://data.berkeley.edu/academics/data-science-undergraduate-studies/data-science-major/) for updates.

## General Guidelines

- All courses taken to fulfill the major requirements below must be taken for letter-graded credit.
- No more than two upper-division courses can overlap between two majors.
- A minimum grade point average (GPA) of 2.0 must be maintained in all courses toward the major, and in all upper-division courses toward the major.

## Lower Division Prerequisites

<table>
<thead>
<tr>
<th>Course Type</th>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/COMPSCI/</td>
<td>DATA 100</td>
<td>Foundations of Data Science</td>
<td>4</td>
</tr>
<tr>
<td>or STAT 20</td>
<td>Introduction to Probability and Statistics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or STAT 89A</td>
<td>Linear Algebra for Data Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or STAT 89B</td>
<td>Linear Algebra for Data Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or EECS 16A</td>
<td>Designing Information Devices and Systems I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or EECS 16B</td>
<td>Designing Information Devices and Systems II</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or PHYSICS 89</td>
<td>Introduction to Mathematical Physics</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>COMPSCI 61A</td>
<td>The Structure and Interpretation of Computer Programs</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or DATA C88C</td>
<td>Computational Structures in Data Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or COMPSCI C88C</td>
<td>Computational Structures in Data Science</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>or ENGIN 7</td>
<td>Introduction to Computer Programming for Scientists and Engineers</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>COMPSCI 61B</td>
<td>Data Structures</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

1. Students may substitute Stat 20 for Data C8 toward the major when combined with CS 61A or CS 88/Data C88C; this option is not available for students who take Engin 7 for their Program Structures requirement. See the lower-division requirements (https://data.berkeley.edu/academics/data-science-undergraduate-studies/data-science-major/requirements-lower-division/) page on the Data Science program website for more details.

## Lower Division Requirements

Students will also be required to take one lower division course towards their choice of Domain Emphasis.

## Upper Division Requirements

Students will be required to complete 8 unique upper-division courses for a total of 28 or more units from the following requirement categories.

### Principles and techniques of data science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/COMPSCI/</td>
<td>Principles &amp; Techniques of Data Science</td>
<td>4</td>
</tr>
<tr>
<td>STAT C100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Computational and Inferential Depth

Students will be required to take two upper division courses comprising 7 or more units that provide computational and inferential depth beyond that provided in Data 100 and the lower-division courses.

### Choose two courses comprising 7+ units from the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTRON 128</td>
<td>Astronomy Data Science Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>COMPSCI 161</td>
<td>Computer Security</td>
<td>4</td>
</tr>
<tr>
<td>COMPSCI 162</td>
<td>Operating Systems and System Programming</td>
<td>4</td>
</tr>
<tr>
<td>COMPSCI 164</td>
<td>Programming Languages and Compilers</td>
<td>4</td>
</tr>
</tbody>
</table>
Choose one of the following:

- DATA/STAT C140: Probability for Data Science
- MATH 106: Mathematical Probability Theory
The Honors versions of these courses (where applicable) will also be learn numerical approximation and optimal decision methods, as well as competencies in advanced calculus and linear algebra, students can to data science and mathematical modeling. Apart from gaining core students the opportunity to explore mathematical techniques essential to these courses from nontraditional paths, for whom these courses should count towards the DE.

**Applied Mathematics and Modeling**

The Applied Mathematics and Modeling domain emphasis gives students the opportunity to explore mathematical techniques essential to data science and mathematical modeling. Apart from gaining core competencies in advanced calculus and linear algebra, students can learn numerical approximation and optimal decision methods, as well as gain experience in their implementation in parallel programming.

*The Honors versions of these courses (where applicable) will also be accepted.*

**Lower Division (choose one)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 53</td>
<td>4</td>
</tr>
<tr>
<td>MATH 55</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (choose two)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIV ENG C133/MEC ENG C180</td>
<td>3</td>
</tr>
<tr>
<td>EECS 127</td>
<td>4</td>
</tr>
<tr>
<td>ENGIN 150</td>
<td>4</td>
</tr>
<tr>
<td>IND ENG 160</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 162</td>
<td>3</td>
</tr>
<tr>
<td>MATH 104</td>
<td>4</td>
</tr>
<tr>
<td>MATH 110</td>
<td>4</td>
</tr>
<tr>
<td>MATH 113</td>
<td>4</td>
</tr>
<tr>
<td>MATH 118</td>
<td>4</td>
</tr>
<tr>
<td>MATH 128A</td>
<td>4</td>
</tr>
</tbody>
</table>

**Business and Industrial Analytics**

The Business and Industrial Analytics domain emphasis allows students to explore the principles and methods of making data-driven decisions under uncertainty in the worlds of business and industry. Students will learn how to approach management decisions from economic, probabilistic, and computational perspectives, and how to analyze and manage risk.

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 1</td>
<td>4</td>
</tr>
<tr>
<td>ECON 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 53</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>IND ENG 115</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 120</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 130</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 153</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 166</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 104</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 134</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 141</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 142</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 161</td>
<td>3</td>
</tr>
</tbody>
</table>

**Cognition**

The Cognition domain emphasis introduces students to fundamental scientific questions about how the human mind works. It gives them the opportunity to pursue one or more disciplinary approaches, including psychology, neuroscience, and linguistics, and to consider computational models of mind.

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COG SCI 1/1B/PSYCH C61/PSYCH C64</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGIN C233</td>
<td>3</td>
</tr>
</tbody>
</table>

We recognize in general that to satisfy the prerequisites for these courses below, a student will have already satisfied the Domain Emphasis. Because these courses are natural to include in this emphasis, they will function as an elective for many students who take them. They are included here merely for those students who get to these courses from nontraditional paths, for whom these courses should count towards the DE.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 128B</td>
<td>4</td>
</tr>
</tbody>
</table>

**Data Science**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPSCI C267/</td>
<td>3</td>
</tr>
<tr>
<td>ENGIN C233</td>
<td>3</td>
</tr>
</tbody>
</table>

For students completing the lower-division requirement outside of UC Berkeley at a college where microeconomics and macroeconomics are offered as separate courses, only microeconomics is required for the Data Science BA. However, note that full equivalence to Econ 1 may still be required as a prerequisite to other courses you wish to take at UC Berkeley.

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 1</td>
<td>4</td>
</tr>
<tr>
<td>ECON 2</td>
<td>4</td>
</tr>
<tr>
<td>MATH 53</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>IND ENG 115</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 120</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 130</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 153</td>
<td>3</td>
</tr>
<tr>
<td>IND ENG 166</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 104</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 134</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 141</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 142</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 161</td>
<td>3</td>
</tr>
</tbody>
</table>
**Computational Methods in Molecular and Genomic Biology**

This domain emphasis will prepare students for work or graduate school in bioinformatics and computational biology with a focus on molecular biology and genomics. Students with this emphasis will be able to understand the mechanisms of cellular processing of genetic data and will prepare them for computational analyses of DNA sequencing data and other molecular biological data.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COG SCI C100/PSYCH C120</td>
<td>Basic Issues in Cognition</td>
<td>3</td>
</tr>
<tr>
<td>COG SCI C101/LINGUIS C105</td>
<td>Cognitive Linguistics</td>
<td>4</td>
</tr>
<tr>
<td>COG SCI/PSYCH C126</td>
<td>Perception</td>
<td>3</td>
</tr>
<tr>
<td>COG SCI/PSYCH C127</td>
<td>Cognitive Neuroscience</td>
<td>3</td>
</tr>
<tr>
<td>COG SCI 131/PSYCH C123</td>
<td>Computational Models of Cognition</td>
<td>4</td>
</tr>
<tr>
<td>COG SCI 132</td>
<td>Rhythms of the Brain: from Neuronal Communication to Function</td>
<td>4</td>
</tr>
<tr>
<td>COG SCI 150</td>
<td>Sensemaking and Organizing</td>
<td>3</td>
</tr>
<tr>
<td>COG SCI 180</td>
<td>Mind, Brain, and Identity</td>
<td>3</td>
</tr>
<tr>
<td>COG SCI 190</td>
<td>Special Topics in Cognitive Science (Data Science and Cognition -- only when offered with this topic)</td>
<td>3</td>
</tr>
<tr>
<td>COMPSCI 188</td>
<td>Introduction to Artificial Intelligence</td>
<td>4</td>
</tr>
<tr>
<td>MUSIC 108</td>
<td>Music Perception and Cognition</td>
<td>4</td>
</tr>
<tr>
<td>MUSIC 108/MUSIC 108A/Music Perception and Cognition</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>PSYCH 114</td>
<td>Biology of Learning</td>
<td>3</td>
</tr>
<tr>
<td>PSYCH 117</td>
<td>Human Neuropsychology</td>
<td>3</td>
</tr>
<tr>
<td>PSYCH 131</td>
<td>Developmental Psychopathology</td>
<td>3</td>
</tr>
<tr>
<td>LINGUIS C146</td>
<td>Language Acquisition</td>
<td>3</td>
</tr>
</tbody>
</table>

**DATA ARTS AND HUMANITIES**

The Data Arts and Humanities domain emphasis allows students to explore and engage data science practices across the humanities and arts. In addition to investigating the place of data in humanistic inquiry and creative work in broad terms, students can learn current data arts and humanities methods specific to different disciplines and departments, as and together with critical inquiry.

