Electrical Engineering and Computer Sciences and Business Administration

• The EECS undergraduate degree program in the College of Engineering is accredited by ABET. The Undergraduate Business Degree Program is accredited by The Association to Advance Collegiate Schools of Business (AACSB).

M.E.T. at a Glance: One program, two Bachelor of Science (BS) degrees

The Electrical Engineering and Computer Sciences and Business Administration simultaneous degree is part of the Management, Entrepreneurship, & Technology Program. The M.E.T. Program aims to educate leaders with a seamless understanding of technology innovation, from idea to real-world impact.

M.E.T. students earn two Bachelor of Science degrees in one program that combines the best of the top-ranked College of Engineering and Haas School of Business. The integrated curriculum is completed in four years. Internships, career coaching, and other enrichment activities provide ample opportunity for hands-on experience with innovation and entrepreneurship. Each M.E.T. cohort is small, allowing for close mentoring and a tight-knit community.

Admission to the M.E.T. Program

The M.E.T. Program seeks inquisitive, self-motivated students with a passion for finding and solving big problems. It is highly competitive and is only open to freshmen during the UC application period.

For further information, please see the M.E.T. website (http://met.berkeley.edu).

Accreditation

The EECS undergraduate degree program in the College of Engineering is accredited by ABET. The Undergraduate Business Degree Program is accredited by The Association to Advance Collegiate Schools of Business (AACSB).

In addition to the University, campus, and M.E.T. Program requirements, listed on the College Requirements tab, students must fulfill the below requirements.

General Guidelines

1. A minimum of 38 upper division business units are required, and a minimum of 12 upper division non-business units are required. (Upper division EECS classes will fulfill the 12 upper division non-business units.)
2. A minimum of 45 technical engineering units are required.¹
3. Students must complete the College Requirements (p. 3) and the Major Requirements.
4. Students must complete the degree program in eight semesters, not Summer Session.

5. All Haas business courses must be taken for a letter grade, with the exception of UGBA 194 (http://guide.berkeley.edu/search/?P=UGBA %20194), UGBA 198 (http://guide.berkeley.edu/search/?P=UGBA %20198) and UGBA 199 (http://guide.berkeley.edu/search/?P=UGBA %20199) (only offered Pass/No Pass).
6. All technical courses that can be used to fulfill a requirement must be taken for a letter grade.
7. Students who receive a grade of D+ or lower in a core UGBA course must repeat the course until they achieve a grade of C- or better.
8. Students in this program must adhere to all policies and procedures of the College of Engineering and the Haas School of Business.

For information regarding University and campus requirements, Reading and Composition, breadth, class schedule, minimum academic progress, and unit requirements, please see the College Requirements (p. 3).

¹Technical engineering courses cannot include:

• Any course taken on a Pass/No Pass basis
• Courses numbered 24, 39, or 84
• Any of the following courses: BIO ENG 100, COMPSCI 70, COMPSCI C79, COMPSCI 195, COMPSCI H195, DES INV courses (except DES INV 15, DES INV 22, DES INV 90E, DES INV 190E), ENGIN 125, ENGIN 157AC, ENGIN 180, IND ENG 95, IND ENG 172, IND ENG 185, IND ENG 186, IND ENG 190 series, IND ENG 191, IND ENG 192, IND ENG 195, MEC ENG 191AC, MEC ENG 190K, and MEC ENG 191K.

Lower Division Requirements

<table>
<thead>
<tr>
<th>Business Prerequisites</th>
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<tbody>
<tr>
<td>UGBA 10</td>
<td>Principles of Business</td>
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<tr>
<td>ECON 1</td>
<td>Introduction to Economics</td>
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<table>
<thead>
<tr>
<th>Natural Sciences</th>
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<tbody>
<tr>
<td>PHYSICS 7A</td>
<td>Physics for Scientists and Engineers</td>
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<tr>
<td>PHYSICS 7B</td>
<td>Physics for Scientists and Engineers</td>
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<tr>
<td>Select one course from the following:</td>
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<td></td>
</tr>
<tr>
<td>ASTRON 7A</td>
<td>Introduction to Astrophysics</td>
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<td>ASTRON 7B</td>
<td>Introduction to Astrophysics</td>
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<td>BIOLOGY 1A &amp; 1AL</td>
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<tr>
<td>BIOLOGY 1B</td>
<td>General Biology Lecture and Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 1A &amp; 1AL</td>
<td>General Chemistry and General Chemistry Laboratory</td>
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<tr>
<td>CHEM 1B</td>
<td>General Chemistry</td>
<td></td>
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<tr>
<td>CHEM 3A &amp; 3AL</td>
<td>Chemical Structure and Reactivity and Organic Chemistry Laboratory</td>
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<tr>
<td>CHEM 3B &amp; 3BL</td>
<td>Chemical Structure and Reactivity and Organic Chemistry Laboratory</td>
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<tr>
<td>CHEM 4A</td>
<td>General Chemistry and Quantitative Analysis</td>
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<td>CHEM 4B</td>
<td>General Chemistry and Quantitative Analysis</td>
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<tr>
<td>MCELLBI 32 &amp; 32L</td>
<td>Introduction to Human Physiology and Introduction to Human Physiology Laboratory</td>
<td></td>
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<tr>
<td>PHYSICS 7C</td>
<td>Physics for Scientists and Engineers</td>
<td></td>
</tr>
</tbody>
</table>

Any upper division letter graded course of 3 units or more in astronomy, chemistry, earth and planetary science, integrative biology, molecular & cell biology, physics, or plant & microbial biology.
Upper Division Requirements

Upper Division Electrical Engineering and Computer Sciences Requirements

Select a minimum of 20 units of upper division EECS courses. At least one of the courses must be a design elective. Select from the following design courses:

- COMPSCI C149: Course Not Available
- COMPSCI 160: User Interface Design and Development
- COMPSCI 162: Operating Systems and System Programming
- COMPSCI 164: Programming Languages and Compilers
- COMPSCI 169: Software Engineering
- COMPSCI 184: Foundations of Computer Graphics
- COMPSCI 186: Introduction to Database Systems
- EECS 149: Introduction to Embedded Systems
- EECS 151 & 151LA: Introduction to Digital Design and Integrated Circuits and Application Specific Integrated Circuits Laboratory

Technical Electives (Lower or Upper Division) 2

EECS Lower Division Core

- EL ENG 16A: Designing Information Devices and Systems I
- EL ENG 16B: Designing Information Devices and Systems II
- COMPSCI 61A: The Structure and Interpretation of Computer Programs
- COMPSCI 61B: Data Structures
- or COMPSCI 61B: Data Structures and Programming Methodology
- COMPSCI 61C: Great Ideas of Computer Architecture (Machine Structures)
- or COMPSCI 61C: Machine Structures (Lab-Centric)

Total Lower Division Units: 58-60

1. CHEM 4A and CHEM 4B are intended for students majoring in chemistry or a closely-related field.
2. Students must complete 4 units of Technical Elective(s) chosen from any lower or upper division course in the following departments: Astronomy, Chemistry, Data Science, Earth and Planetary Science, Integrative Biology, Mathematics, Molecular Cell Biology, Physics, Plant & Microbial Biology, Statistics, or any Engineering department (including EECS). The 4 units of Technical Elective(s) must be in addition to the Natural Science Elective and the 20 units of required EECS Upper Division technical Electives. If the 4 units of Technical Elective(s) are from an Engineering department, the units can count toward the required 45 units of Engineering coursework. Technical Electives and the 45 units of engineering courses cannot include:
   - any course taken on a Pass/No Pass basis; courses numbered 24, 39, or 84; BIOE 100, COMPSCI 70, C79, 195, COMPSCI H195, DES INV courses (except DES INV 15, 22, 90E, 190E), ENGIN 125, 157AC, 180; IND ENG 95, 172, 185, 186, 190 series, IND ENG 191, 192, 195; MEC ENG 191AC, 190K, and 191K.

Upper Division Business Administration Requirements

Select a minimum of 38 units of upper division UGBA elective courses in order to complete a minimum of 38 units of upper division Business Administration courses.

- UGBA 100: Business Communication
- UGBA 101A: Microeconomic Analysis for Business Decisions
- UGBA 101B: Macroeconomic Analysis for Business Decisions
- UGBA 102A: Introduction to Financial Accounting
- UGBA 102B: Introduction to Managerial Accounting
- UGBA 103: Introduction to Finance
- UGBA 104: Analytic Decision Modeling Using Spreadsheets
- UGBA 105: Leading People
- UGBA 106: Marketing
- UGBA 107: The Social, Political, and Ethical Environment of Business

M.E.T. Special Topics

Two courses are required. 2-4

Upper Division Business Administration Elective Courses

Select a minimum of 4-6 units of upper division UGBA elective courses in order to complete a minimum of 38 units of upper division Business Administration courses.

- UGBA 113: Managerial Economics
- UGBA 115: Competitive Strategy
- UGBA 117: Special Topics in Economic Analysis and Policy
- UGBA 118: International Trade
- UGBA 119: Leading Strategy Implementation
- UGBA 120AB: Intermediate Financial Accounting II
- UGBA 120B: Advanced Financial Accounting
- UGBA 121: Federal Income Tax Accounting
- UGBA 122: Financial Information Analysis
- UGBA 123: Operating and Financial Reporting Issues in the Financial Services Industry
- UGBA W125: Professional Judgment in Accounting
- UGBA 126: Auditing
- UGBA 127: Special Topics in Accounting
- UGBA 128: Strategic Cost Management
- UGBA 129: Financial Reporting for Complex Transactions
- UGBA 131: Corporate Finance and Financial Statement Analysis
- UGBA 132: Financial Institutions and Markets
- UGBA 133: Investments
<table>
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<tr>
<th>Course Code</th>
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<tr>
<td>UGBA 136F</td>
<td>Behavioral Finance</td>
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<tr>
<td>UGBA 137</td>
<td>Special Topics in Finance</td>
</tr>
<tr>
<td>UGBA 141</td>
<td>Production and Operations Management</td>
</tr>
<tr>
<td>UGBA 143</td>
<td>Game Theory and Business Decisions</td>
</tr>
<tr>
<td>UGBA 147</td>
<td>Special Topics in Operations and Information Technology Management</td>
</tr>
<tr>
<td>UGBA 151</td>
<td>Management of Human Resources</td>
</tr>
<tr>
<td>UGBA 152</td>
<td>Negotiation and Conflict Resolution</td>
</tr>
<tr>
<td>UGBA 154</td>
<td>Power and Politics in Organizations</td>
</tr>
<tr>
<td>UGBA 155</td>
<td>Leadership</td>
</tr>
<tr>
<td>UGBA 156AC</td>
<td>Diversity in the Workplace</td>
</tr>
<tr>
<td>UGBA 157</td>
<td>Special Topics in the Management of Organizations</td>
</tr>
<tr>
<td>UGBA 160</td>
<td>Consumer Behavior</td>
</tr>
<tr>
<td>UGBA 161</td>
<td>Marketing Research: Data and Analytics</td>
</tr>
<tr>
<td>UGBA 162</td>
<td>Brand Management and Strategy</td>
</tr>
<tr>
<td>UGBA 162A</td>
<td>Product Branding and Branded Entertainment</td>
</tr>
<tr>
<td>UGBA 165</td>
<td>Advertising Strategy</td>
</tr>
<tr>
<td>UGBA 167</td>
<td>Special Topics in Marketing</td>
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<tr>
<td>UGBA 168B</td>
<td>International Marketing</td>
</tr>
<tr>
<td>UGBA 169</td>
<td>Pricing</td>
</tr>
<tr>
<td>UGBA 170</td>
<td>Ethical Leadership in Business</td>
</tr>
<tr>
<td>UGBA C172</td>
<td>History of American Business</td>
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<tr>
<td>UGBA 175</td>
<td>Legal Aspects of Management</td>
</tr>
<tr>
<td>UGBA 176</td>
<td>Media Consulting and Public Relations</td>
</tr>
<tr>
<td>UGBA 177</td>
<td>Special Topics in Business and Public Policy</td>
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<tr>
<td>UGBA 178</td>
<td>Introduction to International Business</td>
</tr>
<tr>
<td>UGBA 179</td>
<td>International Consulting for Small and Medium-Sized Enterprises</td>
</tr>
<tr>
<td>UGBA 180</td>
<td>Introduction to Real Estate and Urban Land Economics</td>
</tr>
<tr>
<td>UGBA 183</td>
<td>Introduction to Real Estate Finance</td>
</tr>
<tr>
<td>UGBA 184</td>
<td>Urban and Real Estate Economics</td>
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<tr>
<td>UGBA 187</td>
<td>Special Topics in Real Estate Economics and Finance</td>
</tr>
<tr>
<td>UGBA 190S</td>
<td>Strategy for the Information Technology Firm</td>
</tr>
<tr>
<td>UGBA 190T</td>
<td>Special Topics in Innovation and Design</td>
</tr>
<tr>
<td>UGBA 190V</td>
<td>Corporate Strategy in Telecommunications and Media</td>
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<tr>
<td>UGBA 191C</td>
<td>Communication for Leaders</td>
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<tr>
<td>UGBA 191I</td>
<td>Improvisational Leadership</td>
</tr>
<tr>
<td>UGBA 191P</td>
<td>Leadership and Personal Development</td>
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<td>UGBA 192A</td>
<td>Leading Nonprofit and Social Enterprises</td>
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<td>UGBA 192B</td>
<td>Strategic Philanthropy</td>
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<tr>
<td>UGBA 192L</td>
<td>Applied Impact Evaluation</td>
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<tr>
<td>UGBA 192N</td>
<td>Topics in Social Sector Leadership</td>
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<tr>
<td>UGBA 192P</td>
<td>Sustainable Business Consulting Projects</td>
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<tr>
<td>UGBA 192T</td>
<td>Topics in Corporate Social Responsibility</td>
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<tr>
<td>UGBA 193C</td>
<td>Curricular Practical Training for International Students</td>
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<tr>
<td>UGBA 193I</td>
<td>Business Abroad</td>
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<tr>
<td>UGBA 194</td>
<td>Undergraduate Colloquium on Business Topics</td>
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<tr>
<td>UGBA 195A</td>
<td>Entrepreneurship</td>
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<tr>
<td>UGBA 195P</td>
<td>Perspectives on Entrepreneurship</td>
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<tr>
<td>UGBA 195S</td>
<td>Entrepreneurship To Address Global Poverty</td>
</tr>
<tr>
<td>UGBA 195T</td>
<td>Topics in Entrepreneurship</td>
</tr>
<tr>
<td>UGBA 196</td>
<td>Special Topics in Business Administration</td>
</tr>
<tr>
<td>UGBA 198</td>
<td>Directed Study</td>
</tr>
<tr>
<td>UGBA 199</td>
<td>Supervised Independent Study and Research</td>
</tr>
</tbody>
</table>

### Total Upper Division Units

57-61

1. M.E.T. Special Topics courses will count as upper division business units.

### University of California Requirements

#### Entry Level Writing

[Entry Level Writing](http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/entry-level-writing-requirement)

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

#### American History and American Institutions

[American History and American Institutions](http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/american-history-institutions-requirement)

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

#### Campus Requirement

[American Cultures](http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/american-cultures-requirement)

American Cultures (AC) is the one requirement that all undergraduate students at UC Berkeley need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity, and culture of the United States. AC courses offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American culture.

#### M.E.T. Program Requirements

#### Reading and Composition

Two Reading and Composition (R&C) courses must be taken for a letter grade (C- or better required), and must be completed by no later than the end of the sophomore year (4th semester of enrollment). The first half of R&C, the “A” course, must be completed by the end of the freshman year; the second half of R&C, the “B” course, by no later than the end of the sophomore year or a student's registration will be blocked. View a detailed list of courses [here](http://guide.berkeley.edu/undergraduate/colleges-schools/engineering/reading-composition-requirement) that fulfill Reading and Composition requirements.

#### Breadth Requirement

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

Students in the M.E.T. Program must successfully complete six breadth courses, one in each of the following categories:

- Arts and Literature (http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/arts-literature)
- Historical Studies (http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/historical-studies)
- International Studies (http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/international-studies)
- Philosophy and Values (http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/philosophy-values) (will be satisfied with UGBA 107)
- Physical Science (http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/physical-science) (will be satisfied with Physics 7B)
- Social and Behavioral Sciences (http://guide.berkeley.edu/undergraduate/colleges-schools/haas-business/social-behavioral-sciences) (will be satisfied with Econ 1)

- With the exception of UGBA 107, UGBA courses cannot be used to fulfill breadth requirements.
- With the exception of Econ 1, microeconomics and macroeconomics at any level (Econ 2, Econ 3, Econ 100A/B, Econ 101A/B, IAS 106/107) cannot be used to fulfill breadth requirements.
- Courses offered by any Engineering department, with the exception of BIO ENG 100, COMPSCI C79, ENGIN 125, 157AC, MEC ENG 191K and 191AC, cannot be used to fulfill breadth requirements.
- No more than two courses from any one department may be used to satisfy the breadth requirement (L&S Discovery courses (http://ldiscovery.berkeley.edu) are exempt).
- Advanced Placement or International Baccalaureate exams cannot be used to fulfill the breadth requirement. Some A-Level exams are accepted, but a maximum of two A-Level exams may be used to fulfill breadth requirements.
- Two of the breadth courses must be upper-division (courses numbered 100-196).
- Courses numbered 97, 98, 99, or above 196 may not be used to complete any breadth requirement.
- Breadth courses must be a minimum of 3 semester units.
- Reading & Composition courses cannot be used to fulfill breadth requirements.

**Class Schedule Requirements**

- Minimum units per semester: 13
- Maximum units per semester: 20.5
- Students in the M.E.T. Program must enroll each semester in no fewer than two technical courses (of a minimum of 3 units each) required of the engineering major program of study in which the student is officially declared.

**Minimum Academic (Grade) Requirements**

- A minimum overall and semester grade point average of 2.000 (C average) is required. Students will be subject to dismissal from the University if during any fall or spring semester their overall U.C. GPA falls below a 2.00, or their semester GPA is less than 2.00.
- Students must achieve a minimum GPA of 2.000 (C average) in upper division technical courses each semester. Students will be subject to dismissal from the University if their upper division technical GPA falls below 2.00.
- A minimum overall GPA of 2.00, and a minimum 2.000 GPA in upper division technical course work required of the major are required to graduate.

**Unit Requirements**

- A minimum of 120 units are required to graduate.
- A maximum of 16 units of Special Studies coursework (courses numbered 97, 98, 99, 197, 198, or 199) will count towards the 120 units; a maximum of four are allowed in a given semester.
- A maximum of four units of Physical Education from any school attended will count towards the 120 units.
- No more than 1/3 of a student's total UC Berkeley units may be taken Pass/No Pass, including physical education courses, Education Abroad Program, or courses taken on another UC campus.

**University of California Requirements**

**Entry Level Writing** (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/entry-level-writing-requirement)

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

**American History and American Institutions** (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/american-history-institutions-requirement)

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

**Campus Requirement**

**American Cultures** (http://guide.berkeley.edu/undergraduate/colleges-schools/natural-resources/american-cultures-requirement)

American Cultures (AC) is the one requirement that all undergraduate students at UC Berkeley need to take and pass in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture in the United States. AC courses offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.
### Second Year

<table>
<thead>
<tr>
<th>Course</th>
<th>Fall Units</th>
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<td>MATH 53</td>
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<tr>
<td>PHYSICS 7A</td>
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<tr>
<td><strong>Breadth: Historical Studies</strong></td>
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<td>Reading &amp; Composition Course from List A</td>
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#### Third Year

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<td>Technical Electives</td>
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<td>Upper Division EECs</td>
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<td>UGBA 100</td>
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<td>UGBA 101A</td>
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<td>UGBA 105</td>
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<tr>
<td><strong>Breadth: International Studies</strong></td>
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#### Fourth Year

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<td>Upper Division EECs</td>
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<td>3</td>
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<td>M.E.T. Special Topics</td>
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<td>2</td>
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<td>UGBA 104</td>
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<td><strong>Total Units: 143-150</strong></td>
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<td>19-20</td>
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1. Math 1A may be fulfilled with a score of 3, 4 or 5 on the AP Calculus AB or BC exam, a score of 5, 6 or 7 on the IB Higher Level Math exam, or a grade of A, B or C on the A-Level Math H1, H2, H3, Pure Math or Further Math exam.

2. Students must complete one course from the following list: ASTRON 7A, ASTRON 7B, BIOLOGY 1A and BIOLOGY 1AL (must take both), BIOLOGY 1B, CHEM 1A and CHEM 1AL (must take both), CHEM 1B, CHEM 3A and CHEM 3AL (must take both), CHEM 3B and CHEM 3BL (must take both), CHEM 4A, CHEM 4B, MCELLB1 32 and MCELLB1 32L (must take both), PHYSICS 7C, or an upper-division course of 3 units or more in astronomy, biology, chemistry, earth and planetary science (other than EPS 170AC), integrative biology, molecular cell biology, physics, or plant & microbial biology. This requirement is listed in the freshman year curriculum, but may be fulfilled with AP exam scores.