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ART 23AC</td>
<td>DIGITAL MEDIA: FOUNDATIONS</td>
<td>4</td>
</tr>
<tr>
<td>HISTORY 88</td>
<td>How Does History Count?</td>
<td>2</td>
</tr>
<tr>
<td>L &amp; S 88</td>
<td>Data Science Connector (Rediscovering Text as Data (only when offered with this topic))</td>
<td>2-4</td>
</tr>
<tr>
<td>L &amp; S 88</td>
<td>Data Science Connector (Rediscovering Text as Data (only when offered with this topic))</td>
<td>2-4</td>
</tr>
<tr>
<td>MUSIC 30</td>
<td>Computational Creativity for Music and the Arts</td>
<td>4</td>
</tr>
<tr>
<td>RHETOR 10</td>
<td>Introduction to Practical Reasoning and Critical Analysis of Argument</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIGHUM 100</td>
<td>Theory and Method in the Digital Humanities (summer only)</td>
<td>3</td>
</tr>
<tr>
<td>DIGHUM 101</td>
<td>Python Programming for Digital Humanities (summer only)</td>
<td>3</td>
</tr>
<tr>
<td>DIGHUM 150A</td>
<td>Digital Humanities and Archival Design (summer only)</td>
<td>3</td>
</tr>
<tr>
<td>DIGHUM 150B</td>
<td>Digital Humanities and Visual and Spatial Analysis (summer only)</td>
<td>3</td>
</tr>
<tr>
<td>DIGHUM 150C</td>
<td>Digital Humanities and Text and Language Analysis (summer only)</td>
<td>3</td>
</tr>
<tr>
<td>DIGHUM 160</td>
<td>Critical Digital Humanities (summer only)</td>
<td>3</td>
</tr>
<tr>
<td>GLOBAL 140</td>
<td>Special Topics in Global Societies and Cultures (Mapping Diasporas: Jewish Culture, Museums, and Digital Humanities (only when offered with this topic))</td>
<td>4</td>
</tr>
<tr>
<td>or JEWISH 121</td>
<td>Topics in Jewish Arts and Culture</td>
<td>3</td>
</tr>
<tr>
<td>HISTART C109/ENGLISH C181</td>
<td>Digital Humanities, Visual Cultures</td>
<td>4</td>
</tr>
<tr>
<td>HISTORY 133D</td>
<td>Calculating Americans: Big Histories of Small Data</td>
<td>4</td>
</tr>
<tr>
<td>HISTART 190T</td>
<td>Transcultural (VR and Its Prehistories (only when offered with this topic))</td>
<td>4</td>
</tr>
<tr>
<td>HISTART 192DH</td>
<td>Undergraduate Seminar: Digital Imaging and Forensic Art History</td>
<td>4</td>
</tr>
<tr>
<td>INFO 103</td>
<td>History of Information</td>
<td>4</td>
</tr>
<tr>
<td>INFO 159</td>
<td>Natural Language Processing</td>
<td>4</td>
</tr>
</tbody>
</table>
and the ecosystems they inhabit shed light on the behavior, abundance and distribution of living organisms emerging diverse data sources from gene sequencing to satellites that. The domain emphasis in Ecology and Environment explores the rapidly

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 100A</td>
<td>Microeconomics</td>
<td>4</td>
</tr>
<tr>
<td>or ECON 101A</td>
<td>Microeconomics (Math Intensive)</td>
<td>4</td>
</tr>
<tr>
<td>ECON/MATH C103</td>
<td>Introduction to Mathematical Economics</td>
<td>4</td>
</tr>
<tr>
<td>MATH C103</td>
<td>Introduction to Mathematical Economics</td>
<td>4</td>
</tr>
<tr>
<td>ECON 104</td>
<td>Advanced Microeconomic Theory</td>
<td>4</td>
</tr>
<tr>
<td>ECON C110/N110/POL SCI C135</td>
<td>Game Theory in the Social Sciences</td>
<td>4</td>
</tr>
<tr>
<td>ECON 119</td>
<td>Psychology and Economics</td>
<td>4</td>
</tr>
<tr>
<td>ECON 121</td>
<td>Industrial Organization and Public Policy</td>
<td>4</td>
</tr>
<tr>
<td>ECON C125/ENVECON C101</td>
<td>Environmental Economics</td>
<td>4</td>
</tr>
<tr>
<td>ECON 136</td>
<td>Financial Economics</td>
<td>4</td>
</tr>
<tr>
<td>ECON 139</td>
<td>Asset Pricing and Portfolio Choice</td>
<td>4</td>
</tr>
<tr>
<td>ECON 140</td>
<td>Econometrics</td>
<td>4</td>
</tr>
<tr>
<td>or ECON 141</td>
<td>Econometrics (Math Intensive)</td>
<td>4</td>
</tr>
<tr>
<td>ECON/PUB POL C142/POL SCI C131A</td>
<td>Applied Econometrics and Public Policy</td>
<td>4</td>
</tr>
</tbody>
</table>

### Ecology and the Environment

The domain emphasis in Ecology and Environment explores the rapidly emerging diverse data sources from gene sequencing to satellites that shed light on the behavior, abundance and distribution of living organisms and the ecosystems they inhabit.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>L &amp; S/ESPM C46</td>
<td>Climate Change and the Future of California</td>
<td>4</td>
</tr>
<tr>
<td>EPS 80</td>
<td>Environmental Earth Sciences</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 15</td>
<td>Introduction to Environmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 2</td>
<td>The Biosphere</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 6</td>
<td>Environmental Biology</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 88B</td>
<td>Data Sciences in Ecology and the Environment</td>
<td>2</td>
</tr>
<tr>
<td>GEOG 40</td>
<td>Introduction to Earth System Science</td>
<td>4</td>
</tr>
</tbody>
</table>

### Environment, Resource Management, and Society

The Domain Emphasis in Environment, Resource Management, and Society explores the interface of economics and policy with ecological and environmental sciences. Topics include climate change, agroecology, energy policy, natural resources, sociology, and culture.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESPM C103/INTEGBI C156</td>
<td>Principles of Conservation Biology</td>
<td>4</td>
</tr>
<tr>
<td>ESPM 111</td>
<td>Ecosystem Ecology</td>
<td>4</td>
</tr>
<tr>
<td>ESPM/EPS C129</td>
<td>Biometeorology</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 130A</td>
<td>Forest Hydrology</td>
<td>4</td>
</tr>
<tr>
<td>ESPM/INTEGBI C153</td>
<td>Ecology</td>
<td>3</td>
</tr>
<tr>
<td>INTEGBI 170LF</td>
<td>Methods in Population and Community Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 157</td>
<td>Data Science in Global Change Ecology</td>
<td>4</td>
</tr>
<tr>
<td>ESPM C170/EPS C183</td>
<td>Carbon Cycle Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 174A</td>
<td>Applied Time Series Analysis for Ecology and Environmental Sciences</td>
<td>3</td>
</tr>
<tr>
<td>CIV ENG C106/EPS C180/ESPM C180</td>
<td>Air Pollution</td>
<td>3</td>
</tr>
</tbody>
</table>
Evolution and Biodiversity

The domain emphasis in Evolution and Biodiversity explores the origins and evolution of the astounding diversity of life on earth. Topics include the analyses and understanding of diverse data from fossils to genomes from our deep past to better understand our planet today.

Lower Division (select one)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVECON C100</td>
<td>Introduction to Culture and Natural Resource Management</td>
<td>4</td>
</tr>
<tr>
<td>ECON C125</td>
<td>Environmental Economics</td>
<td>4</td>
</tr>
<tr>
<td>EPS 50AC</td>
<td>Intermediate Microeconomics with Applications to Sustainability</td>
<td>4</td>
</tr>
</tbody>
</table>

Upper Division (select two)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTEGBI C109</td>
<td>Evolution and Ecology of Development</td>
<td>3</td>
</tr>
<tr>
<td>INTEGBI 113L</td>
<td>Paleobiological Perspectives on Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>INTEGBI 117 &amp; 117LF</td>
<td>Medical Ethnobotany and Medical Ethnobotany Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>INTEGBI 141</td>
<td>Human Genetics</td>
<td>3</td>
</tr>
<tr>
<td>or INTEGBI 16</td>
<td>Human Genetics and Genomics</td>
<td>4</td>
</tr>
<tr>
<td>INTEGBI C160/</td>
<td>Evolution</td>
<td>4</td>
</tr>
<tr>
<td>MCELLBI C144</td>
<td>or INTEGBI 16/Evolution and Earth History: From Genes to Fossils</td>
<td>4</td>
</tr>
<tr>
<td>ENS 102D</td>
<td>Data Structures, Ethnography, and Politics</td>
<td>4</td>
</tr>
<tr>
<td>EPS 105</td>
<td>Social and Political Ecology of Agro-Food Systems</td>
<td>4</td>
</tr>
<tr>
<td>EPS 116</td>
<td>Political Ecology</td>
<td>4</td>
</tr>
<tr>
<td>EPS 118</td>
<td>Grassland and Woodland Management and Conservation</td>
<td>4</td>
</tr>
</tbody>
</table>

Evolution and Biodiversity

The domain emphasis in Evolution and Biodiversity explores the origins and evolution of the astounding diversity of life on earth. Topics include the analyses and understanding of diverse data from fossils to genomes from our deep past to better understand our planet today.

Lower Division (select one)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOLOGY 1A</td>
<td>General Biology Lecture</td>
<td>3</td>
</tr>
<tr>
<td>BIOLOGY 1B</td>
<td>General Biology Lecture and Laboratory</td>
<td>4</td>
</tr>
</tbody>
</table>

Upper Division (select two)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ES&amp;P 105</td>
<td>Natural History Museums and Biodiversity Science</td>
<td>3</td>
</tr>
<tr>
<td>EPS 116B</td>
<td>Environmental Change Genetics</td>
<td>3</td>
</tr>
<tr>
<td>EPS 125/</td>
<td>Biogeography</td>
<td>4</td>
</tr>
<tr>
<td>GEOG C148/</td>
<td>INTEGBI C166</td>
<td>3</td>
</tr>
<tr>
<td>ESPM 152</td>
<td>Global Change Biology</td>
<td>3</td>
</tr>
</tbody>
</table>

Human and Population Health

The goal of the domain emphasis in Human and Population Health is to expose students to questions, data structures, and methodology related to research in subject-matter areas such as epidemiology, environmental health, nutrition, toxicology, metabolic diseases, infectious diseases, and cancer. This includes the formulation of meaningful research questions, the development of sound study designs, data collection, exploratory data analysis, the application of pertinent statistical and computational methods, and the interpretation and validation of results.
The domain emphasis in Human Behavior and Psychology engages students with fundamental aspects of individual and group behavior and the factors and processes that influence it, as explored in the cognitive, behavioral, and economic sciences.