3. M.E.T. Special Topics courses will count as upper division business units. Students must complete a minimum of 20 units of upper division EECS courses. One course must provide a major design experience, and be selected from the following list: EECS 149, EL ENG C106A, EL ENG C106B, EL ENG C128, EL ENG 130, EL ENG 140, EL ENG 149, EL ENG 192, COMPSCI C149, COMPSCI 160, COMPSCI 162, COMPSCI 169, COMPSCI 184, COMPSCI 186, EECS 151 and EECS 151LA (must take both), EECS 151 and EECS 151LB (must take both).
Students must complete a minimum of 45 units of Engineering coursework. Technical Electives and the 45 units of Engineering courses cannot include: any course taken on a Pass/No Pass basis; courses numbered 24, 39, or 84; BIO ENG 100; COMP SCI 70, C79, 195, H195; DES INV courses (except DES INV 15, 22, 90E, 190E); ENGIN 125, 157AC, 180; IND ENG 95, 172, 185, 186, 190 series, 191, 192, 195; MEC ENG 191AC, 190K, and 191K.

Students must complete a minimum of 38 units of upper division business coursework. See UGBA Elective course list under “Major Requirements” tab.

Students must complete 4 units of Technical Elective(s) chosen from any lower or upper division course in the following departments: Astronomy, Chemistry, Data Science, Earth and Planetary Science, Integrative Biology, Mathematics, Molecular Cell Biology, Physics, Plant & Microbial Biology, Statistics, or any Engineering department (including EECS). The 4 units of Technical Elective(s) must be in addition to the Natural Science Elective and the 20 units of required EECS Upper Division Technical Electives. If the 4 units of Technical Elective(s) are from an Engineering department, the units can count toward the required 45 units of Engineering coursework. See footnote 10 for the list of excluded courses.

Students can also take STAT C8 or COMPSCI C8 plus STAT 88 to fulfill the statistics prerequisite. Both courses must be taken to satisfy the requirement, although they do not need to be taken in the same semester. Note: STAT courses will also fulfill the Technical Elective requirement.

- Business Administration (p.  )
- Computer Science (p.  )
- Electrical Engineering (p.  )
- Electrical Engineering and Computer Sciences (p.  )

**Business Administration**

**UGBA 10 Principles of Business 3 Units**

Offered through: Business Administration

Terms offered: Spring 2018, Fall 2017, Spring 2017

This course provides an introduction to the study of the modern business enterprise. The course is taught in five modules, the order of which may vary from semester to semester. The first examines the role and governance of business enterprise in a market economy. The second concentrates on financial issues, while the third looks at the problems of managing people in organizations. The fourth examines product pricing, marketing, and distribution issues and the last concentrates on the international business environment.

Principles of Business: Read More [+]

**Hours & Format**

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

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Formerly known as: Business Administration 10

Principles of Business: Read Less [-]

**UGBA 24 Freshman Seminars 1 Unit**

Offered through: Business Administration

Terms offered: Fall 2013, Spring 2007, Spring 2005

The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.

Freshman Seminars: Read More [+]

**Rules & Requirements**

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

**Hours & Format**

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

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Freshman Seminars: Read Less [-]
UGBA 39D Freshman/Sophomore Seminar 2 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2008, Fall 2007
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester.
Freshman/Sophomore Seminar: Read More [+]
Rules & Requirements
Prerequisites: Priority given to freshmen and sophomores

Hours & Format
Fall and/or spring: 15 weeks - 2-4 hours of seminar per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman/Sophomore Seminar: Read Less [-]

UGBA 96 Lower Division Special Topics in Business Administration 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
Study in various fields of business administration for lower division students. Topics will vary from year to year and will be announced at the beginning of each semester.
Lower Division Special Topics in Business Administration: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer: 6 weeks - 2.5-10 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Lower Division Special Topics in Business Administration: Read Less [-]

UGBA 98 Directed Group Study 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2015, Fall 2014, Spring 2014
Organized group study on topics selected by lower division students under the sponsorship and direction of a member of the Haas School of Business faculty.
Directed Group Study: Read More [+]
Rules & Requirements
Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.
Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Formerly known as: Business Administration 98
Directed Group Study: Read Less [-]

UGBA 100 Business Communication 2 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
Theory and practice of effective communication in a business environment. Students practice what they learn with oral presentations and written assignments that model real-life business situations.
Business Communication: Read More [+]
Rules & Requirements
Prerequisites: Restricted to Undergraduate Business Administration Majors Only

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: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Business Communication: Read Less [-]
UGBA 101A Microeconomic Analysis for Business Decisions 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
Economic analysis applicable to the problems of business enterprises with emphasis on the determination of the level of prices, outputs, and inputs; effects of the state of the competitive environment on business and government policies.

Rules & Requirements

Prerequisites: Economics 1, Mathematics 1A or 16A, Statistics 21, or equivalents

Credit Restrictions: Students will receive no credit for Undergraduate Business Administration 101A after completing Economics 100A or 101A, Environmental Economics and Policy 100 or International and Area Studies 106. A deficient grade in Economics 100A, 101A, Environmental Economics and Policy 100, or International and Area Studies 106 may be repeated by taking 101A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of discussion per week
Summer: 6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

UGBA 101B Macroeconomic Analysis for Business Decisions 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
Analysis of the operation of the market system with emphasis on the factors responsible for economic instability; analysis of public and business policies which are necessary as a result of business fluctuations.

Rules & Requirements

Prerequisites: Economics 1, Mathematics 1A or 16A, Statistics 21, or equivalents

Credit Restrictions: Students will receive no credit for Undergraduate Business Administration 101B after completing Economics 100B or 101B or International and Area Studies 107. A deficient grade in Economics 100B, 101B, or International and Area Studies 107 may be repeated by taking Undergraduate Business Administration 101B.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week
Summer: 6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 111

Macroeconomic Analysis for Business Decisions: Read Less [-]
**UGBA 102A Introduction to Financial Accounting 3 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
The identification, measurement, and reporting of financial effects of events on enterprises, with a particular emphasis on business organization. Preparation and interpretation of balance sheets, income statements, and statements of cash flows.

**Introduction to Financial Accounting: Read More [+]**

**Hours & Format**
- **Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week
- **Summer:** 6 weeks - 5 hours of lecture and 5 hours of discussion per week

**Additional Details**
- **Subject/Course Level:** Undergrad. Business Administration/Undergraduate
- **Grading/Final exam status:** Letter grade. Final exam not required.
- **Formerly known as:** Business Administration 120

**UGBA 102B Introduction to Managerial Accounting 3 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
The uses of accounting systems and their outputs in the process of management of an enterprise. Classification of costs and revenue on several bases for various uses; budgeting and standard cost accounting; analyses of relevant costs and other data for decision making.

**Introduction to Managerial Accounting: Read More [+]**

**Rules & Requirements**
- **Prerequisites:** 102A

**Hours & Format**
- **Fall and/or spring:** 15 weeks - 3 hours of lecture and 1 hour of discussion per week
- **Summer:** 6 weeks - 5 hours of lecture and 5 hours of discussion per week

**Additional Details**
- **Subject/Course Level:** Undergrad. Business Administration/Undergraduate
- **Grading/Final exam status:** Letter grade. Final exam not required.
- **Formerly known as:** Business Administration 123

**UGBA W102A Introduction to Financial Accounting 3 Units**
Offered through: Business Administration
Terms offered: Not yet offered
The identification, measurement, and reporting of financial effects of events on enterprises, with a particular emphasis on business organization. Preparation and interpretation of balance sheets, income statements, and statements of cash flows.

**Introduction to Financial Accounting: Read More [+]**

**Hours & Format**
- **Summer:** 6 weeks - 7.5 hours of web-based lecture per week

**Online:** This is an online course.

**Additional Details**
- **Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

**Instructor:** Zhang

**Introduction to Financial Accounting: Read Less [-]**

**UGBA 103 Introduction to Finance 4 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
Analysis and management of the flow of funds through an enterprise. Cash management, source and application of funds, term loans, types and sources of long-term capital. Capital budgeting, cost of capital, and financial structure. Introduction to capital markets.

**Introduction to Finance: Read More [+]**

**Rules & Requirements**
- **Prerequisites:** 101A

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

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

**Additional Details**
- **Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

**Formerly known as:** Business Administration 130

**Introduction to Finance: Read Less [-]**
UGBA 104 Analytic Decision Modeling Using Spreadsheets 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
This course provides an introduction to several quantitative methods used to facilitate complex decision-making in business, with applications in many different industries, at different levels in the organization, and with different scopes of decisions. The power of the methods covered in this class is further enhanced by implementing them in spreadsheet software, which allows complex problems to be approached and solved in a straightforward and understandable manner.

Analytic Decision Modeling Using Spreadsheets: Read More

Rules & Requirements

Prerequisites: Mathematics 1B or 16B, Statistics 21, or equivalents

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week
Summer: 6 weeks - 5 hours of lecture and 2.5 hours of discussion per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Analytic Decision Modeling Using Spreadsheets: Read Less

UGBA 105 Leading People 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
A general descriptive and analytical study of organizations from the behavioral science point of view. Problems of motivation, leadership, morale, social structure, groups, communications, hierarchy, and control in complex organizations are addressed. The interaction among technology, environment, and human behavior are considered. Alternate theoretical models are discussed.

Leading People: Read More

Rules & Requirements

Credit Restrictions: Students will receive no credit for Undergrad. Business Administration 105 after completing Business Administration 150 or S150.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 6 weeks - 8 hours of lecture per week 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Leading People: Read Less

UGBA 106 Marketing 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
The evolution of markets and marketing; market structure; marketing cost and efficiency; public and private regulation; the development of marketing programs including decisions involving products, price, promotional distribution.

Marketing: Read More

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 6 weeks - 7.5 hours of lecture per week 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Marketing: Read Less
UGBA 107 The Social, Political, and Ethical Environment of Business 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
Study and analysis of American business in a changing social and political environment. Interaction between business and other institutions. Role of business in the development of social values, goals, and national priorities. The expanding role of the corporation in dealing with social problems and issues.

UGBA 113 Managerial Economics 3 Units
Offered through: Business Administration
Terms offered: Fall 2010, Fall 2009
Analysis of the theory and practice of decision-making in business firms, utilizing the concepts and techniques of managerial economics. The business decisions to be investigated include pricing policies, internal transfer pricing, and various choices under uncertainty.

UGBA 115 Competitive Strategy 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 3 Week Session
This course draws upon theories and frameworks from industrial organization economics, game theory, and resource-based views to address the unique challenges confronted by senior executives of organizations. The focus is strategies for competitive advantage at an organizational level. Topics include industry and competitor analysis, horizontal and vertical boundaries of the firm, strategic positioning, internal competencies, and dynamic capabilities.

UGBA 117 Special Topics in Economic Analysis and Policy 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Fall 2013
A variety of topics in economic analysis and policy with emphasis on current problems and research.
**UGBA 118 International Trade 3 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Summer 2017 Second 6 Week Session, Spring 2017
This course will develop models for understanding the economic causes and effects of international trade, will investigate the effects of economic policies that inhibit trade, and will examine the political economy of trade. By integrating the findings of the latest theoretical and empirical research in international economics, this course helps students learn how to explore the current political debates in the U.S. and elsewhere regarding the benefits and costs of international trade.
International Trade: Read More [+]

**Rules & Requirements**

**Prerequisites:** Undergraduate Business Administration 101A or equivalent

**Credit Restrictions:** Students will receive no credit for Undergraduate Business Administration 118 after taking Economics 181 or Economics C181/Environmental Economics and Policy C181.

**Hours & Format**

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

**Summer:** 6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

International Trade: Read Less [-]

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**UGBA 119 Leading Strategy Implementation 3 Units**
Offered through: Business Administration
Class format consists of lectures, experiential exercises, student presentations, and case discussions. This course will cover the concepts and techniques required for successful implementation of business strategies with a particular focus on the role of effective leadership in leading strategic change.
Leading Strategy Implementation: Read More [+]

**Hours & Format**

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

**Summer:** 10 weeks - 4.5 hours of lecture per week

**Online:** This is an online course.

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

**Formerly known as:** Business Administration 190

Leading Strategy Implementation: Read Less [-]

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**UGBA 120AA Intermediate Financial Accounting 1 4 Units**
Offered through: Business Administration
Terms offered: Fall 2017, Summer 2017 First 6 Week Session, Fall 2016
This Course introduces the student to concepts, theory and applications of financial accounting. The topics covered include accrual accounting concepts, financial statement analysis, inventory valuations, capital assets and their corresponding depreciation and impairment. Attention is given to examples on current reporting practices and to the study of reporting requirements promulgated by the Financial Accounting Standards Board ("FASB") with comparison to the International Accounting Standards Board ("IASB").
Intermediate Financial Accounting 1: Read More [+]

**Rules & Requirements**

**Prerequisites:** 102A

**Hours & Format**

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

**Summer:** 6 weeks - 7.5 hours of lecture and 5 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Intermediate Financial Accounting 1: Read Less [-]
**UGBA 120AB Intermediate Financial Accounting 2 4 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Summer 2017 Second 6 Week Session, Spring 2017
This course expands students' knowledge of the concepts, theory, and application of financial accounting. It continues the technical accounting sequence, which also includes UGBA 120AA, Intermediate Accounting 1 and UGBA 120B, Advanced Financial Accounting. Topics include an in-depth treatment of the financing elements of the balance sheet and the income statement, as well as a detailed examination of the statement of cash flows.

Intermediate Financial Accounting 2: Read More [+]

**Rules & Requirements**

**Prerequisites:** UGBA 102A is required. UGBA 120AA is recommended

**Hours & Format**

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

**Summer:** 6 weeks - 7.5 hours of lecture and 5 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Intermediate Financial Accounting 2: Read Less [-]

**UGBA 120B Advanced Financial Accounting 4 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
Continuation of 120A. Sources of long term capital; funds statements, financial analysis, accounting for partnerships, consolidated financial statements, adjustments of accounting data using price indexes; accounting for the financial effects of pension plans; other advanced accounting problems.

Advanced Financial Accounting: Read More [+]

**Rules & Requirements**

**Prerequisites:** UGBA 120AA and 120AB are recommended

**Hours & Format**

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

**Summer:** 6 weeks - 7.5 hours of lecture and 5 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Advanced Financial Accounting: Read Less [-]

**UGBA 121 Federal Income Tax Accounting 4 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2016, Spring 2016
Determination of individual and corporation tax liability; influence of federal taxation on economic activity; tax considerations in business and investment decisions.

Federal Income Tax Accounting: Read More [+]

**Rules & Requirements**

**Prerequisites:** 102A (120AA recommended)

**Hours & Format**

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

**Summer:** 6 weeks - 7.5 hours of lecture and 2 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Federal Income Tax Accounting: Read Less [-]

**UGBA 122 Financial Information Analysis 4 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Fall 2016
This course is designed to: 1) develop basic skills in financial statement analysis; 2) teach students to identify the relevant financial data used in a variety of decision contexts, such as equity valuation, forecasting firm-level economic variables, distress prediction and credit analysis; 3) help students appreciate the factors that influence the outcome of the financial reporting process, such as the incentives of reporting parties, regulatory rules, and a firm's competitive environment.

Financial Information Analysis: Read More [+]

**Rules & Requirements**

**Prerequisites:** 120AA

**Hours & Format**

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

**Summer:** 6 weeks - 7.5 hours of lecture and 5 hours of discussion per week

**Additional Details**

**Subject/Course Level:** Undergrad. Business Administration/Undergraduate

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

Financial Information Analysis: Read Less [-]
UGBA 123 Operating and Financial Reporting Issues in the Financial Services Industry 3 Units
Offered through: Business Administration
Terms offered: Fall 2017
This course examines how accounting in the financial services industry – banking, insurance, real estate – actually operates. Students learn about underwriting and pricing in each sector, investment processes and controls, incentive-based profit sharing, risk management, and the factors that contribute to profitability. Students learn what financial statements reveal about estimates companies make regarding liabilities and, more generally, what they reveal about how companies deal with uncertainty associated with predicting and measuring financial results. Students examine the controversy over employing Fair Value Accounting across sectors and learn about other sector-specific accounting requirements.

Rules & Requirements
Prerequisites: 120AA

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Operating and Financial Reporting Issues in the Financial Services Industry: Read More [+]

UGBA W125 Professional Judgment in Accounting 3 Units
Offered through: Business Administration
Terms offered: Prior to 2007
An online course in reviewing auditing principles with a simulated audit experience over the complex areas of estimates and judgments.

Rules & Requirements
Prerequisites: Preferable to have auditing completed or in progress. Must have intermediate accounting

Hours & Format
Summer: 8 weeks - 5 hours of web-based lecture and 2 hours of web-based discussion per week

Online: This is an online course.

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Professional Judgment in Accounting: Read Less [-]

UGBA 126 Auditing 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
Concepts and problems in the field of professional verification of financial and related information, including ethical, legal and other professional issues, historical developments, and current concerns.

Rules & Requirements
Prerequisites: 120AA (120AB and 120B recommended)

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of discussion per week
Summer: 6 weeks - 7.5 hours of lecture and 2 hours of discussion per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Auditing: Read Less [-]

UGBA 127 Special Topics in Accounting 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
A variety of topics in accounting with emphasis on current problems and research.

Rules & Requirements
Prerequisites: 102A

Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture and 0-1 hours of discussion per week
Summer: 6 weeks - 2.5-10 hours of lecture and 0-2.5 hours of discussion per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Accounting: Read Less [-]
UGBA 128 Strategic Cost Management 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Spring 2015, Fall 2012
Managerial accounting is a company's internal language and is used for decision-making, production management, product design and pricing, performance evaluation and motivation of employees. The objective of the course is to develop the skills and analytical ability of effectively and efficiently use managerial accounting information in order to help a company achieve its strategic and financial goals.

Rules & Requirements
Prerequisites: 102B

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

UGBA 129 Financial Reporting for Complex Transactions 3 Units
Offered through: Business Administration
Terms offered: Spring 2014
This course develops sophisticated users of financial information. Students will enhance their ability to understand the economic essence of important complex business transactions, focusing on topics related to major financial events in the lifecycle of an organization (IPOs, mergers and acquisitions, bankruptcies, etc.) Students' ability to identify and understand the financial reporting and tax issues related to these business dealings and accounting situations will dramatically increase. Many fascinating transactions will be examined in an effort to understand the economic underpinnings of the transactions and their accounting representation in the financial statements.

Rules & Requirements
Prerequisites: UGBA 120A

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.

UGBA 131 Corporate Finance and Financial Statement Analysis 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
This course will cover the principles and practice of business finance. It will focus on project evaluation, capital structure, and corporate governance. Firms' policies toward debt, equity, and dividends are explored. The incentives and conflicts facing managers and owners are also discussed.

Rules & Requirements
Prerequisites: 103

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 6 weeks - 7.5 hours of lecture and 2 hours of discussion per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 134

UGBA 132 Financial Institutions and Markets 3 Units
Offered through: Business Administration
Terms offered: Summer 2017 First 6 Week Session, Summer 2016 10 Week Session, Summer 2016 First 6 Week Session
Organization, behavior, and management of financial institutions. Markets for financial assets and the structure of yields, influence of Federal Reserve System and monetary policy on financial assets and institutions.

Rules & Requirements
Prerequisites: 101A-101B, and 103

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 6 weeks - 8 hours of lecture and 2.5 hours of discussion per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 132
UGBA 133 Investments 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Summer 2017 First 6 Week Session, Summer 2017 Second 6 Week Session
Sources of and demand for investment capital, operations of security markets, determination of investment policy, and procedures for analysis of securities.

Rules & Requirements
Prerequisites: 103

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 6 weeks - 7.5 hours of lecture and 2.5 hours of discussion per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

UGBA 136F Behavioral Finance 3 Units
Offered through: Business Administration
Terms offered: Summer 2017 Second 6 Week Session, Summer 2016 10 Week Session, Summer 2016 Second 6 Week Session
This course explores why markets are sometimes inefficient. We consider the role that investors' heuristics and biases play in generating mispricing in financial markets. We also explore how various trading frictions limit the ability of arbitrageurs to reduce mispricing. Finally, we look at the influence of market inefficiencies on corporate decisions.

Rules & Requirements
Prerequisites: 103

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

UGBA 137 Special Topics in Finance 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Summer 2017 Second 6 Week Session, Spring 2017
A variety of topics in finance with emphasis on current problems and research.

Rules & Requirements
Prerequisites: 103

Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer: 6 weeks - 2.5-10 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 139

UGBA 141 Production and Operations Management 3 Units
Offered through: Business Administration
Terms offered: Spring 2017, Spring 2016, Spring 2015
A survey of the concepts and methodologies for management control of production and operations systems. Topics include inventory control, material requirements planning for multistage production systems, aggregate planning, scheduling, and production distribution.

Rules & Requirements
Prerequisites: 104 or equivalent, or consent of instructor

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 142
UGBA 143 Game Theory and Business Decisions 3 Units
Offered through: Business Administration
Terms offered: Fall 2014, Fall 2013, Spring 2010
This course provides an introduction to game theory and decision analysis. Game theory is concerned with strategic interactions among players (multi-player games), and decision analysis is concerned with making choices under uncertainty (single-player games). Emphasis is placed on applications.

Rules & Requirements
Prerequisites: Mathematics 1B or 16B, Statistics 21, or equivalent

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Game Theory and Business Decisions: Read More [+]

UGBA 147 Special Topics in Operations and Information Technology Management 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Summer 2017 First 6 Week Session, Spring 2009
A variety of topics in manufacturing and information technology with emphasis on current problems and research.
Special Topics in Operations and Information Technology Management: Read More [+]
Rules & Requirements
Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer: 6 weeks - 2.5-10 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Special Topics in Operations and Information Technology Management: Read Less [-]

UGBA 151 Management of Human Resources 3 Units
Offered through: Business Administration
Terms offered: Fall 2016, Summer 2016 10 Week Session, Summer 2016 First 6 Week Session
The designs of systems of rewards, assessment, and manpower development. The interaction of selection, placement, training, personnel evaluation, and career ladders within an on-going organization. Role of the staff manager. Introduction of change. Implications of behavioral research for management problems and policies.
Management of Human Resources: Read More [+]
Rules & Requirements
Prerequisites: 105

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 151
Management of Human Resources: Read Less [-]

UGBA 152 Negotiation and Conflict Resolution 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
The purpose of this course is to understand the theory and processes of negotiation as practiced in a variety of settings. It is designed to be relevant to the broad spectrum of negotiation problems faced by managers and professionals. By focusing on the behavior of individuals, groups, and organizations in the context of competitive situations, the course will allow students the opportunity to develop negotiation skills experientially in useful analytical frameworks (e.g.- simulations, cases).
Negotiation and Conflict Resolution: Read More [+]
Rules & Requirements
Prerequisites: 105

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 152
Negotiation and Conflict Resolution: Read Less [-]
UGBA 154 Power and Politics in Organizations 2 or 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Summer 2017 Second 6 Week Session, Fall 2016
This course will provide students with a sense of “political intelligence.” After taking this course, students will be able to: (1) diagnose the true distribution of power in organizations, (2) identify strategies for building sources of power, (3) develop techniques for influencing others, (4) understand the role of power in building cooperation and leading change in organizations, and (5) make sense of others’ attempts to influence them. These skills are essential for effective and satisfying career building.
Power and Politics in Organizations: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 2-3 hours of lecture per week
Summer: 6 weeks - 7.5-10 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

UGBA 155 Leadership 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
The purpose of this course is for the students to develop understanding of the theory and practice of leadership in various organizational settings. It is designed to allow students the opportunity to develop leadership skills through experiential exercises, behavioral and self-assessments, case studies, class discussions, and lectures.
Leadership: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Leadership: Read Less [-]

UGBA 156AC Diversity in the Workplace 3 Units
Offered through: Business Administration
Terms offered: Fall 2013, Spring 2013, Fall 2011
This course introduces students to various theories on diversity in business and the importance of human capital equity and inclusion to organizations. Students will engage in community-based projects to be more conscious of the social impact of positive human relations and to foster equity, social justice, and civic responsibility. Emphasis placed on experiential learning with issues of race, ethnicity, gender, generational status, spirituality, sexual orientation, and physical and mental ability.
Diversity in the Workplace: Read More [+]

Rules & Requirements
Prerequisites: 10, 105, 151 recommended
Requirements this course satisfies: Satisfies the American Cultures requirement

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Diversity in the Workplace: Read Less [-]

UGBA 157 Special Topics in the Management of Organizations 1 - 4 Units
Offered through: Business Administration
A variety of topics in organizational behavior and industrial relations with emphasis on current problems and research.
Special Topics in the Management of Organizations: Read More [+]

Rules & Requirements
Prerequisites: 105
Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer: 6 weeks - 2.5-10 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 159
Special Topics in the Management of Organizations: Read Less [-]
Consumer behavior is the study of how consumers process information, form attitudes and judgments, and make decisions. Its study is critical to understand how consumers think and behave, which is critical for a company wishing to develop a customer focus. Given how different people are, it is amazing how similarly their minds work. Consumer psychology is the systematic study of how consumers perceive information, how they encode it in memory, integrate it with other sources of information, retrieve it from memory, and utilize it to make decisions. It is one of the building blocks of the study of marketing and provides the student with a set of tools with diverse applications.

**UGBA 160 Consumer Behavior 3 Units**
Offered through: Business Administration
Terms offered: Spring 2018, Summer 2017 First 6 Week Session, Spring 2017
Prerequisites: 106

Marketing research objectives; qualitative research, surveys, experiments, sampling, data analysis.

**UGBA 161 Marketing Research: Data and Analytics 3 Units**
Offered through: Business Administration
Terms offered: Spring 2017, Fall 2014, Fall 2012
Prerequisites: 106

Marketing research objectives; qualitative research, surveys, experiments, sampling, data analysis.

**UGBA 162 Brand Management and Strategy 3 Units**
Offered through: Business Administration
Terms offered: Fall 2017, Fall 2016, Fall 2015
Prerequisites: 106
UGBA 165 Advertising Strategy 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Summer 2017 First 6 Week Session, Fall 2016
Basic concepts and functions of advertising in the economy; consumer
motivation; problems in utilizing advertising and measuring its
effectiveness.
Advertising Strategy: Read More [+]

Rules & Requirements

Prerequisites: 106

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 6 weeks - 7.5 hours of lecture per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 165
Advertising Strategy: Read Less [-]

UGBA 167 Special Topics in Marketing 1 - 4
Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
A variety of topics in marketing with emphasis on current problems and
research.
Special Topics in Marketing: Read More [+]

Rules & Requirements

Prerequisites: 106

Repeat rules: Course may be repeated for credit.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer:
6 weeks - 2.5-10 hours of lecture per week
8 weeks - 4-6 hours of lecture per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 169
Special Topics in Marketing: Read Less [-]

UGBA 168B International Marketing 3 Units
Offered through: Business Administration
Terms offered: Spring 2015, Spring 2014
Provides frameworks, knowledge, and sensitivities to formulate and
implement marketing strategies for competing in the international arena.
Regions and countries covered include the Americas, Europe, Japan,
China, India, Russia, Africa, and Asia-Pacific. Issues covered include
global versus local advertising, international pricing strategies, selecting
and managing strategic international alliances and distribution channels,
managing international brands and product lines through product life
cycle, international retailing, and international marketing organization and
control.
International Marketing: Read More [+]

Hours & Format

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

Additional Details

Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.
International Marketing: Read Less [-]

UGBA 169 Pricing 3 Units
Offered through: Business Administration
Terms offered: Summer 2017 Second 6 Week Session, Spring 2017,
Spring 2016
This three-module course aims to equip students with proven concepts,
techniques, and frameworks for assessing and formulating pricing
strategies. The first module develops the economics and behavioral
foundations of pricing. The second module discusses several innovative
pricing concepts including price customization, nonlinear pricing, price
matching, and product line pricing. The third module analyzes the
strengths and weaknesses of several Internet-based, buyer-determined
pricing models.
Pricing: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 6 weeks - 7.5 hours of lecture per week

Additional Details

Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Pricing: Read Less [-]
UGBA 170 Ethical Leadership in Business 2 Units
Offered through: Business Administration
Terms offered: Spring 2017, Spring 2016, Spring 2015
The purpose of this class is to enhance the ability of students to anticipate, critically analyze, and appropriately respond to the wide-range social and ethical issues that challenge managers as well as individuals in their roles as citizens, consumers, investors, and employees. Instruction is based on lectures and case analysis, supplemented by topical and philosophical articles and essays.
Ethical Leadership in Business: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Ethical Leadership in Business: Read Less [-]

UGBA C172 History of American Business 3 Units
Offered through: Business Administration
Terms offered: Spring 2017, Spring 2016, Spring 2015
This course will examine selected aspects of the history of American business. Included will be discussions of the evolution of the large corporation, the development of modern managerial techniques, and the changing relationship of business, government, and labor.
History of American Business: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Rosen
Also listed as: AMERSTD C172
History of American Business: Read Less [-]

UGBA 175 Legal Aspects of Management 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Summer 2017 Second 6 Week Session, Fall 2016
An analysis of the law and the legal process, emphasizing the nature and functions of law within the U.S. federal system, followed by a discussion of the legal problems pertaining to contracts and related topics, business association, and the impact of law on economic enterprise.
Legal Aspects of Management: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 175
Legal Aspects of Management: Read Less [-]

UGBA 176 Media Consulting and Public Relations 2 Units
Offered through: Business Administration
Terms offered: Fall 2017, Fall 2016
Introduces students to the conceptual issues and formidable practical challenges involved in the profession of corporate and non-profit public relations. Students build on previous coursework in oral and written business communications, brand management, governance and strategy. They learn how to work in teams to craft innovative and effective media responses to external stakeholders (e.g., customers, clients, donors, regulators, lawyers, public officials, the general public) when the organizations for which they work face the need to manage change (e.g. a new product introduction, the entrance of a new competitor) or deal with an unanticipated crisis.
Media Consulting and Public Relations: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture per week
Summer: 6 weeks - 5 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Media Consulting and Public Relations: Read Less [-]
UGBA 177 Special Topics in Business and Public Policy 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2016, Fall 2015, Fall 2014
A variety of topics in business and public policy with emphasis on current problems and research.
Special Topics in Business and Public Policy: Read More [+]

Rules & Requirements

Prerequisites: 107
Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer: 6 weeks - 2.5-10 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 179
Special Topics in Business and Public Policy: Read Less [-]

UGBA 178 Introduction to International Business 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 Second 6 Week Session
A survey involving environmental, economic, political, and social constraints on doing business abroad; effects of overseas business investments on domestic and foreign economies; foreign market analysis and operational strategy of a firm; management problems and development potential of international operations.
Introduction to International Business: Read More [+]

Rules & Requirements

Prerequisites: Undergraduate Business Administration 101A-101B or equivalents
Credit Restrictions: Students will receive no credit for Undergraduate Business Administration 178 after completing Business Administration 188. A deficient grade in Business Administration 188 may be removed by taking Undergraduate Business Administration 178.

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Introduction to International Business: Read Less [-]

UGBA 179 International Consulting for Small and Medium-Sized Enterprises 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
By exploring the intersection of global business, entrepreneurship, and consulting, this course provides an understanding of how decision-makers in small and medium sized enterprises (SMEs) can develop the frameworks necessary for making decisions about how to venture across borders in pursuit of economic opportunities in today's hypercompetitive global business environment. In addition to the technical analysis of cases, there is a strong emphasis on how to create a new service company, market and sell to potential clients, manage client relationships, and leverage financial and human resources in a service setting.
International Consulting for Small and Medium-Sized Enterprises: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 179
International Consulting for Small and Medium-Sized Enterprises: Read Less [-]

UGBA 180 Introduction to Real Estate and Urban Land Economics 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Spring 2017, Fall 2016
The nature of real property; market analysis; construction cycles; mortgage lending; equity investment; metropolitan growth; urban land use; real property valuation; public policies.
Introduction to Real Estate and Urban Land Economics: Read More [+]

Rules & Requirements

Prerequisites: Economics 1, Mathematics 16A or 1A, or equivalents

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 180
Introduction to Real Estate and Urban Land Economics: Read Less [-]
**UGBA 183 Introduction to Real Estate Finance**
3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Spring 2016, Spring 2015
Real estate debt and equity financing; mortgage market structure; effects of credit on demand; equity investment criteria; public policies in real estate finance and urban development.
Introduction to Real Estate Finance: Read More [+]
Rules & Requirements
Prerequisites: 180

**UGBA 187 Special Topics in Real Estate Economics and Finance**
1 - 4 Units
Offered through: Business Administration
Terms offered: Fall 2010, Fall 2009
A variety of topics in real estate economics and finance with emphasis on current problems and research.
Special Topics in Real Estate Economics and Finance: Read More [+]
Rules & Requirements
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

**UGBA 184 Urban and Real Estate Economics**
3 Units
Offered through: Business Administration
Terms offered: Spring 2016, Spring 2015, Spring 2014
This course examines how market forces influence the development of cities and the development and pricing of real estate assets. Topics include city formation; city size; land rent and land use; the operation of residential, commercial and industrial property markets; and the impacts of government policies, including the provision of public services, the imposition property taxes and fees, transportation pricing and investment, and land use regulations.
Urban and Real Estate Economics: Read More [+]
Rules & Requirements
Prerequisites: A background in microeconomics and basic calculus is preferable. Please contact the instructor if you are unsure about your preparation for this course

**UGBA 190S Strategy for the Information Technology Firm**
3 Units
Offered through: Business Administration
Terms offered: Prior to 2007
This course is a strategy and general management course for students interested in pursuing careers in the global information technology industry. Students are taught to view the IT industry through the eyes of the general manager/CEO (whether at a start-up or an industry giant). They learn how to evaluate strategic options and their consequences, how to understand the perspectives of various industry players, and how to anticipate how they are likely to behave under various circumstances. These include the changing economics of production, the role network effects and standards have on adoption of new products and services, the tradeoffs among potential pricing strategies, and the regulatory and public policy context.
Strategy for the Information Technology Firm: Read More [+]

**Hours & Format**
Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 8 weeks - 6 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
UGBA 190T Special Topics in Innovation and Design 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Summer 2017 First 6 Week Session
Advanced study in the fields of innovation and design that will address current and emerging issues. Topics will vary with each offering and will be announced at the beginning of each term.
Special Topics in Innovation and Design: Read More [+]

Rules & Requirements
Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer:
6 weeks - 2.5-10 hours of lecture per week
8 weeks - 2-7.5 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Special Topics in Innovation and Design: Read Less [-]

UGBA 190V Corporate Strategy in Telecommunications and Media 2 Units
Offered through: Business Administration
Terms offered: Prior to 2007
This course is an intensive and in-depth study of the rapidly evolving global telecommunications and media industry viewed through the perspective of an entrepreneur/innovator (whether at a start-up or an established company) attempting to introduce a new product or service into the market. The course is fundamentally about strategy and general management, but will draw from a variety of disciplines including public policy, law, marketing, economics, finance, engineering, and physics to identify the key issues, analyze the potential options and understand the consequences of the decisions made by management.
Corporate Strategy in Telecommunications and Media: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture per week
Summer:
6 weeks - 2.5-10 hours of lecture per week
8 weeks - 2-7.5 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Corporate Strategy in Telecommunications and Media: Read Less [-]

UGBA 191C Communication for Leaders 2 Units
Offered through: Business Administration
Terms offered: Fall 2016, Summer 2016 10 Week Session, Summer 2016 Second 6 Week Session
This course is a workshop in the fundamentals of public speaking skills in today's business environment. Each student will give speeches, coach, and debate each other, and take part in a variety of listening and other communication exercises. The course focuses on authenticity, persuasion, and advocacy.
Communication for Leaders: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 1 hour of lecture and 2 hours of discussion per week
Summer:
6 weeks - 2.5 hours of lecture and 5 hours of discussion per week
8 weeks - 1.5 hours of lecture and 3.5 hours of discussion per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Communication for Leaders: Read Less [-]

UGBA 191I Improvisational Leadership 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Fall 2016, Fall 2015
This class explores the broad principles of improvisation, a performing art form that has developed pedagogical methods to enhance individual spontaneity, listening and awareness, expressive skills, risk-taking, and one's ability to make authentic social and emotional connections. The ultimate aim of the course is to help students develop an innovative and improvisational leadership mindset, sharpening in-the-moment decision making and the ability to quickly recognize and act upon opportunities when presented. In practical terms, this course strives to enhance students' business communication skills and increase both interpersonal intuition and confidence.
Improvisational Leadership: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Improvisational Leadership: Read Less [-]
UGBA 191L Leadership Communication 1
Unit
Offered through: Business Administration
Terms offered: Not yet offered
Leadership Communication is a workshop in the fundamentals of public speaking in today’s business environment. Through prepared and impromptu speeches aimed at moving others to action, peer coaching, and lectures, students will sharpen their authentic and persuasive communication skills, develop critical listening skills, improve abilities to give, receive, and apply feedback, and gain confidence as public speakers.
Leadership Communication: Read More [+]

Hours & Format
Fall and/or spring: 2 weeks - 8 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Alternative to final exam.
Leadership Communication: Read Less [-]

UGBA 191P Leadership and Personal Development 3 Units
Offered through: Business Administration
This course is highly interactive and challenges you to explore questions central to your own leadership journey. The ultimate aim of the class is to help you develop a lifelong leadership development practice, where continuous personal growth is valued and actively pursued.
Leadership and Personal Development: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 6 weeks - 7.5 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Formerly known as: Business Administration 115
Leading Nonprofit and Social Enterprises: Read Less [-]

UGBA 192A Leading Nonprofit and Social Enterprises 3 Units
Offered through: Business Administration
This course prepares students conceptually and practically to found, lead, and manage organizations in the nonprofit sector. The course focuses on mission and theory of change (strategy), role of the board in governance, managing and marketing to multiple constituencies, role of advocacy in meeting mission, leadership styles and managing organizational culture, resource development (philanthropy), nonprofit financial management, managing for impact, HR management (volunteering), and cross-sector alliances.
Leading Nonprofit and Social Enterprises: Read More [+]

Rules & Requirements
Prerequisites: 101A or equivalent

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week
Summer: 6 weeks - 7 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Formerly known as: Business Administration 115
Leading Nonprofit and Social Enterprises: Read Less [-]

UGBA 192AC Social Movements and Social Media 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Fall 2016
This course provides a survey of innovative social movements and their complex relationships to social media technologies. It will examine the evolution from pre-social-media to present-day mobilizing strategies and the interplay between explicitly policy- and advocacy-focused approaches and related efforts rooted in music, visual arts, popular culture and celebrities. The course will place into comparative relief the discourses of explicitly racially- or ethnically-defined movements and movements that mobilize based on other, sometimes overlapping categories of marginalization including class, immigration status, gender identity and occupational category.
Social Movements and Social Media: Read More [+]

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Instructor: David Harris
Social Movements and Social Media: Read Less [-]
UGBA 192B Strategic Philanthropy 2 Units
Offered through: Business Administration
Terms offered: Spring 2018, Spring 2017
This course teaches students the concepts and practices of effective philanthropy. It offers students the experience of studying relevant theories and frameworks for assessing potential grant recipients and a real-world grant making experience in which they complete a series of nonprofit organizational assessments and then make actual grants totaling $10,000 to a limited number of organizations. Students learn about the evolution of the philanthropic sector from traditional entities, such as private, corporate and community foundations, to an array of new funding intermediaries, technology-driven philanthropies, open source platforms, “impact” investors, and venture philanthropy partnerships.

Strategic Philanthropy: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.

UGBA 192L Applied Impact Evaluation 2 Units
Offered through: Business Administration
Terms offered: Prior to 2007
This course covers the methods and applications of impact evaluations, which is the science of measuring the causal impact of a program or policy on outcomes of interest. At its essence, impact evaluation is about generating evidence on which policies work, and which don’t. This subject matter should appeal to three main audiences: (1) those in decision-making positions, such as policy makers and business leaders, and need to consume the information generated from impact evaluations to make informed evidence-based decisions, (2) project managers, development practitioners and business managers who commission impact evaluations and (3) researchers who actually design and implement impact evaluations.

Applied Impact Evaluation: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.

UGBA 192N Topics in Social Sector Leadership 1 - 5 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
Advanced study in the field of social sector leadership that will address current and emerging issues. Topics will vary with each offering and will be announced at the beginning of each term.

Topics in Social Sector Leadership: Read More [+]

Rules & Requirements
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format
Fall and/or spring: 15 weeks - 1-5 hours of lecture per week
Summer: 6 weeks - 2.5-12.5 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Topics in Social Sector Leadership: Read Less [-]

UGBA 192P Sustainable Business Consulting Projects 3 Units
Offered through: Business Administration
Terms offered: Fall 2016, Fall 2014, Fall 2012
Discuss the field of strategic corporate social responsibility (CSR) through a series of lectures, guest speakers, and projects. The course will examine best practices used by companies to engage in socially responsible business practices. It will provide students with a flavor of the complex dilemmas one can face in business in trying to do both “good for society” and “well for shareholders.” It looks at CSR from a corporation perspective, and how this supports core business objectives, core competencies, and bottom-line profits.