**Lower Division (select one)**
- BIOLOGY 1A General Biology Lecture 3
- BIOLOGY 1B General Biology Lecture and Laboratory 4
- MCELLBI 50 The Immune System and Disease 4

**Upper Division (select two)**
- DEMOG 110 Introduction to Population Analysis 3
- INTEGBI 114 Infectious Disease Dynamics 4
- INTEGBI 116L Medical Parasitology 4
- INTEGBI 132 Human Physiology 4
- INTEGBI 137 Human Endocrinology 4
- INTEGBI 140 Biology of Human Reproduction 4
- MCELLBI 132 Biology of Human Cancer 4
- NUSCTX 110 Toxicology 4
- NUSCTX 121 Computational Toxicology 3
- NUSCTX 160 Metabolic Bases of Human Health and Diseases 4
- 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 181 Poverty and Population 3

**Human Behavior and Psychology**

The domain emphasis in Human Behavior and Psychology engages students with fundamental aspects of individual and group behavior and the factors and processes that influence it, as explored in the cognitive, behavioral, and economic sciences.

**Lower Division (select one)**
- COG SCI 1/1B/ N1 Introduction to Cognitive Science 4
- PSYCH 1 General Psychology 3
- PSYCH 2 Principles of Psychology 3

**Upper Division (select two)**
- COG SCI C131/ PSYCH C123 Computational Models of Cognition 4
- ECON C110/ POL SCI C135 Game Theory in the Social Sciences 4
- ECON 119 Psychology and Economics 4
- PSYCH 101D Data Science for Research Psychology 4
- PSYCH 110 Introduction to Biological Psychology 3
- PSYCH 124 The Evolution of Human Behavior 3
- PSYCH 130 Clinical Psychology 3
- PSYCH 134 Health Psychology 3
- or PSYCH N134 Health Psychology
- PSYCH 140 Developmental Psychology 3
- PSYCH 150 Psychology of Personality 3
- PSYCH 156 Human Emotion 3
- PSYCH 160 Social Psychology 3
- or SOCIOL 150 Social Psychology
- PSYCH 167AC Stigma and Prejudice 3
- UGBA 160 Customer Insights 3

**Inequalities in Society**

The Inequalities in Society domain emphasis explores the nature, causes, and consequences of social inequalities, with special attention to race and ethnicity, social class, and gender. Students will develop an understanding of how scientists conceptualize and study social inequalities and the methodological tools they use to do so.

**Lower Division (select one)**
- DATA 4AC Data and Justice 4
- SOCIOL 1 Introduction to Sociology 4
- SOCIOL 3AC Principles of Sociology: American Cultures 4

**Upper Division (select two)**
- AFRICAM 101 Research Methods for African American Studies 4
- or ETH STD 10 Social Science Methods in Ethnic Studies
- AFRICAM 111 Race, Class, and Gender in the United States 3
- GEOG C155/ AFRICAM C156 Race, Space, and Inequality 4
- GWS 131 Gender and Science 4
- PHILOS 117AC The Philosophy of Race, Ethnicity, and Citizenship 4
- POL SCI 167 Racial and Ethnic Politics in the New American Century 3
- PSYCH 167AC Stigma and Prejudice 3
- PUB POL C103 Wealth and Poverty 4
- PUB POL 117AC Race, Ethnicity, and Public Policy 4
- SOCIOL 111AC Sociology of the Family 4
- SOCIOL 113 Sociology of Education 4
- SOCIOL 113AC Sociology of Education 4
- SOCIOL 124 Sociology of Poverty 4
- SOCIOL 127 Development and Globalization 4
- SOCIOL 130 Social Inequalities 4
- SOCIOL 130AC Social Inequalities: American Cultures 4
- SOCIOL 131AC Race and Ethnic Relations: U.S. American Cultures 4
- SOCIOL 133 Sociology of Gender 4

**Linguistic Sciences**

The domain emphasis in Linguistic Sciences explores the data-driven analysis of language. Topics include linguistic structure (phonetics, phonology, morphology, syntax), logic and the philosophy of language, natural language processing, and empirical approaches to reasoning about language as data.

**Lower Division (select one)**
- LINGUIS 100 Introduction to Linguistic Science 4
- PHILOS 12A Introduction to Logic 4

**Upper Division (select two)**
- LINGUIS 100 Introduction to Linguistic Science 4
- LINGUIS 108 Psycholinguistics 3
- LINGUIS 110 Phonetics 4
- LINGUIS 111 Phonology 4
- LINGUIS 113 Experimental Phonetics 3
- LINGUIS 115 Morphology 4
- LINGUIS 120 Syntax 4
- LINGUIS 121 Formal Semantics 4
The domain emphasis in Organizations and the Economy explores economic behavior of firms and governments. What is the nature of work in modern capitalism?

**Neurosciences**
The Neuroscience domain emphasis provides students with expertise in models and methods of computational neuroscience, including data analysis and theoretical models of information processing in the brain. Students with this emphasis will be able to apply statistical analyses to extract patterns embedded in high-dimensional neuroscience datasets (multi-unit recordings, optical imaging, EEG, fMRI), and develop computational models toward elucidating neural mechanisms of information processing in the brain.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCH 61</td>
<td>Brain, Mind, and Behavior</td>
<td>3</td>
</tr>
<tr>
<td>PSYCH 64</td>
<td>Exploring the Brain: Introduction to Neuroscience</td>
<td>3</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**
- ANTHRO 107  Evolution of the Human Brain  4
- COG SCI C127  Cognitive Neuroscience  3
- INTEGBI 139  The Neurobiology of Stress  4
- MCELLBI 160  Cellular and Molecular Neurobiology  4
- MCELLBI 166  Biophysical Neurobiology  3
- PSYCH C113/  Biological Clocks: Physiology and Behavior  3
- INTEGBI C143A
- PSYCH 117  Human Neuropsychology  3
- PSYCH 125  The Developing Brain  3

**Organizations and the Economy**
The domain emphasis in Organizations and the Economy explores the social construction of markets and the role of organizations and institutions in the contemporary economy. How can we understand the economic behavior of firms and governments? What is the nature of work in modern capitalism?

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA 4AC</td>
<td>Data and Justice</td>
<td>4</td>
</tr>
<tr>
<td>SOCIOL 1</td>
<td>Introduction to Sociology</td>
<td>4</td>
</tr>
<tr>
<td>SOCIOL 3AC</td>
<td>Principles of Sociology: American Cultures</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**
- ECON 121  Industrial Organization and Public Policy  4
- ECON 131  Public Economics  4
- ENVECON 142  Industrial Organization with Applications to Agriculture and Natural Resources  4
- GEOG 110  Critical Economic Geographies  4
- GWS 139  Why Work? Gender and Labor Under Capitalism  4
- SOCIOL 110  Organizations and Social Institutions  4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOCIOL 116</td>
<td>Sociology of Work</td>
<td>4</td>
</tr>
<tr>
<td>SOCIOL 119S</td>
<td>Organizational Strategy and Design: A Sociological Perspective</td>
<td>4</td>
</tr>
<tr>
<td>SOCIOL 120</td>
<td>Economy and Society</td>
<td>4</td>
</tr>
<tr>
<td>SOCIOL 121</td>
<td>Innovation and Entrepreneurship: Social and Cultural Context</td>
<td>4</td>
</tr>
<tr>
<td>UGBA 105</td>
<td>Leading People</td>
<td>3</td>
</tr>
<tr>
<td>UGBA 107</td>
<td>The Social, Political, and Ethical Environment of Business</td>
<td>3</td>
</tr>
</tbody>
</table>

**Philosophical Foundations: Evidence and Inference**
When do data confirm a hypothesis or a theory? What do we do when several different hypotheses or theories are consistent with the data? When, if ever, is inductive inference justified? How are models related to what they model? When is reasoning good reasoning? Which conclusions can be inferred from which premises? How does it depend on what we are reasoning about: arithmetic, the physical world, what exists, what is possible, what is known? What are we saying when we say that something is likely or unlikely to occur? What are we saying when we say that one event caused another? Are we saying something about the world or merely something about us, about what we have observed and what we now expect?

**Lower Division (select one)**
- L & S 22  Sense and Sensibility and Science  4
- MATH 55  Discrete Mathematics  4
- PHILOS 4  Knowledge and Its Limits  4
- PHILOS 5  Science and Human Understanding  4
- PHILOS 12A  Introduction to Logic  4

**Upper Division (select two)**
- MATH 125A  Mathematical Logic  4
- MATH 135  Introduction to the Theory of Sets  4
- MATH 136  Incompleteness and Undecidability  4
- PHILOS 122  Theory of Knowledge  4
- PHILOS 125  Metaphysics  4
- PHILOS 128  Philosophy of Science  4
- PHILOS 134  Form and Meaning  4
- PHILOS 140A  Intermediate Logic  4
- PHILOS 140B  Intermediate Logic  4
- PHILOS 142  Philosophical Logic  4
- PHILOS 143  Modal Logic  4
- PHILOS 146  Philosophy of Mathematics  4
- PHILOS 148  Probability and Induction  4
- PHILOS 149  Special Topics in Philosophy of Logic and Mathematics  4
- RHETOR 107  Rhetoric of Scientific Discourse  4

**Philosophical Foundations: Minds, Morals, and Machines**
Can machines think? Can they be conscious? Do they have rights? To answer these questions, we need to understand the nature of thought and consciousness is, and the basis of rights. In virtue of what do we count as thinking or conscious? In virtue of what do we have rights? Increasingly, algorithms are replacing human beings as decision makers. Can machines be the basis of rights? Are we entitled to an explanation of algorithmic decisions? Is it paternalistic or anti-democratic to design
algorithms that don’t give you what you want, if that will mislead you or make you unhappy?

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COG 1/1B/N1</td>
<td>Introduction to Cognitive Science</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 2</td>
<td>Individual Morality and Social Justice</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 3</td>
<td>The Nature of Mind</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 14</td>
<td>Philosophy of Artificial Intelligence</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COG SCI C100/PSYCH C120</td>
<td>Basic Issues in Cognition</td>
<td>3</td>
</tr>
<tr>
<td>COG SCI C101/LINGUIS C105</td>
<td>Cognitive Linguistics</td>
<td>4</td>
</tr>
<tr>
<td>COG SCI C131/PSYCH C123</td>
<td>Computational Models of Cognition</td>
<td>4</td>
</tr>
<tr>
<td>COG SCI/LINGUIS C142</td>
<td>Language and Thought</td>
<td>3</td>
</tr>
<tr>
<td>ECON C110/POL SCI C135</td>
<td>Game Theory in the Social Sciences</td>
<td>4</td>
</tr>
<tr>
<td>STAT 155</td>
<td>Game Theory</td>
<td>3</td>
</tr>
<tr>
<td>PHILOS 104</td>
<td>Ethical Theories</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 115</td>
<td>Political Philosophy</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 132</td>
<td>Philosophy of Mind</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 133</td>
<td>Philosophy of Language</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 135</td>
<td>Theory of Meaning</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 136</td>
<td>Philosophy of Perception</td>
<td>4</td>
</tr>
<tr>
<td>PHILOS 141</td>
<td>Philosophy and Game Theory</td>
<td>4</td>
</tr>
</tbody>
</table>

**Physical Science Analytics**

The Physical Science Analytics domain emphasis allows students to explore ways that data analytics, inference, computational simulation and modeling, uncertainty analysis, and prediction arise in physical science and engineering domains.

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICS 5BL &amp; PHYSICS 5CL</td>
<td>Introduction to Experimental Physics I and Introduction to Experimental Physics II</td>
<td>2</td>
</tr>
<tr>
<td>PHYSICS 7A</td>
<td>Physics for Scientists and Engineers</td>
<td>4</td>
</tr>
<tr>
<td>PHYSICS 77</td>
<td>Introduction to Computational Techniques in Physics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTRON 120</td>
<td>Optical and Infrared Astronomy Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ASTRON 121</td>
<td>Radio Astronomy Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ASTRON 128</td>
<td>Astronomy Data Science Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ASTRON C161</td>
<td>Relativistic Astrophysics and Cosmology</td>
<td>4</td>
</tr>
<tr>
<td>ASTRON C162</td>
<td>Planetary Astrophysics</td>
<td>4</td>
</tr>
<tr>
<td>CIV ENG C133/MEC ENG C180</td>
<td>Engineering Analysis Using the Finite Element Method</td>
<td>3</td>
</tr>
<tr>
<td>ENGIN 150</td>
<td>Basic Modeling and Simulation Tools for Industrial Research Applications</td>
<td>4</td>
</tr>
<tr>
<td>EPS 108</td>
<td>Geodynamics</td>
<td>4</td>
</tr>
<tr>
<td>EPS 109</td>
<td>Computer Simulations with Jupyter Notebooks</td>
<td>4</td>
</tr>
<tr>
<td>EPS 122</td>
<td>Physics of the Earth and Planetary Interiors</td>
<td>3</td>
</tr>
<tr>
<td>EPS C183/ESPM C170</td>
<td>Carbon Cycle Dynamics</td>
<td>3</td>
</tr>
</tbody>
</table>

**Quantitative Social Science**

The Quantitative Social Science domain emphasis provides students with expertise in various methodologies used in quantitative social science research and analysis. Topics include mathematical modeling, description of patterns and trends, statistical modeling, and testing of social scientific hypotheses.

**Lower Division (select one)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 1</td>
<td>Introduction to Economics</td>
<td>4</td>
</tr>
<tr>
<td>or ECON 2</td>
<td>Introduction to Economics--Lecture Format</td>
<td>4</td>
</tr>
<tr>
<td>SOCIO 1</td>
<td>Introduction to Sociology</td>
<td>4</td>
</tr>
<tr>
<td>SOCIO 3AC</td>
<td>Principles of Sociology: American Cultures</td>
<td>4</td>
</tr>
<tr>
<td>SOCIO 5</td>
<td>Evaluation of Evidence</td>
<td>4</td>
</tr>
<tr>
<td>POL SCI 3</td>
<td>Introduction to Empirical Analysis and Quantitative Methods</td>
<td>4</td>
</tr>
<tr>
<td>POL SCI 88</td>
<td>The Scientific Study of Politics</td>
<td>2</td>
</tr>
</tbody>
</table>

**Upper Division (select two)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEMOG 110</td>
<td>Introduction to Population Analysis</td>
<td>3</td>
</tr>
<tr>
<td>DEMOG/SOCIO 126</td>
<td>Introduction to Sociology</td>
<td>4</td>
</tr>
<tr>
<td>DEMOG/ECON C175</td>
<td>Economic Demography</td>
<td>4</td>
</tr>
<tr>
<td>DEMOG 180</td>
<td>Social Networks</td>
<td>4</td>
</tr>
<tr>
<td>ECON C110/POL SCI C135/W135</td>
<td>Game Theory in the Social Sciences</td>
<td>4</td>
</tr>
<tr>
<td>ENVECON/IAS C118</td>
<td>Introductory Applied Econometrics</td>
<td>4</td>
</tr>
<tr>
<td>MEDIAST 130</td>
<td>Research Methods in Media Studies</td>
<td>4</td>
</tr>
<tr>
<td>POL SCI 132B</td>
<td>Machine Learning for Social Scientists</td>
<td>4</td>
</tr>
<tr>
<td>POL SCI 133</td>
<td>Selected Topics in Quantitative Methods</td>
<td>4</td>
</tr>
<tr>
<td>SOCIO 106</td>
<td>Quantitative Sociological Methods</td>
<td>4</td>
</tr>
</tbody>
</table>

**Robotics**

The goal of the domain emphasis in Robotics is to provide a pathway into the field of robotics, which includes the design and control of robots as well as the study of relationships between robots and nature. Topics include manipulation and control, decision making grounded in the physical world, embedded systems, mechatronics, and human-robot interaction.
institutions, policy, and various forms of global social inequality. It constructed, contingent, and contested and how they interact with science, technology, and medicine. It explores how these fields are students with critical capacities to engage with a world shaped by The Science, Technology, and Society (STS) domain emphasis provides Science, Technology, and Society

10

The Science, Technology, and Society (STS) domain emphasis provides

Science, Technology, and Society

The Science, Technology, and Society (STS) domain emphasis provides students with critical capacities to engage with a world shaped by science, technology, and medicine. It explores how these fields are constructed, contingent, and contested and how they interact with institutions, policy, and various forms of global social inequality.

Lower Division (select one)

MATH 53 Multivariable Calculus 4

DATA 4AC Data and Justice 4

GEOG 80 An Introduction to Geospatial Technologies: Mapping, Space and Power 4

HISTORY 30 Science and Society 4

ISF 60 Technology and Values 3

Upper Division (select two)

BIO ENG 105 Engineering Devices 1 4

BIO ENG/EECT C106A Introduction to Robotics 4

BIO ENG/EECT C106B Robotic Manipulation and Interaction 4

EECS 149 Introduction to Embedded and Cyber Physical Systems 4

EL ENG 192 Mechatronic Design Laboratory 4

INTEGBI C135L Laboratory in the Mechanics of Organisms 3

MENG 119 Introduction to MEMS (Microelectromechanical Systems) 3

MENG C134/ EL ENG C128 Feedback Control Systems 4

MENG 135 Design of Microprocessor-Based Mechanical Systems 4

Science, Technology, and Society

The Science, Technology, and Society (STS) domain emphasis provides students with critical capacities to engage with a world shaped by science, technology, and medicine. It explores how these fields are constructed, contingent, and contested and how they interact with institutions, policy, and various forms of global social inequality.

Lower Division (select one)

Data and Justice 4

An Introduction to Geospatial Technologies: Mapping, Space and Power 4

Science and Society 4

Technology and Values 3

Upper Division (select two)

Introduction to Medical Anthropology 4

Special Topics in Medical Anthropology 3

Engineering, The Environment, and Society 4

Science Fiction 4

Economics of Innovation and Intellectual Property 4

Environmental Philosophy and Ethics 4

Bioethics and Society 4

Environmental Justice: Race, Class, Equity, and the Environment 4

Media Technologies 4

Food and the Environment 4

Gender, Race, Nation, and Health 4

Special Topics in the History of Science 4

Proseminar: Problems in Interpretation in the Several Fields of History: History of Science 4

History of Science in the U.S. 4

The Life Sciences since 1750 4

Science, Technology, and Society 4

History of Information 4

Introduction to Technology, Society, and Culture 4

Introduction to Science, Society, and Ethics 4

Rhetoric of Scientific Discourse 4

Technology and Culture 4

Science, Narrative, and Image 4

Sociology of Health and Medicine 4

Society and Technology 4

Virtual Communities/Social Media 4

Introduction to Science, Technology, and Society 4

Introduction to Disability Studies 3

One additional course that meets the Data Science Human Contexts & Ethics requirement may be counted toward the Domain Emphasis in STS. If counted toward the STS DE, this course may not be used to satisfy the HCE requirement:

Information Technology and Society 4

Ethics in Science and Engineering 3

Introduction to Urban Data Analytics 4

Human Contexts and Ethics of Data - DATA/STS 4

Theory and Method in the Digital Humanities 3

Environmental Health and Development 4

Behind the Data: Humans and Values 3

The Social Life of Computing 4

Transforming Tech: Issues and Interventions in STEM and Silicon Valley 4

Moral Questions of Data Science 4

Social Welfare, Health, and Poverty

The goal of the domain emphasis in Social Welfare, Health, and Poverty is to expose students to questions, data structures, and methodology related to research in the subject-matter areas of social welfare, health, and poverty. This includes the formulation of meaningful research questions, the development of sound study designs, data collection, exploratory data analysis, the application of pertinent statistical and computational methods, and the interpretation and validation of results.