Sustainable Business Consulting Projects: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Sustainable Business Consulting Projects: Read Less [-]
UGBA 192T Topics in Corporate Social Responsibility 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2018, Spring 2017, Summer 2016 First 6 Week Session
Advanced study in the field of corporate social responsibility that will address current and emerging issues. Topics will vary with each offering and will be announced at the beginning of each term.
Topics in Corporate Social Responsibility: Read More [+]
Rules & Requirements
Repeat rules: Course may be repeated for credit.
Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer: 6 weeks - 2.5-10 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Topics in Corporate Social Responsibility: Read Less [-]

UGBA 193B Energy & Civilization 4 Units
Offered through: Business Administration
Terms offered: Fall 2017, Fall 2016
Energy is one of the main drivers of civilization. Today we are at the precipice of what many hope will be a major paradigm shift in energy production and use. Two transitions are needed. On the one hand, we must find ways to extend the benefits of our existing energy system to the impoverished people living in the developing world while continuing to provide these benefits to the people of the developed world. On the other hand, we must completely overhaul the existing system to fight climate change and other forms of air and water pollution. Are these shifts truly within our reach? Can we achieve both simultaneously? If so, how? This Big Ideas course will grapple with these questions using an interdisciplinary systems approach.
Energy & Civilization: Read More [+]
Rules & Requirements
Credit Restrictions: Students who take UGBA 193B will not receive credit for L&S 126.
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Energy & Civilization: Read Less [-]

UGBA 193C Curricular Practical Training for International Students 0.0 Units
Offered through: Business Administration
Terms offered: Summer 2014 10 Week Session, Summer 2013 10 Week Session, Summer 2012 10 Week Session
This is a zero-unit internship course for non-immigrant international students participating in internships under the Curricular Practical Training program. Requires a paper exploring how the theoretical constructs learned in UGBA courses were applied during the internship.
Curricular Practical Training for International Students: Read More [+]
Rules & Requirements
Prerequisites: International students only
Hours & Format
Fall and/or spring: 15 weeks - 0 hours of internship per week
Summer: 6 weeks - 0 hours of internship per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.
Curricular Practical Training for International Students: Read Less [-]

UGBA 193I Business Abroad 1 - 4 Units
Offered through: Business Administration
Terms offered: Summer 2017 Second 6 Week Session, Spring 2015
This course includes both formal learning in lectures, experiential learning, and action research through site visits abroad. Students and instructor will visit with international companies and/or organizations to learn about the business opportunities and challenges of operating in a specific country or region. Evaluation is based on student participation, presentations, and a research paper. Country and business industry focus may vary from term to term depending upon the instructor.
Business Abroad: Read More [+]
Rules & Requirements
Prerequisites: To be determined by instructor depending on topic
Repeat rules: Course may be repeated for credit when topic changes.
Hours & Format
Summer: 6 weeks - 3-12 hours of lecture and 3-12 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Business Abroad: Read Less [-]
UGBA 194 Undergraduate Colloquium on Business Topics 1 Unit
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Fall 2016
This is a speakers series course designed to give students insights from practitioners into complex issues facing American business leaders. Each week a guest speaker will discuss an issue related to a particular theme, ranging from corporate governance to the social responsibilities of business. Students will be challenged to synthesize, question, and extend those insights under the guidance of the instructor.
Undergraduate Colloquium on Business Topics: Read More [+]

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

Hours & Format
Fall and/or spring: 15 weeks - 1 hour of lecture per week
Summer: 6 weeks - 2.5 hours of lecture per week

Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.

Undergraduate Colloquium on Business Topics: Read Less [-]

UGBA 195A Entrepreneurship 3 Units
Offered through: Business Administration
Do you have an idea for a new business, but want to learn how to more fully develop this idea? Would you like to receive funding for your business idea, but lack a framework to ask for capital? This course takes students through the new venture process using a business plan as the main deliverable. A well-written business plan sets key milestones and indicates the resources needed to achieve them, in an increasingly complex business environment. Through the planning process that tightly links market and financial planning a business plan creates a set of standards to which investors and teammates can evaluate actual performance, laying the foundation for an “operating plan” once the business is launched.
Entrepreneurship: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Entrepreneurship: Read Less [-]

UGBA 195P Perspectives on Entrepreneurship 3 Units
Offered through: Business Administration
Terms offered: Fall 2017, Fall 2016, Fall 2015
This course explores and examines key issues facing entrepreneurs and their businesses. It is intended to provide a broad spectrum of topics across many business disciplines including accounting, finance, marketing, organizational behavior, production/quality, technology, etc. Students will acquire a keen understanding of both the theoretical and real world tools used by today’s entrepreneurial business leaders in achieving success in today’s global business environment.
Perspectives on Entrepreneurship: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.
Perspectives on Entrepreneurship: Read Less [-]

UGBA 195S Entrepreneurship To Address Global Poverty 3 Units
Offered through: Business Administration
Terms offered: Spring 2013, Spring 2012, Spring 2011
This course examines whether and how entrepreneurial ventures can meaningfully address global poverty vs. more traditional approaches such as foreign aid, private philanthropy or corporate social responsibility initiatives. Combining lectures, case studies, and interviews with social entrepreneurs, it explores poverty and entrepreneurship before focusing on their intersection in various bottom-of-pyramid markets, from health, housing, and education to energy, agriculture, and finance.
Entrepreneurship To Address Global Poverty: Read More [+]

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

Additional Details
Subject/Course Level: Undergrad. Business Administration/
Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Entrepreneurship To Address Global Poverty: Read Less [-]
UGBA 195T Topics in Entrepreneurship 1 - 3 Units
Offered through: Business Administration
Terms offered: Spring 2018, Fall 2017, Spring 2017
Courses of this kind will cover issues in entrepreneurship that either appeal to a specialized interest by type of firm being started (e.g., new ventures in computer software) or in the aspect of the entrepreneurial process being considered (e.g., new venture funding). The courses typically will be designed to take advantage of the access offered by the University and the locale to knowledgeable and experienced members of the business community.
Topics in Entrepreneurship: Read More [+]
Rules & Requirements
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.
Hours & Format
Fall and/or spring: 15 weeks - 1-3 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Topics in Entrepreneurship: Read Less [-]

UGBA 196 Special Topics in Business Administration 1 - 4 Units
Offered through: Business Administration
Terms offered: Fall 2017, Summer 2017 Second 6 Week Session, Spring 2017
Study in various fields of business administration. Topics will vary from year to year and will be announced at the beginning of each semester.
Special Topics in Business Administration: Read More [+]
Rules & Requirements
Prerequisites: Upper division standing
Repeat rules: Course may be repeated for credit when topic changes.
Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of lecture per week
Summer:
6 weeks - 2.5-10 hours of lecture per week
10 weeks - 2-4 hours of lecture per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Business Administration 196
Special Topics in Business Administration: Read Less [-]

UGBA 198 Directed Study 1 - 4 Units
Offered through: Business Administration
Terms offered: Spring 2016, Fall 2015, Spring 2015
Organized group study on topics selected by upper division students under the sponsorship and direction of a member of the Haas School of Business faculty.
Directed Study: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor
Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.
Repeat rules: Course may be repeated for credit.
Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week
Additional Details
Subject/Course Level: Undergrad. Business Administration/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Formerly known as: Business Administration 198
Directed Study: Read Less [-]


**UGBA 199 Supervised Independent Study and Research 1 - 4 Units**

Offered through: Business Administration  
Terms offered: Spring 2015, Spring 2014, Fall 2013  
Enrollment restrictions apply.  
Supervised Independent Study and Research: Read More [+]  

**Rules & Requirements**

**Prerequisites:** Consent of instructor  
Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.  
Repeat rules: Course may be repeated for credit.  

**Hours & Format**

**Fall and/or spring:** 15 weeks - 0 hours of independent study per week  
**Summer:** 6 weeks - 1-4 hours of independent study per week  
8 weeks - 1-4 hours of independent study per week  

**Additional Details**

Subject/Course Level: Undergrad. Business Administration/Undergraduate  
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.  
Formerly known as: Business Administration 199

Supervised Independent Study and Research: Read Less [-]

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**Computer Science**

**COMPSCI C8 Foundations of Data Science 4 Units**

Offered through: Electrical Engin and Computer Sci  
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session  
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)  

**Hours & Format**

**Fall and/or spring:** 15 weeks - 3-3 hours of lecture and 2-2 hours of laboratory per week  
**Summer:** 8 weeks - 6 hours of lecture and 4 hours of laboratory per week  

**Additional Details**

Subject/Course Level: Computer Science/Undergraduate  
Grading/Final exam status: Letter grade. Final exam required.  
Also listed as: INFO C8/STAT C8

Foundations of Data Science: Read Less [-]
COMPSCI C8R Introduction to Computational Thinking with Data 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Not yet offered
An introduction to computational thinking and quantitative reasoning, preparing students for further coursework, especially Foundations of Data Science (CS/Info/Stat C8). Emphasizes the use of computation to gain insight about quantitative problems with real data. Expressions, data types, collections, and tables in Python. Programming practices, abstraction, and iteration. Visualizing univariate and bivariate data with bar charts, histograms, plots, and maps. Introduction to statistical concepts including averages and distributions, predicting one variable from another, association and causality, probability and probabilistic simulation. Relationship between numerical functions and graphs. Sampling and introduction to inference.

Objectives Outcomes

Course Objectives: C8R 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. C8R 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. C8R is a rapid introduction to Python programming, visualization, and data analysis, which will prepare students for success in Data 8.

Student Learning Outcomes: Students will be able to perform basic computations in Python, including working with tabular data. Students will be able to understand basic probabilistic simulations. Students will be able to understand the syntactic structure of Python code. Students will be able to use good practices in Python programming. Students will be able to use visualizations to understand univariate data and to identify associations or causal relationships in bivariate data.

Rules & Requirements

Credit Restrictions: Students who have taken COMPSCI/INFO/STAT C8 will receive no credit for COMPSCI/STAT C8R.

Hours & Format

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructor: Adhikari

Also listed as: STAT C8R

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

COMPSCI 9A Matlab for Programmers 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Introduction to the constructs in the Matlab programming language, aimed at students who already know how to program. Array and matrix operations, functions and function handles, control flow, plotting and image manipulation, cell arrays and structures, and the Symbolic Mathematics toolbox.

Matlab for Programmers: Read More [+]

Rules & Requirements

Prerequisites: Programming experience equivalent to that gained in Computer Science 10; familiarity with applications of matrix processing

Repeat rules: Course may be repeated for a maximum of 4 units.

Hours & Format

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructor: Hilfinger

Matlab for Programmers: Read Less [-]

COMPSCI 9C C for Programmers 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Self-paced course in the C programming language for students who already know how to program. Computation, input and output, flow of control, functions, arrays, and pointers, linked structures, use of dynamic storage, and implementation of abstract data types.

C for Programmers: Read More [+]

Rules & Requirements

Prerequisites: Programming experience with pointers (or addresses in assembly language) and linked data structures equivalent to that gained in Computer Science 9B or 61A, or Engineering 7

Hours & Format

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructor: Hilfinger

C for Programmers: Read Less [-]
COMPSCI 9D Scheme and Functional Programming for Programmers 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Spring 2015
Self-paced course in functional programming, using the Scheme programming language, for students who already know how to program. Recursion; higher-order functions; list processing; implementation of rule-based querying.
Rules & Requirements
Prerequisites: Programming experience similar to that gained in Computer Science 10 or Engineering 7
Hours & Format
Fall and/or spring: 15 weeks - 2 hours of self-paced per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.
Instructor: Hilfinger

COMPSCI 9E Productive Use of the UNIX Environment 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Use of UNIX utilities and scripting facilities for customizing the programming environment, organizing files (possibly in more than one computer account), implementing a personal database, reformatting text, and searching for online resources.
Rules & Requirements
Prerequisites: Programming experience similar to that gained in Computer Science 61A or Engineering 7; DOS or UNIX experience
Hours & Format
Fall and/or spring: 15 weeks - 2 hours of self-paced per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.
Instructor: Hilfinger

COMPSCI 9F C++ for Programmers 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Self-paced introduction to the constructs provided in the C++ programming language for procedural and object-oriented programming, aimed at students who already know how to program.
Rules & Requirements
Prerequisites: Programming experience equivalent to that gained in Computer Science 9B or 61A, or Engineering 7
Hours & Format
Fall and/or spring: 15 weeks - 2 hours of self-paced per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.
Instructor: Hilfinger

COMPSCI 9G JAVA for Programmers 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Self-paced course in Java for students who already know how to program. Applets; variables and computation; events and flow of control; classes and objects; inheritance; GUI elements; applications; arrays, strings, files, and linked structures; exceptions; threads.
Rules & Requirements
Prerequisites: 9C or 9F or 61A plus experience with object-oriented programming or C-based language
Hours & Format
Fall and/or spring: 15 weeks - 2 hours of self-paced per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam required.
Instructor: Garcia

Productive Use of the UNIX Environment: Read Less [-]
COMPSCI 9H Python for Programmers 2
Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Introduction to the constructs provided in the Python programming language, aimed at students who already know how to program. Flow of control; strings, tuples, lists, and dictionaries; CGI programming; file input and output; object-oriented programming; GUI elements.

Rules & Requirements
Prerequisites: Programming experience equivalent to that gained in Computer Science 10

COMPSCI 10 The Beauty and Joy of Computing 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session
An introduction to the beauty and joy of computing. The history, social implications, great principles, and future of computing. Beautiful applications that have changed the world. How computing empowers discovery and progress in other fields. Relevance of computing to the student and society will be emphasized. Students will learn the joy of programming a computer using a friendly, graphical language, and will complete a substantial team programming project related to their interests.

The Beauty and Joy of Computing: Read More [+]

Rules & Requirements
Credit Restrictions: Students will receive no credit for 10 after having taken W10, 61A, 61B or 61C. A deficient grade in 10 may be removed by taking W10.

COMPSCI W10 The Beauty and Joy of Computing 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2012
This course meets the programming prerequisite for 61A. An introduction to the beauty and joy of computing. The history, social implications, great principles, and future of computing. Beautiful applications that have changed the world. How computing empowers discovery and progress in other fields. Relevance of computing to the student and society will be emphasized. Students will learn the joy of programming a computer using a friendly, graphical language, and will complete a substantial team programming project related to their interests.

The Beauty and Joy of Computing: Read More [+]

Rules & Requirements
Credit Restrictions: Students will receive no credit for W10 after taking 10, 61A, 61B or 61C. A deficient grade in 10 may be removed by taking W10.
COMPSCI 36 CS Scholars Seminar: The Educational Climate in CS & CS61A technical discussions 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018
Computer Science 36 is a seminar for CS Scholars who are concurrently taking CS61A: The Structure and Interpretation of Computer Programs. CS Scholars is a cohort-model program to provide support in exploring and potentially declaring a CS major for students with little to no computational background prior to coming to the university. CS 36 provides an introduction to the CS curriculum at UC Berkeley, and the overall CS landscape in both industry and academia—through the lens of accessibility and its relevance to diversity. Additionally, CS36 provides technical instruction to review concepts in CS61A, in order to support CS Scholars’ individual learning and success in the CS61A course.

CS Scholars Seminar: The Educational Climate in CS & CS61A technical discussions: Read More [+]

Objectives
Student Learning Outcomes: Students will know where to find several support services including tutoring, advising, counseling, and career advice.
Students will perform as well as possible in the CS61A prerequisite for the CS major. They will also have customized program plans for completing the major within four years.

Rules & Requirements
Prerequisites: Prerequisite satisfied Concurrently: Participating in the CS Scholars program, and concurrently taking Computer Science 61A

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Hunn

CS Scholars Seminar: The Educational Climate in CS & CS61A technical discussions: Read Less [-]

COMPSCI 39 Freshman/Sophomore Seminar 1.5 - 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Spring 2017
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

Freshman/Sophomore Seminar: Read More [+]

Rules & Requirements
Prerequisites: Priority given to freshmen and sophomores
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Formt
Fall and/or spring: 15 weeks - 2-3 hours of seminar per week

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Hunn

Freshman/Sophomore Seminar: Read Less [-]

COMPSCI 39J Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2010, Spring 2010, Fall 2009
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

Freshman/Sophomore Seminar: Read More [+]

Rules & Requirements
Prerequisites: Priority given to freshmen and sophomores
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Instructor: Hunn

Freshman/Sophomore Seminar: Read Less [-]
COMPSCI 39K Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2013, Spring 2011, Spring 2010
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

COMPSCI 39M Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2008
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

COMPSCI 39N Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2010, Fall 2009
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.

COMPSCI 39P Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2013, Spring 2013, Fall 2012
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
COMPSCI 39Q Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2011
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Freshman/Sophomore Seminar: Read More [+]

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Freshman/Sophomore Seminar: Read Less [-]

COMPSCI 39R Freshman/Sophomore Seminar 1.5 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Spring 2013
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester. Enrollment limits are set by the faculty, but the suggested limit is 25.
Freshman/Sophomore Seminar: Read More [+]

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Freshman/Sophomore Seminar: Read Less [-]

COMPSCI 47A Completion of Work in Computer Science 61A 1 Unit
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Implementation of generic operations. Streams and iterators. Implementation techniques for supporting functional, object-oriented, and constraint-based programming in the Scheme programming language. Together with 9D, 47A constitutes an abbreviated, self-paced version of 61A for students who have already taken a course equivalent to 61B.
Completion of Work in Computer Science 61A: Read More [+]

Rules & Requirements

Prerequisites: 61B or equivalent, 9D, and consent of instructor

Credit Restrictions: Students will receive no credit for 47A after taking 61A.

Hours & Format
Fall and/or spring: 15 weeks - 0 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructor: Garcia

Completion of Work in Computer Science 61A: Read Less [-]

COMPSCI 47B Completion of Work in Computer Science 61B 1 Unit
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Iterators. Hashing, applied to strings and multi-dimensional structures. Heaps. Storage management. Design and implementation of a program containing hundreds of lines of code. Students with sufficient partial credit in 61B may, with consent of instructor, complete the credit in this self-paced course.
Completion of Work in Computer Science 61B: Read More [+]

Rules & Requirements

Prerequisites: A course in data structures, 9G or equivalent, and consent of instructor

Credit Restrictions: Students will receive no credit for 47B after taking 61B.

Hours & Format
Fall and/or spring: 15 weeks - 0 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructor: Garcia

Completion of Work in Computer Science 61B: Read Less [-]
COMPSCI 47C Completion of Work in Computer Science 61C 1 Unit
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
MIPS instruction set simulation. The assembly and linking process. Caches and virtual memory. Pipelined computer organization. Students with sufficient partial credit in 61C may, with consent of instructor, complete the credit in this self-paced course.
Completion of Work in Computer Science 61C: Read More [+]

Rules & Requirements

Prerequisites: Experience with assembly language including writing an interrupt handler, 9C or equivalent, and consent of instructor

Credit Restrictions: Students will receive no credit for 47C after taking 61C.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of self-paced per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructor: Garcia

Completion of Work in Computer Science 61C: Read Less [-]

COMPSCI 61A The Structure and Interpretation of Computer Programs 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session
An introduction to programming and computer science focused on abstraction techniques as means to manage program complexity. Techniques include procedural abstraction; control abstraction using recursion, higher-order functions, generators, and streams; data abstraction using interfaces, objects, classes, and generic operators; and language abstraction using interpreters and macros. The course exposes students to programming paradigms, including functional, object-oriented, and declarative approaches. It includes an introduction to asymptotic analysis of algorithms. There are several significant programming projects.
The Structure and Interpretation of Computer Programs: Read More [+]

Rules & Requirements

Prerequisites: Mathematics 1A (may be taken concurrently); programming experience equivalent to that gained in 3 or the Advanced Placement Computer Science A course

Credit Restrictions: Students will receive no credit for Computer Science 61A after completing Computer Science 47A or Computer Science 61AS. A deficient grade in Computer Science 61AS may be removed by taking Computer Science 61A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 1.5 hours of discussion, and 1.5 hours of laboratory per week

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructors: Garcia, Hilfinger

The Structure and Interpretation of Computer Programs: Read Less [-]
COMPSCI 61AS The Structure and Interpretation of Computer Programs (Self-Paced) 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Summer 2015 8 Week Session
Introductory programming and computer science. Abstraction as means to control program complexity. Programming paradigms: functional, object-oriented, client/server, and declarative (logic). Control abstraction: recursion and higher order functions. Introduction to asymptotic analysis of algorithms. Data abstraction: abstract data types, type-tagged data, first class data types, sequences implemented as lists and as arrays, generic operators implemented with data-directed programming and with message passing. Implementation of object-oriented programming with closures over dispatch procedures. Introduction to interpreters and compilers. There are several significant programming projects. Course may be completed in one or two semesters. Students must complete a minimum of two units during their first semester of 61AS.

The Structure and Interpretation of Computer Programs (Self-Paced):
Read More [+]

Rules & Requirements

Prerequisites: Mathematics 1A (may be taken concurrently). Programming experience equivalent to that gained in 10 or the Advanced Placement Computer Science A course is recommended, but is not essential; students without this experience will begin at an earlier point in the online course

Credit Restrictions: Students will receive no credit for Computer Science 61A after completing Computer Science 47A or Computer Science 61 BL. A deficiency in Computer Science 61BL may be removed by taking Computer Science 61B.

Repeat rules: Course may be repeated for a maximum of 4 units. Course may be repeated for a maximum of 4 units.

Hours & Format
Fall and/or spring: 15 weeks - 6 hours of laboratory per week
Summer: 6 weeks - 15 hours of laboratory per week
8 weeks - 11 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Garcia, Harvey, Hilfinger

The Structure and Interpretation of Computer Programs (Self-Paced):
Read Less [-]

COMPSCI 61B Data Structures 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Fundamental dynamic data structures, including linear lists, queues, trees, and other linked structures; arrays strings, and hash tables. Storage management. Elementary principles of software engineering. Abstract data types. Algorithms for sorting and searching. Introduction to the Java programming language.