Lower Division (select one)

Data and Justice 4

Introduction to Sociology 4

Principles of Sociology: American Cultures 4

Upper Division (select two)

Population, Environment, and Development 3

The Ethics, Methods, and Pragmatics of Global Practice 4

Global Poverty: Challenges and Hopes 4

Critical Thinking In Global Studies 4

Gender, Race, Nation, and Health 4

Global Health: A Multidisciplinary Examination 4

Health Economics and Public Policy 3
Science topics include data-driven modeling, environmental decision-making, climate change, transportation systems, and water resources. Data science explores research in environmental science, sustainable engineering, and the potential of urban policies and planning to shape more equitable futures. Topics include sustainability, mapping, visualization, design, urban economic analysis, smart urbanism, metropolitan structure, urban communities, and place-making, among others.

Social Policy and Law
The Social Policy and Law domain emphasis explores the foundations of legal institutions and its intersection with the history and analysis of social policy. Students can study the social construction of law, the nature of the criminal justice system, and the origins of contemporary social policies, such as health, welfare, and crime policies.

Lower Division (select one)
DATA 4AC Data and Justice 4
SOCIOL 1 Introduction to Sociology 4
SOCIOL 3AC Principles of Sociology: American Cultures 4

Upper Division (select two)
GWS 132AC Gender, Race, and Law 4
LEGALST 100 Foundations of Legal Studies 4
LEGALST 102 Policing and Society 4
LEGALST 123 Data, Prediction & Law 4
LEGALST 158 Law and Development 4
LEGALST 160 Punishment, Culture, and Society 4
PB HLTH 150D Introduction to Health Policy and Management 3
POLECON 111 Poverty and Social Policy 3
POL SCI 186 Public Problems 4
PUB POL 101 Introduction to Public Policy Analysis 4
SOC WEL 112 Social Welfare Policy 3
SOC WEL 181 Social Science and Crime Prevention Policy 3
SOCIOLOG 114 Sociology of Law 4
SOCIOLOG 148 Social Policy 4

Sustainable Development and Engineering
The domain emphasis in Sustainable Development and Engineering explores research in environmental science, sustainable engineering, climate change, transportation systems, and water resources. Data science topics include data-driven modeling, environmental decision-making, and spatial-data analysis.

Lower Division (select one)
CIV ENG 11 Engineered Systems and Sustainability 3
LD ARCH 12 Environmental Science for Sustainable Development 4

Upper Division (select two)
ARCH 140 Energy and Environment 4
CIV ENG 107 Climate Change Mitigation 3
CIV ENG 110 Water Systems of the Future 3
CIV ENG 111 Environmental Engineering 3

Urban Science
The Urban Science domain emphasis explores the theories and methods used to understand the deep structure of how cities function and the potential of urban policies and planning to shape more equitable futures. Topics include sustainability, mapping, visualization, design, urban economic analysis, smart urbanism, metropolitan structure, urban communities, and place-making, among others.

Lower Division (select one)
CIV ENG C88 Data Science for Smart Cities 2
ENV DES 4B Global Cities 3
GEOG 70AC The Urban Experience: Race, Class, Gender & The American City 4

Upper Division (select two)
ARCH 110AC The Social and Cultural Processes in Architecture & Urban Design 3
CY PLAN 110 Introduction to City Planning 4
CY PLAN 113A Economic Analysis for Planning 3
CY PLAN 114 Introduction to Urban and Regional Transportation 3
CY PLAN 119 Planning for Sustainability 4
CY PLAN 140 Urban Design: City-Building and Place-Making 3
ENE,RES 131 Data, Environment and Society 4
ENV DES 100 The City: Theories and Methods in Urban Studies 4
ENV DES 102 Climate Change and City Planning: Adaptation and Resilience 3
GEOG 181 Urban Field Study 4
GEOG 182 Field Study of Buildings and Cities 3
LD ARCH 130 Sustainable Landscapes and Cities 4
LD ARCH/GEOG C188 Geographic Information Science 4
LD ARCH 187 Representation as Research: Contemporary Topics in Landscape Visualization 3
SOCIOLOG 136 Urban Sociology 4

The Minor in Data Science at UC Berkeley aims to provide students with practical knowledge of the methods and techniques of data analysis, as well as the ability to think critically about the construction and implications of data analysis and models. The minor will empower students across the wide array of campus disciplines with a working knowledge of statistics, probability, and computation that allow students not just to participate in data science projects, but to design and carry out rigorous computational and inferential analysis for their field of interest.

General Guidelines
1. All minors must be declared prior to the first day of classes of the student's Expected Graduation Term (EGT). If the student's EGT is a summer term, the deadline to declare a minor is prior to the first...
day of classes of Summer Session A. To declare a minor, contact the department advisor for information on requirements, and the declaration process.

2. All courses for the minor must be taken for a letter grade.

3. Students must earn a C- or better in each course, and have a minimum 2.0 GPA in all courses towards the minor.

4. Students may overlap up to 1 course in the upper division requirements for the Data Science minor with each of their majors (for example, a Computer Science major may count COMPSCI/DATA/STAT C100 toward both their major and the Data Science minor).

5. A maximum of one course offered by or cross-listed with the student’s major department(s) may count toward the data science minor upper-division requirements, including any overlapping course (for example, if a Computer Science major takes COMPSCI/DATA/STAT C100 toward the Data Science minor, this is the only COMPSCI, ELENG, or EECS course which may count toward the upper-division requirements for the minor).

6. An upper-division course used to fulfill a lower-division requirement (for example, Stat 134 to fulfill the probability requirement) will not be counted toward the maximum 1 course allowed to overlap with the major, nor will it fulfill one of the four upper division course requirements.

7. There is no restriction on overlap with another minor.

8. Courses used to fulfill the minor requirements may be applied toward the Seven-Course Breadth requirement.

9. All minor requirements must be completed prior to the last day of finals during the semester in which you plan to graduate.

**Lower-division Requirements**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATA/COMPSCI C8</td>
<td>Foundations of Data Science</td>
<td>4</td>
</tr>
<tr>
<td>or STAT C20</td>
<td>Introduction to Probability and Statistics</td>
<td></td>
</tr>
<tr>
<td>or COMPSCI C88C</td>
<td>Computational Structures in Data Science</td>
<td></td>
</tr>
<tr>
<td>or ENGIN 7</td>
<td>Introduction to Computer Programming for Scientists and Engineers</td>
<td></td>
</tr>
<tr>
<td>or COMPSCI 7</td>
<td>The Structure and Interpretation of Computer Programs</td>
<td></td>
</tr>
<tr>
<td>or MATH 10B</td>
<td>Methods of Mathematics: Calculus, Statistics, and Combinatorics</td>
<td></td>
</tr>
<tr>
<td>or MATH 55</td>
<td>Discrete Mathematics</td>
<td></td>
</tr>
<tr>
<td>or CIV ENG 93</td>
<td>Engineering Data Analysis</td>
<td></td>
</tr>
</tbody>
</table>

1. Students may substitute Stat 20 for Data C8 toward the Data Science minor when combined with CS 61A or CS 88/Data C88C; this option is not available for students who take Engin 7 for their Program Structures requirement.

2. Stat 134, Data C140, Ind Eng 172, EECS 126 or Math 106 may be substituted for the probability requirement.

**Upper-division Requirements**

Complete a total of 4 upper-division courses in one of the following pathways:

1. **Core course Pathway**

   **DATA/COMPSCI/ Principles & Techniques of Data Science**

   **STAT C100**

   Choose one of the following:

   AMERSTD/AFRICAM C134

   or AFRICAM Information Technology and Society

   BIO ENG 100 Ethics in Science and Engineering [3]

   CY PLAN 101 Introduction to Urban Data Analytics [4]

   DATA C104/ HISTORY C184D/History/STS [4]

   STS C104D

   DIGHUM 100 Theory and Method in the Digital Humanities [3]

   ESPM C167/ PB HLTH C160

   INFO 188 Behind the Data: Humans and Values [3]

   ISF 100J The Social Life of Computing [4]

   NWMEIA 151 Transforming Tech: Issues and Interventions in STEM and Silicon Valley [4]

   PHILOS 121 Moral Questions of Data Science [4]

   If completing the 1-core course pathway, choose TWO from the Approved Elective List (https://docs.google.com/document/d/1OvQls_dcVndFVqcguywEnUzHovvKLLFXa8a3Vyl/edit?usp=sharing).

2. **2-core course PATHWAY**

   **DATA/STAT C131A**

   **STAT 133** Concepts in Computing with Data [3]

   Choose one of the following:

   AMERSTD/AFRICAM C134

   or AFRICAM Information Technology and Society

   BIO ENG 100 Ethics in Science and Engineering [3]

   CY PLAN 101 Introduction to Urban Data Analytics [4]

   DATA C104/ HISTORY C184D/History/STS [4]

   STS C104D

   DIGHUM 100 Theory and Method in the Digital Humanities [3]

   ESPM C167/ PB HLTH C160

   INFO 188 Behind the Data: Humans and Values [3]

   ISF 100J The Social Life of Computing [4]
If completing the 2-core course pathway, choose ONE from the Approved Elective List (https://docs.google.com/document/d/1OvQls_dcVndFVqcgufywEnUzXHovrWKLLFTXa8a3Vyl/edit/?usp=sharing).

**Essential Skills**

Computational Reasoning (https://guide.berkeley.edu/undergraduate/colleges-schools/computing-data-science-society/computational-reasoning-requirement/)
The Computational Reasoning requirement is designed to provide a basic understanding of and competency in concepts such as programming, algorithms, iteration, and data-structures.

Human and Social Dynamics of Data and Technology (https://guide.berkeley.edu/undergraduate/colleges-schools/computing-data-science-society/human-social-data/)
The Human and Social Dynamics of Data and Technology requirement is designed for the purpose of developing an understanding of how technology and data interact with human and societal contexts, including ethical considerations and applications such as education, health, law, natural resources, and public policy.

The Statistical Reasoning requirement is designed to provide basic understanding of and competency in the scientific approach to statistical problem solving, including uncertainty, prediction, and estimation.

Reading and Composition (https://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/reading-composition-requirement/)
The Reading and Composition requirement is the same as for the College of Letters and Science; it 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.

To see how to satisfy the R&C requirement, visit the College of Letters and Science Reading and Composition Requirement page (http://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/reading-composition-requirement/).

**Breadth Requirements**
The undergraduate breadth requirements are the same for CDSS students as for the College of Letters and Science, with the exception that a second semester foreign language course can be used to satisfy the International Studies breadth. To learn more about the L&S Seven-Course Breadth Requirement, visit the L&S Breadth Requirements page. (https://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/#breadthrequirementstext) To learn more about using a foreign language course to satisfy the International Studies breadth, visit the CDSS website page on Satisfying International Studies Breadth with a Foreign Language Course (https://guide.berkeley.edu/undergraduate/colleges-schools/computing-data-science-society/satisfying-international-studies-class/).

The undergraduate major programs in computer science, data science, and statistics have transitioned from the College of Letters & Science to CDSS. Students who were admitted in Spring 2024 or earlier have the option of completing either the L&S College Requirements (https://guide.berkeley.edu/undergraduate/colleges-schools/letters-science/#collegerequirementstext), i.e., the breadth and essential skills requirements, or the CDSS college requirements (above).

All students must meet CDSS general policy (below). The one exception is with time-to-degree. Students admitted Fall 2022 or earlier are subject to the 130 unit maximum, rather than the 8 semester maximum (5 for transfer students).

**Class Schedule Requirements**

- Minimum units per semester: 12
- Maximum units per semester: 20.5

**Academic (Grade) Requirements**

- Minimum cumulative GPA: 2.0
- Minimum GPA for one semester: 1.5

**Bachelor’s Degree Requirements**

- Minimum total units: 120. Of these 120 units:
  - PE maximum units: 4
  - Special Studies maximum units: 16
  - Minimum 300-499 course units: 6
  - Minimum upper division units: 36
  - Maximum number of semesters: 8 for first-year entrants; 5 for transfer students; summer terms do not count toward the maximum
  - Minimum GPA in upper division and graduate courses identified for the major: 2.0
  - Meet all major requirements
  - Meet all general, curricular, and residence requirements of the University of California and the Berkeley campus

For more information about CDSS requirements, visit student resources and information (https://data.berkeley.edu/information-and-resources-students/) on the College of Computing, Data Science, and Society website.

Sample plans for completing major coursework are included below. These are not comprehensive plans which will reflect the situation of every student. These sample plans are meant only to serve as a baseline guide for structuring a plan of study, and only include the minimum courses for meeting the Data Science major requirements.

**For new freshmen (four-year plan):**

<table>
<thead>
<tr>
<th>Data Science</th>
<th>Freshman</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall Units</strong></td>
<td><strong>Spring Units</strong></td>
</tr>
<tr>
<td>DATA C8</td>
<td>4 COMPSCI 61A or DATA C88C</td>
</tr>
<tr>
<td>MATH 1A (10A or 16A acceptable)</td>
<td>4 MATH 1B</td>
</tr>
</tbody>
</table>
For transfer students (two-year plan):

*Note: this sample plan is based on a transfer student who has completed 1 year of calculus, linear algebra and data structures, as well as IGETC/7-Course Breadth at their previous college or university, which may not reflect the reality for every transfer student. Students should consult with a Data Science Advisor to make an individualized plan based on their specific situation.

Major maps are experience maps that help undergraduates plan their Berkeley journey based on intended major or field of interest. Featuring student opportunities and resources from your college and department as well as across campus, each map includes curated suggestions for planning your studies, engaging outside the classroom, and pursuing your career goals in a timeline format.

Use the major map below to explore potential paths and design your own unique undergraduate experience:

View the Data Science Major Map. (https://discovery.berkeley.edu/getting-started/major-maps/data-science/)

### Student Teams

Each semester, we recruit dozens of students to participate in our student teams as interns and volunteers, with opportunities to advance into team lead roles and other leadership positions. Teams include Communications, Operations, External Relations, and Curriculum Development. Interested students can email ds-teams@berkeley.edu with questions about the opportunities. Learn more here (https://data.berkeley.edu/academics/campus-resources/student-opportunities/).

### Data Scholars

The Data Scholars program addresses issues of underrepresentation in the data science community by establishing a welcoming, educational, and empowering environment for underrepresented and nontraditional students. The program, which offers specialized tutoring, advising, mentorship, and workshops, is especially suited for students who can bring diverse perspectives to the field of Data Science. Learn more here (https://data.berkeley.edu/academics/campus-resources/data-scholars/).

### Data Science Peer Advising

Data Science Peer Advisors are available to help fellow students choose classes, explore academic interests, and learn how to declare the Data Science major and minor. The Data Science Peer Advising services are available on a drop-in basis. Contact the Data Science Peer Advisors at ds-peer-consulting@berkeley.edu. Learn more here (https://data.berkeley.edu/degrees/peer-advising/).

### Data Science Course Staff

Data Science Undergraduate Studies appoints graduate and undergraduate students to support its instructional programs. Our outstanding staff teams bear significant responsibility for our students’ experience and learning in Data classes. Staff team members also form strong bonds with each other, mentor junior members, and create staff

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

DATA 4AC Data and Justice 4 Units
Terms offered: Spring 2023, Spring 2022, Spring 2021
This course engages students with fundamental questions of justice in relation to data and computing in American society. Data collection, visualization, and analysis have been entangled in the struggle for racial and social justice because they can make injustice visible, imaginable, and thus actionable. Data has also been used to oppress minoritized communities and institutionalize, rationalize, and naturalize systems of racial violence. The course examines key sites of justice involving data (such as citizenship, policing, prisons, environment, and health). Along with critical social science tools, students gain introductory experience and do collaborative and creative projects with data science using real-world data.

Data and Justice: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

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

Data and Justice: Read Less [-]

DATA 6 Introduction to Computational Thinking with Data 3 Units
Terms offered: Not yet offered
An introduction to computational thinking and quantitative reasoning, preparing students for further coursework (especially Foundations of Data Science, Data 8). Emphasizes the use of computation to gain insight about quantitative problems. Uses data from various domains in the social sciences in order to develop an understanding of the societal implications of data science. Expressions, data types, collections, and tables in Python. Programming practices, abstraction, and iteration. The data science lifecycle. Visualizing univariate and bivariate data with bar charts, histograms, plots, and maps. Introduction to statistical concepts including averages and distributions, prediction, causality, probability, sampling, and inference.

Introduction to Computational Thinking with Data: Read More [+]

Objectives & Outcomes

Course Objectives: C6 also includes quantitative reasoning concepts that aren’t covered in Data 8. These include certain topics in: principles of data visualization; simulation of random processes; and understanding numerical functions through their graphs. This will help prepare students for computational and quantitative courses other than Data 8. C6 takes advantage of the complementarity of computing and quantitative reasoning to enliven abstract ideas and build students’ confidence in their ability to solve real problems with quantitative tools. Students learn computer science concepts and immediately apply them to plot functions, visualize data, and simulate random events.

Foundations of Data Science (CS/Info/Stat C8, a.k.a. Data 8) is an increasingly popular class for entering students at Berkeley. Data 8 builds students’ computing skills in the first month of the semester, and students rely on these skills as the course progresses. For some students, particularly those with little prior exposure to computing, developing these skills benefits from further time and practice. C6 is a rapid introduction to Python programming, visualization, and data analysis, which will prepare students for success in Data 8.

Student Learning Outcomes: Appreciate the interdisciplinary nature of data science.
Create and use visualizations to understand univariate data and to identify associations or causal relationships in bivariate data.
Formulate questions about data and perform exploratory data analysis.
Perform basic computations in Python, and be able to work with tabular data.
Run and understand basic probabilistic simulations.
Understand the syntactic structure of Python code.
Use good practices in Python programming.

Rules & Requirements

Credit Restrictions: Students will receive no credit for DATA 6 after completing DATA C8.

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 0 hours of laboratory per week

Summer: 6 weeks - 4 hours of lecture, 2 hours of discussion, and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

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

Instructors: Yan, Hug, Harding
DATA 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: Data Science, Undergraduate/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/INFO C8/STAT C8

DATA 88 Data Science Connector 2 - 4 Units
Terms offered: Spring 2022, Spring 2021, Fall 2020
Designed to be taken in conjunction with the Foundations of Data Science (COMPSCI/INFO/STAT C8) course, each connector course will flesh out data science ideas in the context of one particular field. Blending inferential thinking and computational thinking, the course relies on the increasing availability of datasets across a wide range of human endeavor, and students’ natural interest in such data, to teach students to work actively with data in a field of their interest and to interpret and critique their analyses of data. Topics vary by field, and several topics will be offered each term.
Data Science Connector: Read More [+]

Objectives & Outcomes
Course Objectives: Discuss how to formulate and substantiate an argument with evidence
Explain a variety of analytic and visualization techniques
Explore approaches to effective communication
Explore the challenges with working with primary and secondary data

Student Learning Outcomes: Apply data analysis to evaluate everyday problems
Communicate effectively in written, spoken, and graphical form about specific issues
Interpret statistical results
Know how to locate and use primary data sources
Obtain and/or collect relevant data using specific qualitative and/or quantitative research methods
Understand how to use empirical evidence to evaluate an argument

Rules & Requirements
Prerequisites: Instructors may require students to enroll concurrently or have completed Data 8 (COMPSCI/STAT/INFO C8)
Repeat rules: Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

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

Additional Details
Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.

Data Science Connector: Read Less [-]
DATA 88E Economic Models 2 Units
Terms offered: Fall 2024, Fall 2023, Fall 2022
This class aims to motivate and illustrate key concepts in economics through a series of exercises and examples that use Python Jupyter notebooks. The class covers concepts from introductory economics, microeconomic theory, econometrics, development economics, environmental economics and public economics. The course provides data science students a pathway to apply Python programming and data science concepts within the discipline of economics. The course will also gives economics students a pathway to apply programming to reinforce fundamental concepts and to advance the level of study in upper division coursework and possible thesis work.
Economic Models: Read More [+]

Objectives & Outcomes

Course Objectives:
Demonstrate how to construct understanding of concepts in economics by developing and coding examples
Illustrate topics in economics through coding applications
Motivate basics of econometrics from a data science perspective

Student Learning Outcomes:
Programmatically create and interpret graphs of simple equations used in microeconomics
Reason about and solve simple equations used in microeconomics through coding
Understand basic concepts in economics

Rules & Requirements

Prerequisites:
You must have taken Data C8 or be concurrently enrolled in Data C8 to take this course. That being said, we are able to make exceptions if you have prior programming or data science experience; please email the course staff if you have any questions. Prior economics knowledge may be helpful but is not necessary

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week
Summer:
6 weeks - 5 hours of lecture per week
8 weeks - 4 hours of lecture per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.