Data Structures: Read More [+]

Rules & Requirements

Prerequisites: Computer Science 61A or Computer Science 88 or Engineering 7
Credit Restrictions: Students will receive no credit for Computer Science 61B after completing Computer Science 47B or 61 BL. A deficiency in Computer Science 61BL may be removed by taking Computer Science 61B.
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week
Summer: 8 weeks - 6 hours of lecture, 2 hours of discussion, and 4 hours of laboratory per week

Additional Details

Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Hilfinger, Shewchuk
Data Structures: Read Less [-]
COMPSCI 61BL Data Structures and Programming Methodology 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Summer 2017 8 Week Session, Summer 2016 10 Week Session, Summer 2016 8 Week Session
The same material as in 61B, but in a laboratory-based format.
Rules & Requirements
Prerequisites: COMPSCI 61A or COMPSCI 88 or ENGIN 7
Credit Restrictions: Students will receive no credit for 61BL after taking 47B or 61B. Deficiency in 61B may be removed by taking 61BL.
Hours & Format
Fall and/or spring: 15 weeks - 1 hour of lecture and 6 hours of laboratory per week
Summer: 8 weeks - 2 hours of lecture and 12 hours of laboratory per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Hilfinger
Data Structures and Programming Methodology: Read Less [-]

COMPSCI 61C Great Ideas of Computer Architecture (Machine Structures) 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session
The internal organization and operation of digital computers. Machine architecture, support for high-level languages (logic, arithmetic, instruction sequencing) and operating systems (I/O, interrupts, memory management, process switching). Elements of computer logic design. Tradeoffs involved in fundamental architectural design decisions.
Rules & Requirements
Prerequisites: 61A, along with either 61B or 61BL, or programming experience equivalent to that gained in 9C, 9F, or 9G
Credit Restrictions: Students will receive no credit for 61C after taking 47C or 61CL. Deficiency in 61C may be removed by taking 61CL.
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 2 hours of laboratory per week
Summer: 8 weeks - 6 hours of lecture, 2 hours of discussion, and 4 hours of laboratory per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Garcia, Katz, Stojanovic
Great Ideas of Computer Architecture (Machine Structures): Read Less [-]
COMPSCI 61CL Machine Structures (Lab-Centric) 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2009, Spring 2009, Fall 2008
The same material as in 61C but in a lab-centric format.
Machine Structures (Lab-Centric): Read More [+]

Rules & Requirements

Prerequisites: 61A, along with 61B or 61BL, or programming experience equivalent to that gained in 9C, 9F, or 9G

Credit Restrictions: Students will receive no credit for 61CL after taking 47C or 61C. Deficiency in 61C may be removed by taking 61CL.

Hours & Format

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Garcia, Patterson

Machine Structures (Lab-Centric): Read Less [-]
COMPSCI 70 Discrete Mathematics and Probability Theory 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session
Logic, infinity, and induction; applications include undecidability and stable marriage problem. Modular arithmetic and GCDs; applications include primality testing and cryptography. Polynomials; examples include error correcting codes and interpolation. Probability including sample spaces, independence, random variables, law of large numbers; examples include load balancing, existence arguments, Bayesian inference.
Discrete Mathematics and Probability Theory: Read More [+]
Rules & Requirements
Prerequisites: Sophomore mathematical maturity, and programming experience equivalent to that gained in 3 or the Advanced Placement Computer Science A course
Credit Restrictions: Students will receive no credit for 70 after taking Mathematics 55.
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: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Rao, Vazirani, Wagner, Sahai
Discrete Mathematics and Probability Theory: Read Less [-]

COMPSCI C79 Societal Risks and the Law 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2013
Defining, perceiving, quantifying and measuring risk; identifying risks and estimating their importance; determining whether laws and regulations can protect us from these risks; examining how well existing laws work and how they could be improved; evaluating costs and benefits. Applications may vary by term. This course cannot be used to complete engineering unit or technical elective requirements for students in the College of Engineering.
Societal Risks and the Law: Read More [+]
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Also listed as: POL SCI C79/STAT C79
Societal Risks and the Law: Read Less [-]

COMPSCI 88 Computational Structures in Data Science 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2016, Spring 2016
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.
Computational Structures in Data Science: Read More [+]
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: Math 1A. Also, this course is a Data Science connector course and may only be taken concurrently with or after COMPSCI 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 may receive no credit for Computer Science 88 after completing Computer Science 61A.
Hours & Format
Fall and/or spring: 15 weeks - 1 hour of lecture and 2 hours of laboratory per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Computational Structures in Data Science: Read Less [-]
COMPSCI 94 Special Topics 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2015
Topics will vary semester to semester. See the Computer Science Division announcements.
Special Topics: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit when topic changes.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Special Topics: Read Less [-]

COMPSCI 97 Field Study 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2015, Spring 2015, Fall 2014
Students take part in organized individual field sponsored programs with off-campus companies or tutoring/mentoring relevant to specific aspects and applications of computer science on or off campus. Note Summer CPT or OPT students: written report required. Course does not count toward major requirements, but will be counted in the cumulative units toward graduation.
Field Study: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor (see department adviser)
Repeat rules: Course may be repeated for credit.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Field Study: Read Less [-]

COMPSCI 98 Directed Group Study 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2016, Fall 2015, Spring 2015
Seminars for group study of selected topics, which will vary from year to year. Intended for students in the lower division.
Directed Group Study: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

COMPSCI 99 Individual Study and Research for Undergraduates 1 - 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2015, Fall 2014, Spring 2014
A course for lower division students in good standing who wish to undertake a program of individual inquiry initiated jointly by the student and a professor. There are no other formal prerequisites, but the supervising professor must be convinced that the student is able to profit by the program.
Individual Study and Research for Undergraduates: Read More [+]

Rules & Requirements
Prerequisites: GPA of 3.4 or better
Repeat rules: Course may be repeated for credit.

Hours & Format
Fall and/or spring: 15 weeks - 0 hours of independent study per week
Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Individual Study and Research for Undergraduates: Read Less [-]
COMPSCI C100 Principles & Techniques of Data Science 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
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: Computer Science/Information/Statistics C8 or Engineering 7; and either Computer Science 61A or Computer Science 88. Corequisite: Mathematics 54 or Electrical Engineering 16A

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: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Also listed as: STAT C100
Principles & Techniques of Data Science: Read Less [-]

COMPSCI 146L Programmable Digital Systems Laboratory 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2015
Hardware description languages for digital system design and interactions with tool flows. Design, implementation, and verification of digital designs. Digital synthesis, partitioning, placement, routing, and simulation for Field-Programmable Gate Arrays. Large digital-system design concepts. Project design component – example, a full processor implementation with peripherals.

Programmable Digital Systems Laboratory: Read More [+]

Objectives Outcomes
Student Learning Outcomes: This course is a one-time offering to supplement the EE141 course offered in the Fall 2014, with a lab and project section that cover the design of larger digital systems on a programmable chip platform (FPGA). The EE141 lectures in the Fall 2014 already covered the necessary lecture material, so students who took the EE141 lab in the Fall of 2014 will have a chance to expand their skills into the area of FPGA Digital System Design. Hence the pre-requisite for this course is that a student has taken the EE141 course in the Fall 2014.

Rules & Requirements
Prerequisites: Computer Science 61C, Electrical Engineering 105 recommended and Electrical Engineering 141 (taken Fall 2014) - mandatory

Credit Restrictions: Students will receive no credit for Computer Science 146L after taking Fall 2014 version of Computer Science 150.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Instructor: Stojanovic
Programmable Digital Systems Laboratory: Read Less [-]
COMPSCI 152 Computer Architecture and Engineering 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2016, Spring 2016
Instruction set architecture, microcoding, pipelining (simple and complex),
Memory hierarchies and virtual memory. Processor parallelism: VLIW, vectors, multithreading, Multiprocessors.
Computer Architecture and Engineering: Read More [+]
Rules & Requirements
Prerequisites: 61C

COMPSCI 160 User Interface Design and Development 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session
The design, implementation, and evaluation of user interfaces. User-centered design and task analysis. Conceptual models and interface metaphors. Usability inspection and evaluation methods. Analysis of user study data. Input methods (keyboard, pointing, touch, tangible) and input models. Visual design principles. Interface prototyping and implementation methodologies and tools. Students will develop a user interface for a specific task and target user group in teams.
User Interface Design and Development: Read More [+]
Rules & Requirements
Prerequisites: Computer Science 61B or 61BL
Credit Restrictions: Students will receive no credit for Computer Science 160 after taking Computer Science 260A.

COMPSCI 161 Computer Security 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Introduction to computer security. Cryptography, including encryption, authentication, hash functions, cryptographic protocols, and applications. Operating system security, access control. Network security, firewalls, viruses, and worms. Software security, defensive programming, and language-based security. Case studies from real-world systems.
Computer Security: Read More [+]
Rules & Requirements
Prerequisites: 61C (Machine Structures), plus either 70 (Discrete Mathematics) or Mathematics 55

COMPSCI 162 Operating Systems and System Programming 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Operating Systems and System Programming: Read More [+]
Rules & Requirements
Prerequisites: Computer Science 61B, 61C, and 70
COMPSCI 164 Programming Languages and Compilers 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Prerequisites: 61B and 61C

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Bodik, Hilfinger, Necula
Programming Languages and Compilers: Read Less [-]

COMPSCI 168 Introduction to the Internet: Architecture and Protocols 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Fall 2016, Fall 2015
This course is an introduction to the Internet architecture. We will focus on the concepts and fundamental design principles that have contributed to the Internet's scalability and robustness and survey the various protocols and algorithms used within this architecture. Topics include layering, addressing, intradomain routing, interdomain routing, reliable delivery, congestion control, and the core protocols (e.g., TCP, UDP, IP, DNS, and HTTP) and network technologies (e.g., Ethernet, wireless). Introduction to the Internet: Architecture and Protocols: Read More [+] Rules & Requirements
Prerequisites: Computer Science 61B and 162

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Katz, Paxson, Ratnasamy, Shenker, Stoica
Introduction to the Internet: Architecture and Protocols: Read Less [-]

COMPSCI 169 Software Engineering 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Summer 2017 8 Week Session, Fall 2016
Ideas and techniques for designing, developing, and modifying large software systems. Function-oriented and object-oriented modular design techniques, designing for re-use and maintainability. Specification and documentation. Verification and validation. Cost and quality metrics and estimation. Project team organization and management. Students will work in teams on a substantial programming project. Software Engineering: Read More [+] Rules & Requirements
Prerequisites: Computer Science 61B and 61C, and either Computer Science 70 or Mathematics 113

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Brewer, Fox, Necula, Sen
Software Engineering: Read Less [-]

COMPSCI 170 Efficient Algorithms and Intractable Problems 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Concept and basic techniques in the design and analysis of algorithms; models of computation; lower bounds; algorithms for optimum search trees, balanced trees and UNION-FIND algorithms; numerical and algebraic algorithms; combinatorial algorithms; Turing machines, how to count steps, deterministic and nondeterministic Turing machines, NP-completeness. Unsolvable and intractable problems. Efficient Algorithms and Intractable Problems: Read More [+] Rules & Requirements
Prerequisites: Computer Science 61B and 70

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Demmel, Papadimitriou, Rao, Wagner, Vazirani
Efficient Algorithms and Intractable Problems: Read Less [-]
COMPSCI 172 Computability and Complexity
4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Spring 2015
Computability and Complexity: Read More [+]  
Rules & Requirements
Prerequisites: 170  
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate  
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Papadimitriou, Seshia, Sinclair, Vazirani
Computability and Complexity: Read Less [-]  

COMPSCI 176 Algorithms for Computational Biology
4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Fall 2016, Fall 2015
Algorithms and probabilistic models that arise in various computational biology applications: suffix trees, suffix arrays, pattern matching, repeat finding, sequence alignment, phylogenetics, genome rearrangements, hidden Markov models, gene finding, motif finding, stochastic context free grammars, RNA secondary structure. There are no biology prerequisites for this course, but a strong quantitative background will be essential.
Algorithms for Computational Biology: Read More [+]  
Rules & Requirements
Prerequisites: Computer Science 70 and 170. Experience programming in a language such as C, C++, Java, or Python  
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate  
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Song
Algorithms for Computational Biology: Read Less [-]  

COMPSCI 174 Combinatorics and Discrete Probability
4 Units
Offered through: Electrical Engin and Computer Sci
Combinatorics and Discrete Probability: Read More [+]  
Rules & Requirements
Prerequisites: 170  
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate  
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Bartlett, Papadimitriou, Sinclair, Vazirani
Combinatorics and Discrete Probability: Read Less [-]
COMPSCI 184 Foundations of Computer Graphics 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Spring 2017, Fall 2016

Rules & Requirements

Prerequisites: Computer Science 61B or 61BL; programming skills in C, C++, or Java; linear algebra and calculus

Credit Restrictions: Students will receive no credit for Comp Sci 184 after taking Comp Sci 284A.

Hours & Format

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructors: O'Brien, Sequin, Barsky, Ramamoorthi, Agrawala

Foundations of Computer Graphics: Read Less [-]

COMPSCI 186 Introduction to Database Systems 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Access methods and file systems to facilitate data access. Hierarchical, network, relational, and object-oriented data models. Query languages for models. Embedding query languages in programming languages. Database services including protection, integrity control, and alternative views of data. High-level interfaces including application generators, browsers, and report writers. Introduction to transaction processing. Database system implementation to be done as term project.

Introduction to Database Systems: Read More [+]

Rules & Requirements

Prerequisites: 61B and 61C

Credit Restrictions: Students will receive no credit for Comp Sci 186 after taking Comp Sci 286A.

Hours & Format

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructors: Franklin, Hellerstein

Introduction to Database Systems: Read Less [-]

COMPSCI 188 Introduction to Artificial Intelligence 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Ideas and techniques underlying the design of intelligent computer systems. Topics include search, game playing, knowledge representation, inference, planning, reasoning under uncertainty, machine learning, robotics, perception, and language understanding.

Introduction to Artificial Intelligence: Read More [+]

Rules & Requirements

Prerequisites: Computer Science 61A; Computer Science 61B; Computer Science 70

Hours & Format

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

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

Additional Details

Subject/Course Level: Computer Science/Undergraduate

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

Instructors: Abbeel, Klein, Russell

Introduction to Artificial Intelligence: Read Less [-]
COMPSCI 189 Introduction to Machine Learning 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Theoretical foundations, algorithms, methodologies, and applications for machine learning. Topics may include supervised methods for regression and classification (linear models, trees, neural networks, ensemble methods, instance-based methods); generative and discriminative probabilistic models; Bayesian parametric learning; density estimation and clustering; Bayesian networks; time series models; dimensionality reduction; programming projects covering a variety of real-world applications.
Introduction to Machine Learning: Read More [+]

Rules & Requirements
Prerequisites: Mathematics 53 and 54; Computer Science 70 or consent of instructor
Credit Restrictions: Students will receive no credit for Comp Sci 189 after taking Comp Sci 289A.

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Abbeel, Bartlett, Darrell, El Ghaoui, Jordan, Klein, Malik, Russell

Introduction to Machine Learning: Read Less [-]

COMPSCI C191 Quantum Information Science and Technology 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2017, Fall 2014, Spring 2012
This multidisciplinary course provides an introduction to fundamental conceptual aspects of quantum mechanics from a computational and informational theoretic perspective, as well as physical implementations and technological applications of quantum information science. Basic sections of quantum algorithms, complexity, and cryptography, will be touched upon, as well as pertinent physical realizations from nanoscale science and engineering.
Quantum Information Science and Technology: Read More [+]

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Crommie, Vazirani, Whaley
Also listed as: CHEM C191/PHYSICS C191
Quantum Information Science and Technology: Read Less [-]

COMPSCI 194 Special Topics 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Topics will vary semester to semester. See the Computer Science Division announcements.
Special Topics: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Special Topics: Read Less [-]
COMPSCI 195 Social Implications of Computer Technology 1 Unit
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Topics include electronic community; the changing nature of work; technological risks; the information economy; intellectual property; privacy; artificial intelligence and the sense of self; pornography and censorship; professional ethics. Students will lead discussions on additional topics.
Social Implications of Computer Technology: Read More [+]
Rules & Requirements
Credit Restrictions: Students will receive no credit for 195 after taking C195/Interdisciplinary Field Study C155 or H195.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Instructor: Harvey

Social Implications of Computer Technology: Read Less [-]

COMPSCI H195 Honors Social Implications of Computer Technology 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2014, Fall 2013, Spring 2013
Topics include electronic community; the changing nature of work; technological risks; the information economy; intellectual property; privacy; artificial intelligence and the sense of self; pornography and censorship; professional ethics. Students may lead discussions on additional topics.
Honors Social Implications of Computer Technology: Read More [+]
Rules & Requirements
Credit Restrictions: Student will receive no credit for H195 after taking 195 or C195.

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Instructor: Harvey

Honors Social Implications of Computer Technology: Read Less [-]

COMPSCI H196A Senior Honors Thesis Research 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2016, Fall 2010, Spring 2010
Thesis work under the supervision of a faculty member. To obtain credit the student must, at the end of two semesters, submit a satisfactory thesis to the Electrical Engineering and Computer Science department archive. A total of four units must be taken. The units may be distributed between one and two semesters in any way. H196A-H196B count as graded technical elective units, but may not be used to satisfy the requirement for 27 upper division technical units in the College of Letters and Science with a major in Computer Science.
Senior Honors Thesis Research: Read More [+]
Rules & Requirements
Prerequisites: Open only to students in the computer science honors program

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Senior Honors Thesis Research: Read Less [-]

COMPSCI H196B Senior Honors Thesis Research 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2010, Spring 2009, Fall 2008
Thesis work under the supervision of a faculty member. To obtain credit the student must, at the end of two semesters, submit a satisfactory thesis to the Electrical Engineering and Computer Science department archive. A total of four units must be taken. The units may be distributed between one and two semesters in any way. H196A-H196B count as graded technical elective units, but may not be used to satisfy the requirement for 27 upper division technical units in the College of Letters and Science with a major in Computer Science.
Senior Honors Thesis Research: Read More [+]
Rules & Requirements
Prerequisites: Open only to students in the computer science honors program

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

Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

Senior Honors Thesis Research: Read Less [-]
COMPSCI 197 Field Study 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2016, Summer 2016 10 Week Session, Fall 2015
Students take part in organized individual field sponsored programs with
off-campus companies or tutoring/mentoring relevant to specific aspects
and applications of computer science on or off campus. Note Summer
CPT or OPT students: written report required. Course does not count
toward major requirements, but will be counted in the cumulative units
toward graduation.
Field Study: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor (see department adviser)
Repeat rules: Course may be repeated for credit.
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
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final
exam not required.
Field Study: Read Less [-]

COMPSCI 198 Directed Group Studies for Advanced Undergraduates 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Group study of selected topics in Computer Sciences, usually relating to
new developments.
Directed Group Studies for Advanced Undergraduates: Read More [+]
Rules & Requirements
Prerequisites: 2.0 GPA or better; 60 units completed
Repeat rules: Course may be repeated for credit.
Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of directed group study per
week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final
exam not required.
Directed Group Studies for Advanced Undergraduates: Read Less [-]

COMPSCI 199 Supervised Independent Study 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2016, Fall 2015, Spring 2015
Supervised independent study. Enrollment restrictions apply.
Supervised Independent Study: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor and major adviser
Credit Restrictions: Enrollment is restricted; see the Introduction to
Courses and Curricula section of this catalog.
Hours & Format
Fall and/or spring: 15 weeks - 0 hours of independent study per week
Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week
Additional Details
Subject/Course Level: Computer Science/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final
exam not required.
Supervised Independent Study: Read Less [-]
Electrical Engineering

EL ENG 16A Designing Information Devices and Systems I 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Summer 2017 8 Week Session
This course and its follow-on course EE16B focus on the fundamentals of designing modern information devices and systems that interface with the real world. Together, this course sequence provides a comprehensive foundation for core EECS topics in signal processing, learning, control, and circuit design while introducing key linear-algebraic concepts motivated by application contexts. Modeling is emphasized in a way that deepens mathematical maturity, and in both labs and homework, students will engage computationally, physically, and visually with the concepts being introduced in addition to traditional paper/pencil exercises. The courses are aimed at entering students as well as non-majors seeking a broad foundation for the field.
Designing Information Devices and Systems I:  Read More [+]

Rules & Requirements

Prerequisites: Math 1A, Math 1B or equivalent (may be taken concurrently), CS 61A or equivalent (encouraged to be taken concurrently)

Credit Restrictions: Students will receive no credit for Electrical Engineering 16A after completing Electrical Engineering 20 or 40.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture, 2 hours of discussion, and 3 hours of laboratory per week
Summer: 8 weeks - 6 hours of lecture, 4 hours of discussion, and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Alon, Arcak, Ayazifar, Maharbiz, Subramanian, Tomlin

Designing Information Devices and Systems I:  Read Less [-]

EL ENG 16B Designing Information Devices and Systems II 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
This course is a follow-on to Electrical Engineering 16A, and focuses on the fundamentals of designing and building modern information devices and systems that interface with the real world. The course sequence provides a comprehensive introduction to core EECS topics in circuit design, signals, and systems in an application-driven context. The courses are delivered assuming mathematical maturity and aptitude at roughly the level of having completed Math 1A-1B, and are aimed at entering students as well as non-majors seeking a broad introduction to the field.
Designing Information Devices and Systems II:  Read More [+]

Rules & Requirements

Prerequisites: Electrical Engineering 16A, Designing Information Devices and Systems I

Credit Restrictions: Students will receive no credit for Electrical Engineering 16B after completing Electrical Engineering 20 or 40.<BR/>

Hours & Format

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

Additional Details

Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Alon, Ayazifar, Lustig, Maharbiz, Subramanian, Tomlin

Designing Information Devices and Systems II:  Read Less [-]

EL ENG 24 Freshman Seminar 1 Unit
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Spring 2017, Spring 2016
The Freshman Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small seminar setting. Freshman seminars are offered in all campus departments, and topics may vary from department to department and semester to semester.
Freshman Seminar:  Read More [+]

Rules & Requirements

Hours & Format

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

Additional Details

Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminar:  Read Less [-]
EL ENG 25 What Electrical Engineers Do--Feedback from Recent Graduates 1 Unit
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2011
A Berkeley Electrical Engineering and Computer Sciences degree opens
the door to many opportunities, but what exactly are they? Graduation
is only a few years away and it's not too early to find out. In this seminar
students will hear from practicing engineers who recently graduated.
What are they working on? Are they working in a team? What do they
wish they had learned better? How did they find their jobs?
What Electrical Engineers Do--Feedback from Recent Graduates: Read
More [+]

Hours & Format
Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final
exam not required.
Instructor: Boser
What Electrical Engineers Do--Feedback from Recent Graduates: Read
Less [-]

EL ENG 39 Freshman/Sophomore Seminar 2 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Fall 2016
Freshman and sophomore seminars offer lower division students the
opportunity to explore an intellectual topic with a faculty member and a
group of peers in a small-seminar setting. These seminars are offered in
all campus departments; topics vary from department to department and
from semester to semester. Enrollment limits are set by the faculty, but
the suggested limit is 25.
Freshman/Sophomore Seminar: Read More [+]

Rules & Requirements
Prerequisites: Priority given to freshmen and sophomore
Repeat rules: Course may be repeated for credit as topic varies. Course
may be repeated for credit when topic changes.