Economic Models: Read Less [-]

DATA C88C Computational Structures in Data Science 3 Units
Terms offered: Fall 2024, Summer 2024 8 Week Session, Spring 2024, Spring 2023, Fall 2022
Development of Computer Science topics appearing in Foundations of Data Science (C8); expands computational concepts and techniques of abstraction. Understanding the structures that underlie the programs, algorithms, and languages used in data science and elsewhere. Mastery of a particular programming language while studying general techniques for managing program complexity, e.g., functional, object-oriented, and declarative programming. Provides practical experience with composing larger systems through several significant programming projects.

Objectives & Outcomes

Course Objectives:
Develop a foundation of computer science concepts that arise in the context of data analytics, including algorithm, representation, interpretation, abstraction, sequencing, conditional, function, iteration, recursion, types, objects, and testing, and develop proficiency in the application of these concepts in the context of a modern programming language at a scale of whole programs on par with a traditional CS introduction course.

Student Learning Outcomes:
Students will be able to demonstrate a working knowledge of these concepts and a proficiency of programming based upon them sufficient to construct substantial stand-alone programs.

Rules & Requirements

Prerequisites:
This course is a Data Science connector course and may only be taken concurrently with or after COMPSCI C8/DATA C8/INFO C8/STAT C8. Students may take more than one Data Science connector (88) course if they wish, concurrent with or after having taken the C8 course

Credit Restrictions:
Students will receive no credit for DATA C88C after completing COMPSCI 61A.

Hours & Format

Fall and/or spring: 15 weeks - 2-2 hours of lecture, 2-2 hours of laboratory, and 0-1 hours of supplement per week
Summer:
8 weeks - 4-4 hours of lecture, 4-4 hours of laboratory, and 0-2 hours of supplement per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Ball, Culler
Formerly known as: Computer Science 88
Also listed as: COMPSCI C88C

Computational Structures in Data Science: Read Less [-]
DATA 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: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Statistics 88
Also listed as: STAT C88S
Probability and Mathematical Statistics in Data Science: Read Less [-]

DATA 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: Data Science, Undergraduate/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/STAT C100
Principles & Techniques of Data Science: Read Less [-]

DATA 94 Special Topics in Data Science 1 - 4 Units
Terms offered: Fall 2024, Spring 2021
Topics will vary semester to semester.
Special Topics in Data Science: Read More [+]
Hours & Format
Fall and/or spring: 15 weeks - 1-3 hours of lecture, 0-2 hours of discussion, and 0-2 hours of laboratory per week
Summer: 8 weeks - 2-6 hours of lecture, 0-4 hours of discussion, and 0-4 hours of laboratory per week
Additional Details
Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Final exam required, with common exam group.
Special Topics in Data Science: Read Less [-]
DATA 101 Data Engineering 4 Units
Terms offered: Spring 2024, Fall 2023, Fall 2022
This course will cover the principles and practices of managing data at scale, with a focus on use cases in data analysis and machine learning. We will cover the entire life cycle of data management and science, ranging from data preparation to exploration, visualization and analysis, to machine learning and collaboration, with a focus on ensuring reliable, scalable operationalization.

Rules & Requirements

Prerequisites: COMPSCI 61B or INFO 206B or equivalent courses in programming with a C- or better, or Pass; AND COMPSCI C100/ DATA C100/STAT C100 or COMPSCI 189 or INFO 251 or DATA 144 or equivalent upper-division course in data science with a C- or better, or Pass

Hours & Format

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

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

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

Instructors: Hellerstein, Jain, Parameswaran

Data Engineering: Read More [+]

DATA 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.

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: Data Science, Undergraduate/Undergraduate

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

Formerly known as: Statistics 102

Also listed as: STAT C102

Data, Inference, and Decisions: Read Less [-]
DATA C104 Human Contexts and Ethics of Data - DATA/History/STS 4 Units
Terms offered: Fall 2024, Summer 2024 8 Week Session, Spring 2024, Spring 2022, Fall 2020, Spring 2020
This course teaches you to use the tools of applied historical thinking and Science, Technology, and Society (STS) to recognize, analyze, and shape the human contexts and ethics of data. It addresses key topics such as doing ethical data science amid shifting definitions of human subjects, consent, and privacy; the changing relationship between data, democracy, and law; the role of data analytics in how corporations and governments provide public goods such as health and security to citizens; sensors, machine learning and artificial intelligence and changing landscapes of labor, industry, and city life. It prepares you to engage as a knowledgeable and responsible citizen and professional in the varied arenas of our datafied world.

Rules & Requirements
Credit Restrictions: Students will receive no credit for DATA C104/HISTORY C184D/STS C104D after completing DATA 104. A deficient grade in DATA C104/HISTORY C184D/STS C104D may be removed by taking DATA 104.

Hours & Format
Fall and/or spring: 15 weeks - 3-3 hours of lecture and 0-1.5 hours of discussion per week
Summer:
6 weeks - 7.5-7.5 hours of lecture and 0-3.5 hours of discussion per week
8 weeks - 6-6 hours of lecture and 0-3 hours of discussion per week

Additional Details
Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: History C184D/Science and Technology Studies C104D
Also listed as: HISTORY C184D/STS C104D

DATA 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.

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: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Statistics 131A
Also listed as: STAT C131A

Statistical Methods for Data Science: Read Less [-]
DATA C140 Probability for Data Science 4 Units
Terms offered: Fall 2024, Spring 2024, Fall 2023, Spring 2023
Probability for Data Science: Read More [+]

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: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Statistics 140
Also listed as: STAT C140

Data Mining and Analytics 3 Units
Terms offered: Fall 2024, Fall 2023, Fall 2022
Data Mining and Analytics introduces students to practical fundamentals of data mining and emerging paradigms of data mining and machine learning with enough theory to aid intuition building. The course is project-oriented, with a project beginning in class every week. The in-class portion of the project is meant to be collaborative and a time for the instructor and GSIs to work closely with project groups to understand the objectives, help work through software logistics, and connect project work to lecture. Lectures will introduce theories, concepts, practical contexts, and algorithms. Students should expect to leave the class with hands-on, contemporary data mining skills they can confidently apply in research and industry.
Data Mining and Analytics: Read More [+]

Course Objectives: Conduct manual feature engineering (from domain knowledge) vs. machine induced featurization (representation learning)
Develop intuition in various machine learning classification algorithms (e.g. decision trees, feed-forward neural networks, recurrent neural networks, skip-grams) and clustering techniques (e.g. k-means, spectral)
Foster critical thinking about real-world actionability from analytics
Provide an overview of issues in research and practice that will affect the practice of data science in a variety of domains

Student Learning Outcomes: Develop capabilities in a range of data mining techniques
Gain the ability to solve problems in data mining research and practice
Think critically about how to assess analytics
Use data mining and analytics in a domain of application

Rules & Requirements
Prerequisites: Corequisite: Data/CompSci/Stat C100 (C- or better, or Pass, required if completed prior to Data 144)
Credit Restrictions: Students will receive no credit for DATA 144 after completing INFO 154. A deficient grade in DATA 144 may be removed by taking INFO 154.

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

Additional Details
Subject/Course Level: Data Science, Undergraduate/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.
Instructor: Pardos
Data Mining and Analytics: Read Less [-]
DATA 188 Advanced Data Science Connector
2 Units
Terms offered: Spring 2024
Designed to be taken concurrently with or after Principles and
Techniques of Data Science (Data C100) or Probability for Data Science
(Data C140) or both, each connector course consists of an intensive
study of data science ideas in a particular field. Topics include the
development of the theory of data science and the application of data
science in a variety of domains. Topics vary by field, and more than one
topic may be offered in a semester.
Advanced Data Science Connector: Read More [+]

Objectives & Outcomes

Course Objectives: Develop theoretical mastery in data science topics,
address the challenges of gathering data and converting it to usable
formats, develop skills in selecting appropriate data science methods,
explore approaches to decision-making and effective communication.

Student Learning Outcomes: Understand and apply theory in an
area of data science, or follow the data science life cycle in a domain
of application from question formulation to the use of advanced data
science methods and the communication of results.

Rules & Requirements

Prerequisites: Prerequisites or corequisites may vary depending on
topic. Consult the Schedule of Classes or department website for details

Repeat rules: Course may be repeated for credit when topic changes.
Students may enroll in multiple sections of this course within the same
semester.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar and 1 hour of
discussion per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

Grading/Final exam status: Letter grade. Alternate method of
final assessment during regularly scheduled final exam group (e.g.,
presentation, final project, etc.).

Advanced Data Science Connector: Read Less [-]

DATA H195A Data Science Honors Thesis Seminar
2 Units
Terms offered: Prior to 2007
The senior honors thesis seminar gives students an opportunity to
experience firsthand what it means to do data science research. Over
two semesters, students will learn to formulate a research problem,
design a research strategy, collect evidence, and write up the findings
and analysis. The first semester focuses primarily on the preparation and
implementation of a research proposal, as well as data management
strategies. During the second semester, we will emphasize analysis
and writing. The final result will be a hybrid product with a 20-25 page
research paper, with data visualizations and analysis tables, along with a
documented data source, annotated code, well documented Github
repository, and open science posting of the project.
Data Science Honors Thesis Seminar: Read More [+]

Objectives & Outcomes

Course Objectives: Assist students with project organization and
management.
Convey approaches to effective writing and visual communication.
Discuss how to formulate and substantiate an argument with evidence.
Explain approaches to designing a research question and project.
Explore a variety of analytic and visualization techniques and discuss
their appropriateness to different research questions.
Identify the challenges in data acquisition and management.

Student Learning Outcomes: Communicate effectively in written,
spoken, and graphical form.
Develop an understanding of data availability, constraints, and ethics.
Develop data management skills.
Develop reproducible research and interpret results.
Formulate a proposal for a research project.
Learn how to develop a research question and project.
Understand how to organize empirical work into a written document.
Understand how to use empirical evidence to construct an argument.

Rules & Requirements

Prerequisites: There are no specific prerequisites. Students must be
accepted into the data science honors program in order to take this
course. Students must complete H195A in order to enroll in H195B

Hours & Format

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

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

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

Data Science Honors Thesis Seminar: Read Less [-]
DATA H195B Data Science Honors Thesis Seminar 2 Units
Terms offered: Spring 2020
The senior honors thesis seminar gives students an opportunity to experience firsthand what it means to do data science research. Over two semesters, students will learn to formulate a research problem, design a research strategy, collect evidence, and write up the findings and analysis. The first semester focuses primarily on the preparation and implementation of a research proposal, as well as data management strategies. During the second semester, we will emphasize analysis and writing. The final result will be a hybrid product with a 20-25 page research paper, with data visualizations and analysis tables, along with a documented data source, annotated code, well documented Github repository, and open science posting of the project.

Data Science Honors Thesis Seminar: Read More [+]

Objectives & Outcomes

Course Objectives:
- Assist students with project organization and management.
- Convey approaches to effective writing and visual communication.
- Discuss how to formulate and substantiate an argument with evidence.
- Explain approaches to designing a research question and project.
- Explore a variety of analytic and visualization techniques and discuss their appropriateness to different research questions.
- Identify the challenges in data acquisition and management.

Student Learning Outcomes:
- Communicate effectively in written, spoken, and graphical form.
- Develop an understanding of data availability, constraints, and ethics.
- Develop data management skills.
- Develop reproducible research and interpret results.
- Formulate a proposal for a research project.
- Learn how to develop a research question and project.
- Understand how to organize empirical work into a written document.
- Understand how to use empirical evidence to construct an argument.

Rules & Requirements

Prerequisites: There are no specific prerequisites. Students must be accepted into the data science honors program in order to take this course. Students must complete H195A in order to enroll in H195B

Hours & Format

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

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

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

Data Science Honors Thesis Seminar: Read Less [-]

DATA 197 Field Studies in Data Science 1 - 4 Units
Terms offered: Fall 2019
Students take part in organized individual field sponsored programs with off-campus organizations or tutoring/mentoring relevant to specific aspects and applications of data science on or off campus. Note Summer CPT or OPT students: written report required. Course may not count toward major requirements but will be counted in the cumulative units toward graduation.

Field Studies in Data Science: Read More [+]

Rules & Requirements

Prerequisites: Consent of instructor (see department advisor). Upper-division standing

Repeat rules: Course may be repeated for credit with advisor consent.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:
- 6 weeks - 2.5-10 hours of fieldwork per week
- 8 weeks - 2-7.5 hours of fieldwork per week
- 10 weeks - 1-5-6 hours of fieldwork per week

Additional Details

Subject/Course Level: Data Science, Undergraduate/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

Field Studies in Data Science: Read Less [-]
DATA 198 Directed Group Studies for Advanced Undergraduates 1 - 4 Units
Terms offered: Fall 2024, Spring 2024, Fall 2023
Written proposal must be approved by a faculty sponsor, who will serve as Instructor of Record. Seminars for the group study of selected topics, which will vary from semester to semester. Topics may be initiated by students.

**Rules & Requirements**

**Prerequisites:** Instructors may require students to enroll concurrently or have completed Data 8 (COMPSCI/STAT/INFO C8). Upper-division standing and consent of instructor

**Repeat rules:** Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

**Hours & Format**

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

**Additional Details**

**Subject/Course Level:** Data Science, Undergraduate/Undergraduate

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

Directed Group Studies for Advanced Undergraduates: Read More [+]

DATA 199 Supervised Independent Study and Research 1 - 4 Units
Terms offered: Prior to 2007
Independent study and research by arrangement with faculty or staff. This course allows students to obtain course credit for participation in undergraduate research. Students may opt either to participate in a semester-long series of workshops which provide a guided research experience with project milestone assignments and regular feedback, or they may opt to work independently with supervision from one faculty research mentor.

**Objectives & Outcomes**

**Student Learning Outcomes:** Develop and refine skills acquired in other courses in a hands-on, self-directed research project. Identify how to properly manage data and describe best practices in programming and analytics. Integrate feedback from an instructor into research on a regular basis. Learn how to structure and complete a research project working independently.

**Rules & Requirements**

**Prerequisites:** Instructors may require students to enroll concurrently or have completed Data 8 (COMPSCI/STAT/INFO C8). Upper-division standing and consent of instructor

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

**Hours & Format**

Fall and/or spring: 15 weeks - 3-12 hours of independent study per week

Summer:
6 weeks - 7.5-30 hours of independent study per week
8 weeks - 5.5-22.5 hours of independent study per week

**Additional Details**

**Subject/Course Level:** Data Science, Undergraduate/Undergraduate

**Grading/Final exam status:** Offered for pass/not pass grade only. Alternative to final exam.

Supervised Independent Study and Research: Read Less [-]
DATA 200S Principles and Techniques of Data Science 3 Units
Terms offered: Fall 2024, Spring 2024, Fall 2023
Explores the data science lifecycle: question formulation, data collection and cleaning, exploratory, analysis, visualization, statistical inference, prediction, and decision-making. Focuses on quantitative critical thinking and key principles and techniques: languages for transforming, querying and analyzing data; algorithms for machine learning methods: regression, classification and clustering; principles of informative visualization; measurement error and prediction; and techniques for scalable data processing. Research term project.
Principles and Techniques of Data Science: Read More [+]
Rules & Requirements
Prerequisites: DATA/COMPSCI/INFO/STAT C8; and COMPSCI 61A or COMPSCI/DATA C88C. Corequisites: MATH 54 or EECS 16A
Credit Restrictions: Students will receive no credit for DATA 200S after completing DATA C100, or DATA C200. A deficient grade in DATA 200S may be removed by taking DATA C200.
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
Additional Details
Subject/Course Level: Data Science, Undergraduate/Graduate
Grading: Letter grade.
Principles and Techniques of Data Science: Read Less [-]

DATA C200 Principles and Techniques of Data Science 4 Units
Terms offered: Fall 2024, Spring 2024, Fall 2023, Spring 2023, Spring 2022, Spring 2021, Spring 2020
Explores the data science lifecycle: question formulation, data collection and cleaning, exploratory, analysis, visualization, statistical inference, prediction, and decision-making. Focuses on quantitative critical thinking and key principles and techniques: languages for transforming, querying and analyzing data; algorithms for machine learning methods: regression, classification and clustering; principles of informative visualization; measurement error and prediction; and techniques for scalable data processing. Research term project.
Principles and Techniques of Data Science: Read More [+]
Rules & Requirements
Prerequisites: COMPSCI C8 / INFO C8 / STAT C8 or ENGIN 7; and either COMPSCI 61A or COMPSCI 88. Corequisites: MATH 54 or EECS 16A
Credit Restrictions: Students will receive no credit for DATA C200/COMPSCI C200A/STAT C200C after completing DATA C100.
Hours & Format
Fall and/or spring:
8 weeks - 6-6 hours of lecture, 2-2 hours of discussion, and 0-2 hours of laboratory per week
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: Data Science, Undergraduate/Graduate
Grading: Letter grade.
Formerly known as: Statistics C200C/Computer Science C200A
Also listed as: COMPSCI C200A/STAT C200C
Principles and Techniques of Data Science: Read Less [-]
DATA C204 Human Contexts and Ethics of Data 4 Units
Terms offered: Spring 2024
This course teaches you to use approaches from the across the humanities and interpretive social sciences and tools of Science, Technology, and Society (STS) to recognize, analyze, and shape the human contexts, social implications, and ethics of data and data technologies, including data analytics, algorithmic decision systems, machine learning (ML), and artificial intelligence (AI).

Human Contexts and Ethics of Data: Read More [+]

Rules & Requirements
Prerequisites: Graduate standing or permission of the instructor. Graduate students without previous (undergraduate or graduate-level) preparation in the interpretive social sciences or humanities are encouraged to confer with the instructor before enrolling.

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details
Subject/Course Level: Data Science, Undergraduate/Graduate
Grading: Letter grade.
Instructor: Carson
Also listed as: HISTORY C254/STS C204

Human Contexts and Ethics of Data: Read Less [-]

DATA 298 Directed Group Studies for Graduates 1 - 4 Units
Terms offered: Prior to 2007
DATA 298 provides credit for directed group study by graduate students working closely with an instructor who is a faculty member. Students are responsible for finding an instructor to supervise their work, and they will meet with that instructor weekly or bi-weekly. Faculty members must commit to supervising and evaluating the students' work and be available to meet regularly as required by the guidelines.

Directed Group Studies for Graduates: Read More [+]

Rules & Requirements
Prerequisites: Instructors may require students to enroll concurrently or have completed Data C8 (COMPSCI/STAT/INFO C8) or or Data C200 (COMPSCI C200A/STAT C200C). Graduate standing and consent of instructor
Repeat rules: Course may be repeated for credit without restriction. Students may enroll in multiple sections of this course within the same semester.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Additional Details
Subject/Course Level: Data Science, Undergraduate/Graduate
Grading: Letter grade.

Directed Group Studies for Graduates: Read Less [-]

DATA 375 Professional Preparation: Teaching of Data Science 2 Units
Terms offered: Spring 2024
Discussion and practice of techniques for effective teaching of student-centered learning, focusing on issues most relevant to teaching assistants in data science courses. Discussion, review and development of formative and summative assessments, guidance of laboratory classes, course development, supervised practice teaching, and culturally relevant pedagogy.

Professional Preparation: Teaching of Data Science: Read More [+]

Rules & Requirements
Prerequisites: Concurrent Teaching Assistant appointment required

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details
Subject/Course Level: Data Science, Undergraduate/Professional course for teachers or prospective teachers
Grading: Offered for satisfactory/unsatisfactory grade only.

Professional Preparation: Teaching of Data Science: Read Less [-]