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of
discussion per week
Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per
week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Introduction to Digital Electronics: Read Less [-]

EL ENG 42 Introduction to Digital Electronics 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2013, Summer 2013 8 Week Session, Spring 2013
This course serves as an introduction to the principles of electrical
engineering, starting from the basic concepts of voltage and current and
circuit elements of resistors, capacitors, and inductors. Circuit analysis
is taught using Kirchhoff's voltage and current laws with Thevenin and
Norton equivalents. Operational amplifiers with feedback are introduced
as basic building blocks for amplification and filtering. Semiconductor
devices including diodes and MOSFETS and their IV characteristics
are covered. Applications of diodes for rectification, and design of
MOSFETS in common source amplifiers are taught. Digital logic gates
and design using CMOS as well as simple flip-flops are introduced.
Speed and scaling issues for CMOS are considered. The course includes
as motivating examples designs of high level applications including logic
circuits, amplifiers, power supplies, and communication links.
Introduction to Digital Electronics: Read More [+]
Rules & Requirements
Prerequisites: Mathematics 1B
Credit Restrictions: Students will receive no credit for 42 after taking 40
or 100.

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of
discussion per week
Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per
week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: The grading option will be decided by the
instructor when the class is offered. Final exam required.
Introduction to Digital Electronics: Read Less [-]
**EL ENG 43 Introductory Electronics Laboratory 1 Unit**
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2013, Summer 2013 8 Week Session, Spring 2013
Using and understanding electronics laboratory equipment such as oscilloscope, power supplies, function generator, multimeter, curve-tracer, and RLC-meter. Includes a term project of constructing and testing a robot or other appropriate electromechanical device.
Introductory Electronics Laboratory: Read More [+]

**Rules & Requirements**

**Prerequisites:** 42 (may be taken concurrently) or equivalent or consent of instructor

**Hours & Format**

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

Summer: 8 weeks - 3.5 hours of laboratory per week

**Additional Details**

**Subject/Course Level:** Electrical Engineering/Undergraduate

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

Introductory Electronics Laboratory: Read Less [-]

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**EL ENG 49 Electronics for the Internet of Things 4 Units**
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018

Electronics has become pervasive in our lives as a powerful technology with applications in a wide range of fields including healthcare, environmental monitoring, robotics, or entertainment. This course teaches how to build electronic circuits that interact with the environment through sensors and actuators and how to communicate wirelessly with the internet to cooperate with other devices and with humans. In the laboratory students design and build representative samples such as solar harvesters, robots, that exchange information with or are controlled from the cloud.

Electronics for the Internet of Things: Read More [+]

**Objectives Outcomes**

**Course Objectives:** Electronics has become a powerful and ubiquitous technology supporting solutions to a wide range of applications in fields ranging from science, engineering, healthcare, environmental monitoring, transportation, to entertainment. The objective of this course is to teach students majoring in these and related subjects how to use electronic devices to solve problems in their areas of expertise.

Through the lecture and laboratory, students gain insight into the possibilities and limitations of the technology and how to use electronics to help solve problems. Students learn to use electronics to interact with the environment through sound, light, temperature, motion using sensors and actuators, and how to use electronic computation to orchestrate the interactions and exchange information wirelessly over the internet.

**Student Learning Outcomes:** Deploy electronic sensors and interface them to microcontrollers through digital and analog channels as well as common protocols (I2C, SPI), Design, build and test electronic devices leveraging these concepts. Interact with the internet and cloud services using protocols such as http, MQTT, Blynk, Interface DC motors, steppers and servos to microcontrollers, Represent information with voltage, current, power, and energy and how to measure these quantities with laboratory equipment, To use and program low-cost and low-power microcontrollers for sensing, actuation, and information processing, and find and use program libraries supporting these tasks

Understand and make basic low-pass and high-pass filters, Wheatstone bridge etc.

Use electronics to sense and actuate physical parameters such as temperature, humidity, sound, light, and motion.

**Rules & Requirements**

**Prerequisites:** Engineering 7 or Computer Science 10 or equivalent background in computer programming (including Computer Science 61A, Data Science 8) Math 1a or equivalent background in Calculus

**Hours & Format**

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

**Additional Details**

**Subject/Course Level:** Electrical Engineering/Undergraduate

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

**Instructor:** Boser

Electronics for the Internet of Things: Read Less [-]
EL ENG 84 Sophomore Seminar 1 or 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Spring 2016, Fall 2015
Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.
Sophomore Seminar: Read More [+]

Rules & Requirements
Prerequisites: At discretion of instructor
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

Hours & Format
Fall and/or spring:
5 weeks - 3-6 hours of seminar per week
10 weeks - 1.5-3 hours of seminar per week
15 weeks - 1-2 hours of seminar per week
Summer:
6 weeks - 2.5-5 hours of seminar per week
8 weeks - 1.5-3.5 hours of seminar per week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.
Sophomore Seminar: Read Less [-]

EL ENG 97 Field Study 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Spring 2015
Students take part in organized individual field sponsored programs with off-campus companies or tutoring/mentoring relevant to specific aspects and applications of computer science on or off campus. Note Summer CPT or OPT students: written report required. Course does not count toward major requirements, but will be counted in the cumulative units toward graduation.
Field Study: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor (see department adviser)
Repeat rules: Course may be repeated for credit.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Field Study: Read Less [-]

EL ENG 98 Directed Group Study for Undergraduates 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2016, Spring 2016, Fall 2015
Group study of selected topics in electrical engineering, usually relating to new developments.
Directed Group Study for Undergraduates: Read More [+]

Rules & Requirements
Repeat rules: Course may be repeated for credit.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Directed Group Study for Undergraduates: Read Less [-]
EL ENG 99 Individual Study and Research for Undergraduates 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Spring 2015
Supervised independent study and research for students with fewer than 60 units completed.
Individual Study and Research for Undergraduates: Read More [+]
Rules & Requirements
Prerequisites: Freshman or sophomore standing and consent of instructor. Minimum GPA of 3.4 required
Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.
Repeat rules: Course may be repeated for credit.
Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of independent study per week
Summer: 6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Individual Study and Research for Undergraduates: Read Less [-]
EL ENG 105 Microelectronic Devices and Circuits 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
This course covers the fundamental circuit and device concepts needed to understand analog integrated circuits. After an overview of the basic properties of semiconductors, the p-n junction and MOS capacitors are described and the MOSFET is modeled as a large-signal device. Two port small-signal amplifiers and their realization using single stage and multistage CMOS building blocks are discussed. Sinusoidal steady-state signals are introduced and the techniques of phasor analysis are developed, including impedance and the magnitude and phase response of linear circuits. The frequency responses of single and multi-stage amplifiers are analyzed. Differential amplifiers are introduced.
Microelectronic Devices and Circuits: Read More [+]
Rules & Requirements
Prerequisites: EE 16A & B
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 3 hours of laboratory per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Bajcsy
Formerly known as: Electrical Engineering C125/Bioengineering C125
Also listed as: BIO ENG C125
Introduction to Robotics: Read Less [-]

EL ENG C106A Introduction to Robotics 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Fall 2016, Fall 2015
An introduction to the kinematics, dynamics, and control of robot manipulators, robotic vision, and sensing. The course covers forward and inverse kinematics of serial chain manipulators, the manipulator Jacobian, force relations, dynamics, and control. It presents elementary principles on proximity, tactile, and force sensing, vision sensors, camera calibration, stereo construction, and motion detection. The course concludes with current applications of robotics in active perception, medical robotics, and other areas.
Introduction to Robotics: Read More [+]
Rules & Requirements
Prerequisites: EE 120 or equivalent, consent of instructor
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 3 hours of laboratory per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Bajcsy
Formerly known as: Electrical Engineering C125/Bioengineering C125
Also listed as: BIO ENG C125
Introduction to Robotics: Read Less [-]
EL ENG C106B Robotic Manipulation and Interaction 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2017, Spring 2016
This course is a sequel to Electrical Engineering C106A/Bioengineering C125, which covers kinematics, dynamics and control of a single robot. This course will cover dynamics and control of groups of robotic manipulators coordinating with each other and interacting with the environment. Concepts will include an introduction to grasping and the constrained manipulation, contacts and force control for interaction with the environment. We will also cover active perception guided manipulation, as well as the manipulation of non-rigid objects. Throughout, we will emphasize design and human-robot interactions, and applications to applications in manufacturing, service robotics, tele-surgery, and locomotion.

Robotic Manipulation and Interaction: Read More [+]

Rules & Requirements
Prerequisites: Electrical Engineering C106A/Bioengineering C125 or consent of the instructor

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.
Instructors: Bajcsy, Sastry

Also listed as: BIO ENG C125B

EL ENG 117 Electromagnetic Fields and Waves 4 Units
Offered through: Electrical Engin and Computer Sci
Review of static electric and magnetic fields and applications; Maxwell's equations; transmission lines; propagation and reflection of plane waves; introduction to guided waves, microwave networks, and radiation and antennas. Minilabs on statics, transmission lines, and waves.

Electromagnetic Fields and Waves: Read More [+]

Rules & Requirements
Prerequisites: Electrical Engineering 16B, Mathematics 53, 54, Physics 7B, or equivalent that covers AC circuits and electromagnetics up to Maxwell's equations

Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture, 1 hour of discussion, and 1.5 hours of laboratory per week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

EL ENG 118 Introduction to Optical Engineering 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Fall 2016, Fall 2015

Introduction to Optical Engineering: Read More [+]

Rules & Requirements
Prerequisites: Math 53, and EE 16AB or Math 54
Credit Restrictions: Students will receive no credit for Electrical Engineering 118 after taking Electrical Engineering 218A. A deficient grade in Electrical Engineering 119 may be removed by taking Electrical Engineering 118.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Waller

Introduction to Optical Engineering: Read Less [-]
EL ENG 120 Signals and Systems 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Signals and Systems: Read More [+]
Rules & Requirements
Prerequisites: EE 16A and 16B

EL ENG 121 Introduction to Digital Communication Systems 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2014, Fall 2013
Introduction to the basic principles of the design and analysis of modern digital communication systems. Topics include source coding, channel coding, baseband and passband modulation techniques, receiver design, and channel equalization. Applications to design of digital telephone modems, compact disks, and digital wireless communication systems. Concepts illustrated by a sequence of MATLAB exercises.
Introduction to Digital Communication Systems: Read More [+]
Rules & Requirements
Prerequisites: EE 16 A & B; CS 70

EL ENG 122 Introduction to Communication Networks 4 Units
Offered through: Electrical Engin and Computer Sci
This course focuses on the fundamentals of the wired and wireless communication networks. The course covers both the architectural principles for making these networks scalable and robust, as well as the key techniques essential for analyzing and designing them. The topics include graph theory, Markov chains, queueing, optimization techniques, the physical and link layers, switching, transport, cellular networks and Wi-Fi.
Introduction to Communication Networks: Read More [+]
Rules & Requirements
Prerequisites: Computer Science 70, Computer Science 70

EL ENG 123 Digital Signal Processing 4 Units
Offered through: Electrical Engin and Computer Sci
Digital Signal Processing: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 124 Introduction to Computer Science 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to computer science, including problem solving, algorithm analysis, data structures, and software design. Topics include: modeling, abstraction, and design; sequential, recursive, imperative, and object-oriented programming; data structures and algorithms; software design and implementation; and an introduction to computer architectures.
Introduction to Computer Science: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 125 Introduction to Computer Systems 4 Units
Offered through: Electrical Engin and Computer Sci
This course introduces the fundamental concepts of computer systems, including computer hardware, operating systems, and networked systems. Topics include: computer hardware architecture; assembly language programming; operating system design; and networked systems.
Introduction to Computer Systems: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 126 Introduction to Embedded Systems 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the design of embedded systems, including microcontrollers, digital signal processors, and interface hardware. Topics include: the internal architecture of microprocessors; software development tools; and the design of digital systems.
Introduction to Embedded Systems: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 127 Introduction to Software Engineering 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the principles and practices of software engineering, including software development processes, software project management, and software quality assurance. Topics include: software project planning; software design methods; and software testing and verification.
Introduction to Software Engineering: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 128 Introduction to Computer Networks 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to computer networks, including the principles of network design and the implementation of network services. Topics include: network design principles; network protocols; and network security.
Introduction to Computer Networks: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 129 Introduction to Computer Security 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the principles of computer security, including the design and implementation of security systems. Topics include: access control; cryptography; and secure software development.
Introduction to Computer Security: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 130 Introduction to Computer Systems 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the design of computer systems, including computer hardware, operating systems, and networked systems. Topics include: computer hardware architecture; assembly language programming; operating system design; and networked systems.
Introduction to Computer Systems: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 131 Introduction to Computer Networks 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to computer networks, including the principles of network design and the implementation of network services. Topics include: network design principles; network protocols; and network security.
Introduction to Computer Networks: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 132 Introduction to Computer Security 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the principles of computer security, including the design and implementation of security systems. Topics include: access control; cryptography; and secure software development.
Introduction to Computer Security: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 133 Introduction to Computer Systems 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the design of computer systems, including computer hardware, operating systems, and networked systems. Topics include: computer hardware architecture; assembly language programming; operating system design; and networked systems.
Introduction to Computer Systems: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 134 Introduction to Computer Networks 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to computer networks, including the principles of network design and the implementation of network services. Topics include: network design principles; network protocols; and network security.
Introduction to Computer Networks: Read More [+]
Rules & Requirements
Prerequisites: 120

EL ENG 135 Introduction to Computer Security 4 Units
Offered through: Electrical Engin and Computer Sci
This course provides an introduction to the principles of computer security, including the design and implementation of security systems. Topics include: access control; cryptography; and secure software development.
Introduction to Computer Security: Read More [+]
Rules & Requirements
Prerequisites: 120
**EL ENG 126 Probability and Random Processes 4 Units**
Offered through: Electrical Engineering and Computer Sciences and Business Administration
Terms offered: Spring 2017, Fall 2016, Spring 2016

**Rules & Requirements**
Prerequisites: EE 16A and 16B

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

**Additional Details**
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

**EL ENG C128 Feedback Control Systems 4 Units**
Offered through: Electrical Engineering and Computer Sciences
Terms offered: Spring 2018, Fall 2017, Spring 2017
Analysis and synthesis of linear feedback control systems in transform and time domains. Control system design by root locus, frequency response, and state space methods. Applications to electro-mechanical and mechatronics systems.

**Rules & Requirements**
Prerequisites: EE 16A and either ME 132 or EE 120

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

**Additional Details**
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

**EL ENG 129 Neural and Nonlinear Information Processing 3 Units**
Offered through: Electrical Engineering and Computer Sciences
Terms offered: Spring 2010, Fall 2009, Spring 2009
Principles of massively parallel real-time computation, optimization, and information processing via nonlinear dynamics and analog VLSI neural networks, applications selected from image processing, pattern recognition, feature extraction, motion detection, data compression, secure communication, bionic eye, auto waves, and Turing patterns.

**Rules & Requirements**
Prerequisites: 120 or consent of instructor

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

**Additional Details**
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam not required.
Instructor: Chua

**EL ENG 130 Integrated-Circuit Devices 4 Units**
Offered through: Electrical Engineering and Computer Sciences
Terms offered: Spring 2018, Fall 2017, Spring 2017
Overview of electronic properties of semiconductor. Metal-semiconductor contacts, pn junctions, bipolar transistors, and MOS field-effect transistors. Properties that are significant to device operation for integrated circuits. Silicon device fabrication technology.

**Rules & Requirements**
Prerequisites: EE 16A and 16B

**Credit Restrictions:** Students will receive no credit for El Eng 130 after taking El Eng 230A.

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

**Additional Details**
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
EL ENG 134 Fundamentals of Photovoltaic Devices 4 Units
Offered through: Electrical Engin and Computer Sci
This course is designed to give an introduction to, and overview of, the fundamentals of photovoltaic devices. Students will learn how solar cells work, understand the concepts and models of solar cell device physics, and formulate and solve relevant physical problems related to photovoltaic devices. Monocrystalline, thin film and third generation solar cells will be discussed and analyzed. Light management and economic considerations in a solar cell system will also be covered.

Rules & Requirements
Prerequisites: EE 16A and 16B

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Arias

Introduction to Electric Power Systems: Read Less [-]

EL ENG 137A Introduction to Electric Power Systems 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Fall 2016, Fall 2015
Overview of conventional electric power conversion and delivery, emphasizing a systemic understanding of the electric grid with primary focus at the transmission level, aimed toward recognizing needs and opportunities for technological innovation. Topics include aspects of a.c. system design, electric generators, components of transmission and distribution systems, power flow analysis, system planning and operation, performance measures, and limitations of legacy technologies.

Rules & Requirements
Prerequisites: EE 16A and 16B or consent of instructor; Physics 7B

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: von Meier

Introduction to Electric Power Systems: Read Less [-]

EL ENG 137B Introduction to Electric Power Systems 4 Units
Offered through: Electrical Engin and Computer Sci
Overview of recent and potential future evolution of electric power systems with focus on new and emerging technologies for power conversion and delivery, primarily at the distribution level. Topics include power electronics applications, solar and wind generation, distribution system design and operation, electric energy storage, information management and communications, demand response, and microgrids.

Rules & Requirements
Prerequisites: Electrical Engineering 137A or consent of instructor

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: von Meier

Introduction to Electric Power Systems: Read Less [-]

EL ENG 140 Linear Integrated Circuits 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Single and multiple stage transistor amplifiers. Operational amplifiers. Feedback amplifiers, 2-port formulation, source, load, and feedback network loading. Frequency response of cascaded amplifiers, gain-bandwidth exchange, compensation, dominant pole techniques, root locus. Supply and temperature independent biasing and references. Selected applications of analog circuits such as analog-to-digital converters, switched capacitor filters, and comparators. Hardware laboratory and design project.

Rules & Requirements
Prerequisites: Electrical Engineering 105
Credit Restrictions: Students will receive no credit for El Eng 140 after taking El Eng 240A.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Alon, Sanders

Linear Integrated Circuits: Read Less [-]
EL ENG 142 Integrated Circuits for Communications 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Spring 2016, Spring 2015
Analysis and design of electronic circuits for communication systems, with an emphasis on integrated circuits for wireless communication systems. Analysis of noise and distortion in amplifiers with application to radio receiver design. Power amplifier design with application to wireless radio transmitters. Radio-frequency mixers, oscillators, phase-locked loops, modulators, and demodulators.
Integrated Circuits for Communications: Read More [+]

Rules & Requirements
Prerequisites: EE 16A & B; EE 105
Credit Restrictions: Students will receive no credit for El Eng 142 after taking El Eng 242A.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

EL ENG 143 Microfabrication Technology 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Fall 2017, Spring 2017
Integrated circuit device fabrication and surface micromachining technology. Thermal oxidation, ion implantation, impurity diffusion, film deposition, epitaxy, lithography, etching, contacts and interconnections, and process integration issues. Device design and mask layout, relation between physical structure and electrical/mechanical performance. MOS transistors and poly-Si surface microstructures will be fabricated in the laboratory and evaluated.
Microfabrication Technology: Read More [+]

Rules & Requirements
Prerequisites: Physics 7B or equivalent

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.

EL ENG 144 Fundamental Algorithms for Systems Modeling, Analysis, and Optimization 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2015, Fall 2014, Fall 2013
The modeling, analysis, and optimization of complex systems requires a range of algorithms and design software. This course reviews the fundamental techniques underlying the design methodology for complex systems, using integrated circuit design as example. Topics include design flows, discrete and continuous models and algorithms, and strategies for implementing algorithms efficiently and correctly in software. Laboratory assignments and a class project will expose students to state-of-the-art tools.
Fundamental Algorithms for Systems Modeling, Analysis, and Optimization: Read More [+]

Rules & Requirements
Prerequisites: EE 16A; Computer Science 70 or consent of instructor

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Keutzer, Lee, Roychowdhury, Seshia

Fundamental Algorithms for Systems Modeling, Analysis, and Optimization: Read Less [-]
EL ENG C145B Medical Imaging Signals and Systems 4 Units
Offered through: Electrical Engineering and Computer Science
Terms offered: Fall 2017, Fall 2016, Fall 2015
Biomedical imaging is a clinically important application of engineering, applied mathematics, physics, and medicine. In this course, we apply linear systems theory and basic physics to analyze X-ray imaging, computerized tomography, nuclear medicine, and MRI. We cover the basic physics and instrumentation that characterizes medical imaging as an ideal perfect-resolution image blurred by an impulse response. This material could prepare the student for a career in designing new medical imaging systems that reliably detect small tumors or infarcts.

EL ENG C145L Introductory Electronic Transducers Laboratory 3 Units
Offered through: Electrical Engineering and Computer Science
Terms offered: Fall 2014, Fall 2013, Fall 2012
Laboratory exercises exploring a variety of electronic transducers for measuring physical quantities such as temperature, force, displacement, sound, light, ionic potential; the use of circuits for low-level differential amplification and analog signal processing; and the use of microcomputers for digital sampling and display. Lectures cover principles explored in the laboratory exercises; construction and signal to noise of electronic transducers and actuators; and design of circuits for sensing and controlling physical quantities.

EL ENG C145M Introductory Microcomputer Interfacing Laboratory 3 Units
Offered through: Electrical Engineering and Computer Science
Terms offered: Spring 2013, Spring 2012, Spring 2011
Laboratory exercises constructing basic interfacing circuits and writing 20-100 line C programs for data acquisition, storage, analysis, display, and control. Use of the IBM PC with microprogrammable digital counter/timer, parallel I/O port. Circuit components include anti-aliasing filters, the S/H amplifier, A/D and D/A converters. Exercises include effects of aliasing in periodic sampling, fast Fourier transforms of basic waveforms, the use of the Hanning filter for leakage reduction, Fourier analysis of the human voice, digital filters, and control using Fourier deconvolution. Lectures cover principles explored in the lab exercises and design of microcomputer-based systems for data acquisitions, analysis and control.

Rules & Requirements
Prerequisites: Electrical Engineering 16A and 16B
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Conolly
Also listed as: BIO ENG C165
Medical Imaging Signals and Systems: Read Less [-]
Introductory Electronic Transducers Laboratory: Read More [+]

Rules & Requirements
Prerequisites: EE 16A & 16B
Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Derenzo
Also listed as: BIO ENG C145L
Introductory Electronic Transducers Laboratory: Read More [+]
Introductory Microcomputer Interfacing Laboratory: Read Less [-]

Rules & Requirements
Prerequisites: Electrical Engineering 16A and 16B
Hours & Format
Fall and/or spring: 15 weeks - 2 hours of lecture and 3 hours of laboratory per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Derenzo
Also listed as: BIO ENG C145M
Introductory Microcomputer Interfacing Laboratory: Read More [+]
Introductory Microcomputer Interfacing Laboratory: Read Less [-]
EL ENG C145O Laboratory in the Mechanics of Organisms 3 Units
Offered through: Electrical Engin and Computer Sci
Introduction to laboratory and field study of the biomechanics of animals and plants using fundamental biomechanical techniques and equipment. Course has a series of rotations involving students in experiments demonstrating how solid and fluid mechanics can be used to discover the way in which diverse organisms move and interact with their physical environment. The laboratories emphasize sampling methodology, experimental design, and statistical interpretation of results. Latter third of course devoted to independent research projects. Written reports and class presentation of project results are required.
Laboratory in the Mechanics of Organisms: Read More [+]
Rules & Requirements
Prerequisites: Integrative Biology 135 or consent of instructor; for Electrical Engineering and Computer Science students, Electrical Engineering 105, 120 or Computer Science 184
Credit Restrictions: Students will receive no credit for C135L after taking 135L.
Hours & Format
Fall and/or spring: 15 weeks - 6 hours of laboratory, 1 hour of discussion, and 1 hour of fieldwork per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Formerly known as: Integrative Biology 135L
Also listed as: BIO ENG C136L/INTEGBI C135L
Laboratory in the Mechanics of Organisms: Read Less [-]

EL ENG 146L Application Specific Integrated Circuits Laboratory 2 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2015
This is a lab course that covers the design of modern Application-Specific Integrated Circuits (ASICs). The labs lay the foundation of modern digital design by first setting-up the scripting and hardware description language base for specification of digital systems and interactions with tool flows. Software testing of digital designs is covered leading into a set of labs that cover the design flow. Digital synthesis, floorplanning, placement and routing are covered, as well as tools to evaluate design timing and power. Chip-level assembly is covered, instantiation of custom IP blocks: I/O pads, memories, PLLs, etc. The labs culminate with a project design – implementation of a 3-stage RISC-V processor with register file and caches.
Application Specific Integrated Circuits Laboratory: Read More [+]
Objectives Outcomes
Course Objectives: This course is a one-time offering to supplement the CS150 course offered in the Fall 2014, with a lab and project section that cover the Application-Specific Integrated Circuit Design. The CS150 lectures in the Fall 2014 already covered the necessary lecture material, so students who took the CS150 lab in the Fall of 2014 will have a chance to expand their skills into the area of Application-Specific Integrated Circuit design. Hence the pre-requisite for this course is that a student has taken the CS150 course in the Fall 2014.
Rules & Requirements
Prerequisites: Electrical Engineering 40; Electrical Engineering 105 recommended and Computer Science 150 (taken Fall 2014) - mandatory
Credit Restrictions: Students will receive no credit for Electrical Engineering 146L after taking Fall 2014 version of Electrical Engineering 141/241A.
Hours & Format
Fall and/or spring: 15 weeks - 3 hours of laboratory and 1 hour of discussion per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Instructor: Stojanovic
Application Specific Integrated Circuits Laboratory: Read Less [-]
EL ENG 147 Introduction to Microelectromechanical Systems (MEMS) 3 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Fall 2017, Fall 2016, Fall 2015
This course will teach fundamentals of micromachining and microfabrication techniques, including planar thin-film process technologies, photolithographic techniques, deposition and etching techniques, and the other technologies that are central to MEMS fabrication. It will pay special attention to teaching of fundamentals necessary for the design and analysis of devices and systems in mechanical, electrical, fluidic, and thermal energy/signal domains, and will teach basic techniques for multi-domain analysis. Fundamentals of sensing and transduction mechanisms including capacitive and piezoresistive techniques, and design and analysis of micromachined miniature sensors and actuators using these techniques will be covered.
Introduction to Microelectromechanical Systems (MEMS): Read More [+]

Rules & Requirements
Prerequisites: Electrical Engineering 16A and 16B
Credit Restrictions: Students will receive no credit for El Eng 147 after taking El Eng 247A.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Maharbiz, Nguyen, Pister

Introduction to Microelectromechanical Systems (MEMS): Read Less [-]

EL ENG 192 Mechatronic Design Laboratory 4 Units
Offered through: Electrical Engin and Computer Sci
Design project course, focusing on application of theoretical principles in electrical engineering to control of a small-scale system, such as a mobile robot. Small teams of students will design and construct a mechatronic system incorporating sensors, actuators, and intelligence.
Mechatronic Design Laboratory: Read More [+]

Rules & Requirements
Prerequisites: EE120, EE16A+EE16B, CS61ABC

Hours & Format
Fall and/or spring: 15 weeks - 1.5 hours of lecture and 10 hours of laboratory per week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Fearing

Mechatronic Design Laboratory: Read Less [-]

EL ENG 194 Special Topics 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Spring 2017, Fall 2015
Topics will vary semester to semester. See the Electrical Engineering announcements.
Special Topics: Read More [+]

Rules & Requirements
Prerequisites: Consent of instructor
Repeat rules: Course may be repeated for credit as topic varies. Course may be repeated for credit when topic changes.

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

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Special Topics: Read Less [-]
EL ENG H196A Senior Honors Thesis Research 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Spring 2015
Thesis work under the supervision of a faculty member. A minimum of four units must be taken; the units may be distributed between one and two semesters in any way. To obtain credit a satisfactory thesis must be submitted at the end of the two semesters to the Electrical and Engineering and Computer Science Department archive. Students who complete four units and a thesis in one semester receive a letter grade at the end of H196A. Students who do not, receive an IP in H196A and must enroll in H196B.
Senior Honors Thesis Research: Read More [+]
Rules & Requirements
Prerequisites: Open only to students in the Electrical Engineering and Computer Science honors program

EL ENG H196B Senior Honors Thesis Research 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Spring 2015, Spring 2014
Thesis work under the supervision of a faculty member. A minimum of four units must be taken; the units may be distributed between one and two semesters in any way. To obtain credit a satisfactory thesis must be submitted at the end of the two semesters to the Electrical and Engineering and Computer Science Department archive. Students who complete four units and a thesis in one semester receive a letter grade at the end of H196A. Students who do not, receive an IP in H196A and must enroll in H196B.
Senior Honors Thesis Research: Read More [+]
Rules & Requirements
Prerequisites: Open only to students in the Electrical Engineering and Computer Science honors program

EL ENG 197 Field Study 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2016, Fall 2015, Spring 2015
Students take part in organized individual field sponsored programs with off-campus companies or tutoring/mentoring relevant to specific aspects and applications of computer science on or off campus. Note Summer CPT or OPT students: written report required. Course does not count toward major requirements, but will be counted in the cumulative units toward graduation.
Field Study: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor (see department adviser)
Repeat rules: Course may be repeated for credit.
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
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Field Study: Read Less [-]

EL ENG 198 Directed Group Study for Advanced Undergraduates 1 - 4 Units
Offered through: Electrical Engin and Computer Sci
Terms offered: Spring 2018, Spring 2017, Fall 2016
Group study of selected topics in electrical engineering, usually relating to new developments.
Directed Group Study for Advanced Undergraduates: Read More [+]
Rules & Requirements
Prerequisites: 2.0 GPA or better; 60 units completed
Repeat rules: Course may be repeated for credit.
Hours & Format
Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week
Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Directed Group Study for Advanced Undergraduates: Read Less [-]
EL ENG 199 Supervised Independent Study 1
- 4 Units
Offered through: Electrical Eng and Computer Sci
Terms offered: Fall 2017, Fall 2016, Summer 2016 8 Week Session
Supervised independent study. Enrollment restrictions apply.
Supervised Independent Study: Read More [+]
Rules & Requirements
Prerequisites: Consent of instructor and major adviser
Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Hours & Format
Fall and/or spring: 15 weeks - 0 hours of independent study per week
Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details
Subject/Course Level: Electrical Engineering/Undergraduate
Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.
Supervised Independent Study: Read Less [-]

Electrical Engineering and Computer Sciences
EECS 47D Completion of work in Electrical Engineering 16A 1 - 3 Units
Terms offered: Not yet offered
This course allows students who have had a linear algebra and/or basic circuit theory course to complete the work in EE16A and be ready for EE16B or EE47E. The course focuses on the fundamentals of designing modern information devices and systems that interface with the real world and provides a comprehensive foundation for core EECS topics in signal processing, learning, control, and circuit design. Modeling is emphasized in a way that deepens mathematical maturity, and in both labs and homework, students will engage computationally, physically, and visually with the concepts being introduced in addition to traditional paper/pencil exercises.
Completion of work in Electrical Engineering 16A: Read More [+]
Rules & Requirements
Prerequisites: Math 1A, Math 1B or equivalent, CS 61A or equivalent (encouraged to be taken concurrently), College level courses in linear algebra and/or circuit theory, and consent of the instructor

Hours & Format
Fall and/or spring: 15 weeks - 2-8 hours of self-paced per week
Summer: 8 weeks - 4-13 hours of self-paced per week

Additional Details
Subject/Course Level: Electrical Engin and Computer Sci/ Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Alon, Arcak, Ayazifar, Maharbiz, Niknejad, Ranade, Sahai, Subramanian, Tomlin
Completion of work in Electrical Engineering 16A: Read Less [-]
EECS 47E Completion of work in Electrical Engineering 16B 1 - 3 Units

Terms offered: Not yet offered
This course allows students who have had a linear algebra and/or basic circuit theory course to complete the work in EE16B. The course focuses on the fundamentals of designing modern information devices and systems that interface with the real world and provides a comprehensive foundation for core EECS topics in signal processing (DFT), learning (SVD/PCA), feedback control, and circuit design. Modeling is emphasized in a way that deepens mathematical maturity, and in both labs and homework, students will engage computationally, physically, and visually with the concepts being introduced in addition to traditional paper/pencil exercises.

Completion of work in Electrical Engineering 16B: Read More [+]

Rules & Requirements

Prerequisites: Math 1A, Math 1B or equivalent, EE16A or EECS 47D or Math 54, CS 61A or equivalent, College level courses in linear algebra and/or circuit theory, and consent of the instructor

Hours & Format

Fall and/or spring: 15 weeks - 3-8 hours of self-paced per week
Summer: 8 weeks - 6-16 hours of self-paced per week

Additional Details

Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate

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

Instructors: Alon, Arcak, Ayazifar, Maharbiz, Niknejad, Ranade, Sahai, Subramanian, Tomlin

Completion of work in Electrical Engineering 16B: Read Less [-]

EECS 47F Completion of work in Computer Science 70 1 - 3 Units

Terms offered: Not yet offered
This course allows students who have had a discrete math and/or probability course to complete the work in CS70. Logic, infinity, and induction; applications include undecidability and stable marriage problem. Modular arithmetic and GCDs; applications include primality testing and cryptography. Polynomials; examples include error correcting codes and interpolation. Probability including sample spaces, independence, random variables, law of large numbers; examples include load balancing, existence arguments, Bayesian inference.

Completion of work in Computer Science 70: Read More [+]

Rules & Requirements

Prerequisites: Sophomore mathematical maturity, programming experience equivalent to that gained in 61A, a prior college level course on discrete math and/or probability, and consent of the instructor

Hours & Format

Fall and/or spring: 15 weeks - 3-8 hours of self-paced per week
Summer: 8 weeks - 6-16 hours of self-paced per week

Additional Details

Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate

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

Instructors: Ranade, Rao, Sahai, Seshia, Vazirani, Walrand

Completion of work in Computer Science 70: Read Less [-]
EECS C106A Introduction to Robotics 4 Units
Terms offered: Fall 2017
An introduction to the kinematics, dynamics, and control of robot manipulators, robotic vision, and sensing. The course covers forward and inverse kinematics of serial chain manipulators, the manipulator Jacobian, force relations, dynamics, and control. It presents elementary principles on proximity, tactile, and force sensing, vision sensors, camera calibration, stereo construction, and motion detection. The course concludes with current applications of robotics in active perception, medical robotics, and other areas.
Introduction to Robotics: Read More [+]

Rules & Requirements

Prerequisites: Electrical Engineering 120 or equivalent, consent of instructor

Credit Restrictions: Students will receive no credit for Electrical Engineering and Computer Science C106A/Bioengineering C106A after completing EE C106A/BioE C125, Electrical Engineering 206A, or Electrical Engineering and Computer Science 206A.

Hours & Format

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

Additional Details

Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate

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

Instructor: Bajcsy

Also listed as: BIO ENG C106A

Introduction to Robotics: Read Less [-]

EECS C106B Robotic Manipulation and Interaction 4 Units
Terms offered: Spring 2018
This course is a sequel to EECS C106A/Bioengineering C106A, which covers kinematics, dynamics and control of a single robot. This course will cover dynamics and control of groups of robotic manipulators coordinating with each other and interacting with the environment. Concepts will include an introduction to grasping and the constrained manipulation, contacts and force control for interaction with the environment. We will also cover active perception guided manipulation, as well as the manipulation of non-rigid objects. Throughout, we will emphasize design and human-robot interactions, and applications to applications in manufacturing, service robotics, tele-surgery, and locomotion.
Robotic Manipulation and Interaction: Read More [+]

Rules & Requirements

Prerequisites: Electrical Engineering and Computer Science C106A/Bioengineering C106A or consent of the instructor

Credit Restrictions: Students will receive no credit for Electrical Engineering and Computer Science C106B/Bioengineering C106B after completing Electrical Engineering C106B/Bioengineering C125B, Electrical Engineering 206B, or Electrical Engineering and Computer Science 206B.

Hours & Format

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

Additional Details

Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate

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

Instructors: Bajcsy, Sastry

Also listed as: BIO ENG C106B

Robotic Manipulation and Interaction: Read Less [-]
EECS 126 Probability and Random Processes
4 Units
Terms offered: Spring 2018, Fall 2017

Probability and Random Processes: Read More [+]

Rules & Requirements
Prerequisites: CS 70 preferred but not required. Familiarity with linear algebra
Credit Restrictions: Students will receive no credit for EECS 126 after completing EE 126.

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

Additional Details
Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: Ramchandran
Probability and Random Processes: Read Less [-]

EECS 127 Optimization Models in Engineering 4 Units
Terms offered: Spring 2018, Fall 2017
This course offers an introduction to optimization models and their applications, ranging from machine learning and statistics to decision-making and control, with emphasis on numerically tractable problems, such as linear or constrained least-squares optimization.

Optimization Models in Engineering: Read More [+]

Rules & Requirements
Prerequisites: EE 16A & 16B or consent of instructor
Credit Restrictions: Students will receive no credit for EECS 127 after taking EECS 227AT or Electrical Engineering 127/227AT.

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

Additional Details
Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructor: El Ghaoui
Formerly known as: Electrical Engineering 127
Optimization Models in Engineering: Read Less [-]
EECS 149 Introduction to Embedded Systems 4 Units
Terms offered: Fall 2017, Fall 2016, Fall 2015
This course introduces students to the basics of modeling, analysis, and design of embedded, cyber-physical systems. Students learn how to integrate computation with physical processes to meet a desired specification. Topics include models of computation, control, analysis and verification, interfacing with the physical world, real-time behaviors, mapping to platforms, and distributed embedded systems. The course has a strong laboratory component, with emphasis on a semester-long sequence of projects.

Introduction to Embedded Systems: Read More [+]

Objectives Outcomes

Course Objectives:
- To develop the skills to realize embedded systems that are safe, reliable, and efficient in their use of resources.
- To learn how to model and design the joint dynamics of software, networks, and physical processes.
- To learn to think critically about technologies that are available for achieving such joint dynamics.

Rules & Requirements

Prerequisites: EE 16A & B, or permission of instructor; CS 61C and CS 70

Hours & Format

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

Additional Details

Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate
Grading/Final exam status: Letter grade. Alternative to final exam.
Instructors: Seshia, Lee

Introduction to Embedded Systems: Read Less [-]

EECS 151 Introduction to Digital Design and Integrated Circuits 3 Units
Terms offered: Spring 2018, Fall 2017, Spring 2017
An introduction to digital and system design. The material provides a top-down view of the principles, components, and methodologies for large scale digital system design. The underlying CMOS devices and manufacturing technologies are introduced, but quickly abstracted to higher-levels to focus the class on design of larger digital modules for both FPGAs (field programmable gate arrays) and ASICs (application specific integrated circuits). The class includes extensive use of industrial grade design automation and verification tools for assignments, labs and projects.
The class has two lab options: ASIC Lab (EECS 151LA) and FPGA Lab (EECS 151LB). Students must enroll in at least one of the labs concurrently with the class.

Introduction to Digital Design and Integrated Circuits: Read More [+]

Objectives Outcomes

Course Objectives:
The Verilog hardware description language is introduced and used. Basic digital system design concepts, Boolean operations/combinational logic, sequential elements and finite-state-machines, are described. Design of larger building blocks such as arithmetic units, interconnection networks, input/output units, as well as memory design (SRAM, Caches, FIFOs) and integration are also covered. Parallelism, pipelining and other micro-architectural optimizations are introduced. A number of physical design issues visible at the architecture level are covered as well, such as interconnects, power, and reliability.

Rules & Requirements

Prerequisites: Electrical Engineering 16A & 16B
Credit Restrictions: Students must enroll concurrently in at least one the lab flavors EECS151LA or EECS151LB. Students wishing to take a second lab flavor next term can sign-up only for that Lab section and receive a Letter grade. The pre-requisite for “Lab-only” enrollment that term will be EECS151 from previous terms.

Hours & Format

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

Additional Details

Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate
Grading/Final exam status: Letter grade. Final exam required.
Instructors: Stojanovic, Wawrzynek

Introduction to Digital Design and Integrated Circuits: Read Less [-]
EECS 151LA Application Specific Integrated Circuits Laboratory 2 Units
Terms offered: Spring 2018, Fall 2017, Spring 2017
This lab lays the foundation of modern digital design by first presenting the scripting and hardware description language base for specification of digital systems and interactions with tool flows. The labs are centered on a large design with the focus on rapid design space exploration. The lab exercises culminate with a project design, e.g., implementation of a three-stage RISC-V processor with a register file and caches. The design is mapped to simulation and layout specification.
Application Specific Integrated Circuits Laboratory: Read More [+]

Objectives Outcomes
Course Objectives: Software testing of digital designs is covered leading to a set of exercises that cover the design flow. Digital synthesis, floor-planning, placement and routing are covered, as well as tools to evaluate timing and power consumption. Chip-level assembly is covered, including instantiation of custom blocks: I/O pads, memories, PLLs, etc.

Rules & Requirements
Prerequisites: Computer Science 61C, Electrical Engineering 16A & 16B, Electrical Engineering 105

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

Additional Details
Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.
Instructors: Stojanovic, Wawrzynek

Application Specific Integrated Circuits Laboratory: Read Less [-]

EECS 151LB Field-Programmable Gate Array Laboratory 2 Units
Terms offered: Spring 2018, Fall 2017, Spring 2017
This lab covers the design of modern digital systems with Field-Programmable Gate Array (FPGA) platforms. A series of lab exercises provide the background and practice of digital design using a modern FPGA design tool flow. Digital synthesis, partitioning, placement, routing, and simulation tools for FPGAs are covered in detail. The labs exercises culminate with a large design project, e.g., an implementation of a full three-stage RISC-V processor system, with caches, graphics acceleration, and external peripheral components. The design is mapped and demonstrated on an FPGA hardware platform.
Field-Programmable Gate Array Laboratory: Read More [+]

Rules & Requirements
Prerequisites: Electrical Engineering 16A & 16B; Electrical Engineering 105 recommended and Computer Science 61C

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

Additional Details
Subject/Course Level: Electrical Engin and Computer Sci/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.
Instructors: Stojanovic, Wawrzynek

Field-Programmable Gate Array Laboratory: Read Less [-]

Computer Sciences and Electrical Engineering Faculty
Pieter Abbeel, Associate Professor. Artificial Intelligence (AI); Control, Intelligent Systems, and Robotics (CIR); Machine Learning. Research Profile (http://vcresearch.berkeley.edu/faculty/pieter-abbeel)

Maneesh Agrawala, Professor. Human-Computer Interaction (HCI). Research Profile (http://vcresearch.berkeley.edu/faculty/maneesh-agrawala)

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Babak Ayazifar, Professor. Education (EDUC), Signal processing and system theory EDUCATION: Development of pedagogical techniques and assessment tools.; Signal Processing (SP), Graph signal processing.

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Ruzena Bajcsy, Professor. Artificial Intelligence (AI); Biosystems & Computational Biology (BIO); Control, Intelligent Systems, and Robotics (CIR); Graphics (GR); Human-Computer Interaction (HCI), Computer vision; Bridging information technology to humanities and social sciences; Security (SEC).
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Brian A. Barsky, Professor. Computer science, geometric design and modeling, computer graphics, computer aided cornea modeling and visualization, medical imaging, virtual environments for surgical simulation.
Research Profile (http://vcresearch.berkeley.edu/node/13851)

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Research Profile (http://vcresearch.berkeley.edu/node/14413)

Alexandre M. Bayen, Professor. Transportation, modelling and control of distributed parameters systems, large scale infrastructure systems, water distribution.
Research Profile (http://vcresearch.berkeley.edu/node/14130)

Jeffrey Bokor, Professor. Physical Electronics (PHY); Nanotechnology.
Research Profile (http://vcresearch.berkeley.edu/faculty/jeffrey-bokor)

Bernhard Boser, Professor. Biosystems & Computational Biology (BIO); Design, Modeling and Analysis (DMA); Integrated Circuits (INC); Physical Electronics (PHY).
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Eric Brewer, Professor. Operating Systems & Networking (OSNT); Energy (ENE); Security (SEC); Developing regions; Programming languages.
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John Canny, Professor. Computer science, activity-based computing, livenotes, mechatronic devices, flexion.
Research Profile (http://vcresearch.berkeley.edu/node/14606)

Jose M. Carreira, Professor. Brain-machine interfaces, neural ensemble computation, neuroprosthetics, sensorimotor learning and control.
Research Profile (http://vcresearch.berkeley.edu/node/14341)

Constance Chang-Hasnain, Professor. Microsystems and materials; Nano-Optoelectronic devices.

Alessandro Chiesa, Assistant Professor. Security (SEC); Theory (THY).

John Chuang, Professor. Computer networking, computer security, economic incentives, ICTD.
Research Profile (http://vcresearch.berkeley.edu/node/15010)

Phillip Colella, Professor in Residence.

Steven Conolly, Professor. Medical imaging instrumentation and control.
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Thomas Courtade, Assistant Professor. Communications & Networking (COMNET).
Research Profile (http://vcresearch.berkeley.edu/faculty/thomas-courtade)

David E. Culler, Professor. Computer Architecture & Engineering (ARC); Energy (ENE); Operating Systems & Networking (OSNT); Programming Systems (PS); Security (SEC); Parallel architecture; High-performance networks; Workstation clusters.
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Trevor Darrell, Professor in Residence. Artificial Intelligence (AI); Control, Intelligent Systems, and Robotics (CIR); Computer Vision.

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John DeNero, Assistant Professor. Artificial Intelligence (AI); Education (EDUC).

Anca Dragan, Assistant Professor. Artificial Intelligence (AI); Control, Intelligent Systems, and Robotics (CIR); Human-Computer Interaction (HCI).

Alexei (Alyosha) Efros, Associate Professor. Computer Vision; Graphics (GR); Artificial Intelligence (AI).
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Laurent El Ghaoui, Professor. Decision-making under uncertainty, convex optimization, robust solutions, semidefinite programming, exhaustive simulation.
Research Profile (http://vcresearch.berkeley.edu/node/15019)

Ronald S. Fearing, Professor. Control, Intelligent Systems, and Robotics (CIR); Biosystems & Computational Biology (BIO).

Armando Fox, Professor. Programming systems (PS), Education (EDUC), Operating Systems and Networking (OSNT).
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Michael Franklin, Professor. Operating Systems & Networking (OSNT), AMPLab.

Robert Full, Professor. Energetics, comparative biomechanics, arthropod, adhesion, comparative physiology, locomotion, neuromechanics, biomimicry, biological inspiration, reptile, gecko, amphibian, robots, artificial muscles.
Research Profile (http://vcresearch.berkeley.edu/node/14168)

Jack L. Gallant, Professor. Vision science, form vision, attention, fMRI, computational neuroscience, natural scene perception, brain encoding, brain decoding.
Research Profile (http://vcresearch.berkeley.edu/node/14700)

**Dan Garcia, Professor.** Education (EDUC); Computational Game Theory; Graphics (GR).

**Sanjam Garg, Assistant Professor.** Theory (THY); Security (SEC). Research Profile (http://vcresearch.berkeley.edu/faculty/sanjam-garg)

**Ali Ghodsi, Adjunct Assistant Professor.** Database Management Systems (DBMS); Operating Systems & Networking (OSNT).

**Ken Goldberg, Professor.** Robotics, art, social media, new media, automation. Research Profile (http://vcresearch.berkeley.edu/node/14251)

**Joseph Gonzalez, Assistant Professor.** Artificial Intelligence (AI); Database Management Systems (DBMS).

**Joshua Hug, Assistant Professor.** Education (EDUC); Computer Science education.

**Ali Javey, Professor.** Physical Electronics (PHY); Energy (ENE); Micro/Nano Electro Mechanical Systems (MEMS); Nanomaterials and Nanotechnology. Research Profile (http://vcresearch.berkeley.edu/faculty/alibaba)

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**Anthony D. Joseph, Professor.** Operating Systems & Networking (OSNT); Security (SEC); Computer and Network Security; Distributed systems; Mobile computing; Wireless networking; Software engineering, and operating systems. Research Profile (http://vcresearch.berkeley.edu/faculty/anthony-d-joseph)

**+ Richard Karp, Professor.** Computational molecular biology, genomics, DNA molecules, structure of genetic regulatory networks, combinatorial and statistical methods. Research Profile (http://vcresearch.berkeley.edu/faculty/richard-karp)

**Randy H. Katz, Professor.** Computer Architecture & Engineering (ARC); Operating Systems & Networking (OSNT); Distributed and networked systems design and implementation.

**Kurt Keutzer, Professor.** Computer Architecture & Engineering (ARC); Design, Modeling and Analysis (DMA); Scientific Computing (SCI). Research Profile (http://vcresearch.berkeley.edu/faculty/kurt-keutzer)

**Daniel Klein, Professor.** Artificial Intelligence (AI); Natural Language Processing, Computational Linguistics, Machine Learning. Research Profile (http://vcresearch.berkeley.edu/faculty/daniel-klein)

**John D. Kubiatowicz, Professor.** Operating Systems & Networking (OSNT); Security (SEC); Computer architecture; Quantum computer design; Internet-scale storage systems; Peer-to-peer networking. Research Profile (http://vcresearch.berkeley.edu/faculty/john-d-kubiatowicz)

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**Edward A. Lee, Professor.** Embedded Software, Real-Time Systems, Cyber-Physical Systems, Concurrency; Design, Modeling and Analysis (DMA); Programming Systems (PS); Signal Processing (SP). Research Profile (http://vcresearch.berkeley.edu/faculty/edward-lee)

**Luke Lee, Professor.** Biophotonics, biophysics, biomaterials science, molecular imaging, single cell analysis, bio-nano interfaces, integrated microfluidic devices (iMD) for diagnostics and preventive personalized medicine. Research Profile (http://vcresearch.berkeley.edu/node/14953)

**Chunlei Liu, Associate Professor.**

**Tsu-Jae King Liu, Professor.** Physical Electronics (PHY); Micro/Nano Electro Mechanical Systems (MEMS). Research Profile (http://vcresearch.berkeley.edu/faculty/tsu-jae-king-liu)

**Michael Lustig, Associate Professor.** Medical Imaging; Magnetic Resonance Imaging; Signal Processing (SP); Scientific Computing (SCI); Physical Electronics (PHY); Communications & Networking (COMNET); Biosystems & Computational Biology (BIO); Control, Intelligent Systems, and Robotics (CIR).

**Michel Maharbiz, Associate Professor.** Neural interfaces, bioMEMS, microsystems, MEMS, microsystems for the life sciences. Research Profile (http://vcresearch.berkeley.edu/node/15053)

**Jitendra Malik, Professor.** Artificial Intelligence (AI); Biosystems & Computational Biology (BIO); Control, Intelligent Systems, and Robotics (CIR); Graphics (GR); Human-Computer Interaction (HCI); Signal Processing (SP). Research Profile (http://vcresearch.berkeley.edu/faculty/jitendra-malik)

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Shyam Parekh, Adjunct Associate Professor. Communications & Networking (COMNET).

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S. Shankar Sastry, **Professor.** Computer science, robotics, aerial robots, cybersecurity, cyber defense, homeland defense, nonholonomic systems, control of hybrid systems, sensor networks, interactive visualization, robotic telesurgery, rapid prototyping.

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Scott Shenker, **Professor.** Internet Architecture, Software-Defined Networks, Datacenter Infrastructure, Large-Scale Distributed Systems, Game Theory and Economics; Operating Systems & Networking (OSNT).

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Costas J. Spanos, **Professor.** Energy (ENE); Integrated Circuits (INC); Physical Electronics (PHY); Semiconductor manufacturing; Solid-State Devices.

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Bernd Sturmfels, **Professor.** Mathematics, combinatorics, computational algebraic geometry.

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Doug Tygar, **Professor.** Privacy, technology policy, computer security, electronic commerce, software engineering, reliable systems, embedded systems, computer networks, cryptography, cryptology, authentication, ad hoc networks.

Research Profile (http://vcresearch.berkeley.edu/node/15560)

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Research Profile (http://vcresearch.berkeley.edu/node/15573)

Alexandra von Meier, **Adjunct Professor.** Energy (ENE), Electric Grids, Power Distribution.

David Wagner, **Professor.** Security (SEC).

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Research Profile (http://vcresearch.berkeley.edu/node/15701)

Laura Waller, **Assistant Professor.** Physical Electronics (PHY); Signal Processing (SP); Computational imaging; Optics and Imaging; Biosystems & Computational Biology (BIO); Graphics (GR).

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John Wawrzynek, **Professor.** Computer Architecture & Engineering (ARC).

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Ming C. Wu, **Professor.** Si photonics, optoelectronics, nanophotonics, optical MEMS, Optofluidics; Micro/Nano Electro Mechanical Systems (MEMS); Physical Electronics (PHY).
Eli Yablonovitch, Professor. Optoelectronics Research Group, high speed optical communications, photonic crystals at optical and microwave frequencies, the milli-Volt switch, optical antennas and solar cells.; Physical Electronics (PHY).
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Katherine A. Yelick, Professor. Programming Systems (PS); Scientific Computing (SCI); Biosystems & Computational Biology (BIO); parallel computing techniques.
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Nir Yosef, Assistant Professor. Computational biology.
Research Profile (http://vcresearch.berkeley.edu/faculty/nir-yosef)

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Avideh Zakhor, Professor. Signal Processing (SP); Artificial Intelligence (AI); Control, Intelligent Systems, and Robotics (CIR); Graphics (GR).
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Lecturers
Gerald Friedland, Lecturer.

Visitng Faculty
Eric Friedman
Laura Grigori
Justin Hsia, Biosystems & Computational Biology (BIO).

Christopher Hunn
Georgios Michelogiannakis
Omur Ozel
Barath Raghavan
David Richerby
Johannes Royset
Patrick Virtue
Nicholas Weaver, Operating Systems & Networking (OSNT).

Emeritus Faculty
David A. Hodges, Professor Emeritus. Short wavelength electromagnetics; Soft X-ray microscopy; Coherence; EUV lithography.
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Elwyn R. Berlekamp, Professor Emeritus. Computer science, electrical engineering, mathematics, combinatorial game theory, algebraic coding theory.
Research Profile (http://vcresearch.berkeley.edu/node/14435)

Manuel Blum, Professor Emeritus. Recursive function, cryptographic protocols, program checking.

Robert K. Brayton, Professor Emeritus. Design, Modeling and Analysis (DMA); Advanced methods in combinational and sequential logic synthesis and formal verification.
Research Profile (http://vcresearch.berkeley.edu/faculty/robert-k-brayton)

Robert W. Brodersen, Professor Emeritus. Design, Modeling and Analysis (DMA); Integrated Circuits (INC);

Thomas F. Budinger, Professor Emeritus. Image processing, biomedical electronics, quantitative aging, cardiovascular physiology, bioastronautics, image reconstruction, nuclear magnetic resonance, positron emission, tomography, reconstruction tomography, inverse problem mathematics.
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Nathan W. Cheung, Professor Emeritus. Nanofabrication; Heterogeneous integration of microsystems; Plasma and ion-beam processing technologies; Electronic materials.
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Leon O. Chua, Professor Emeritus. Biosystems & Computational Biology (BIO); Control, Intelligent Systems, and Robotics (CIR), Cellular neural networks; Cellular automata; Complexity.; Nanoelectronics; Nonlinear circuits and systems; Nonlinear dynamics; Chaos.;
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Mike Clancy, Professor Emeritus. Science education, cognitive development, educational software.
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Richard J. Fateman, Professor Emeritus. Artificial Intelligence (AI); Scientific Computing (SCI), Computer algebra systems; Programming environments and systems; Programming languages and compilers; Symbolic mathematical computation; Document image analysis, multimodal input of mathematics.
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Jerome A. Feldman, Professor Emeritus. Artificial Intelligence (AI); Biosystems & Computational Biology (BIO); Security (SEC); cognitive science.
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Domenico Ferrari, Professor Emeritus. UC Berkeley Unix Project, high-speed network testbeds and the design of real-time communication services and network protocols for multimedia traffic.

Susan L. Graham, Professor Emeritus. Graphics (GR); Human-Computer Interaction (HCI); Programming Systems (PS); Scientific Computing (SCI); Software development environments, software engineering.
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Paul R. Gray, Professor Emeritus. Design, Modeling and Analysis (DMA); Integrated Circuits (INC).
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T. Kenneth Gustafson, Professor Emeritus. Solid-State Devices; Basic electromagnetic and quantum applications.

Michael A. Harrison, Professor Emeritus. Multimedia; User interfaces; Software environments.

Brian K. Harvey, Professor Emeritus. Education (EDUC).
Research Profile (http://vcresearch.berkeley.edu/faculty/brian-harvey)

David A. Hodges, Professor Emeritus. Integrated Circuits (INC).
Chenming Hu, **Professor Emeritus.** Semiconductor Device Technologies. Research Profile [here](http://vcresearch.berkeley.edu/faculty/chenming-calvin-hu)

William M. Kahan, **Professor Emeritus.** Computer Architecture & Engineering (ARC); Scientific Computing (SCI); Computer architecture; Scientific computing; Numerical analysis. Research Profile [here](http://vcresearch.berkeley.edu/faculty/william-m-kahan)

Edward L. Keller, **Professor Emeritus.** Computational neuroscience; bioengineering; neurophysiology of the oculomotor system.

Kam Y. Lau, **Professor Emeritus.** Communications & Networking (COMNET); Optoelectronic devices; Microwave and millimeter wave signal transport over optical fiber links. Research Profile [here](http://vcresearch.berkeley.edu/faculty/kam-y-lau)

Edwin R. Lewis, **Professor Emeritus.** Research Profile [here](http://vcresearch.berkeley.edu/faculty/edwin-r-lewis)

Allan J. Lichtenberg, **Professor Emeritus.** Nano-Optoelectronics, Electromagnetics/Plasmas; Energy (ENE). Research Profile [here](http://vcresearch.berkeley.edu/faculty/allan-j-lichtenberg)

Michael A. Lieberman, **Professor Emeritus.** Plasma-assisted materials processing; Energy (ENE). Research Profile [here](http://vcresearch.berkeley.edu/faculty/michael-lieberman)

Kenneth K. Mei, **Professor Emeritus.** Nano-Optoelectronics, Electromagnetics/Plasmas.

David G. Messerschmitt, **Professor Emeritus.** Communications & Networking (COMNET); Signal Processing (SP); Business and economics issues in the software industry.

Robert G. Meyer, **Professor Emeritus.** Integrated Circuits (INC). Research Profile [here](http://vcresearch.berkeley.edu/faculty/robert-g-meyer)

Nelson Morgan, **Professor Emeritus.** Signal Processing (SP).

+ Richard Muller, **Professor Emeritus.** Astrophysics, geophysics, physics, elementary particle physics, cosmic micro wave background, supernovae for cosmology, origin of the earth’s magnetic flips, Nemesis theory, glacial cycles, red sprites, lunar impacts, iridium measurement. Research Profile [here](http://vcresearch.berkeley.edu/node/15154)

Andrew R. Neureuther, **Professor Emeritus.** Integrated Circuits (INC); Solid-State Devices. Research Profile [here](http://vcresearch.berkeley.edu/faculty/andrew-r-neureuther)

William G. Oldham, **Professor Emeritus.** Integrated circuits; Semiconductor manufacturing. Research Profile [here](http://vcresearch.berkeley.edu/faculty/william-g-oldham)

Beresford N. Parlett, **Professor Emeritus.**

Elijah Polak, **Professor Emeritus.** Control, Intelligent Systems, and Robotics (CIR). Numerical methods for engineering optimization. Research Profile [here](http://vcresearch.berkeley.edu/faculty/elijah-polak)

Chittoor V. Ramamoorthy, **Professor Emeritus.** Software engineering.

Lawrence A. Rowe, **Professor Emeritus.** Multimedia Technology. Research Profile [here](http://vcresearch.berkeley.edu/faculty/lawrence-rowe)

Steven E. Schwarz, **Professor Emeritus.** Solid-State Devices; Nano-Optoelectronics, Electromagnetics/Plasmas.

Carlo H. Sequin, **Professor Emeritus.** Geometric modeling, Artistic geometry, Mathematical visualizations.; Graphics (GR); Human-Computer Interaction (HCI); CAD tools.

Jerome R. Singer, **Professor Emeritus.**

Alan J. Smith, **Professor Emeritus.** Computer Architecture & Engineering (ARC); Operating Systems & Networking (OSNT); Computer System Performance Analysis, I/O Systems, Cache Memories, Memory Systems. Research Profile [here](http://vcresearch.berkeley.edu/faculty/alanj-smith)

Michael Stonebraker, **Professor Emeritus.** Database Technology.

Aram J. Thamsonian, **Professor Emeritus.** Research Profile [here](http://vcresearch.berkeley.edu/faculty/aram-thamsonian)

Theodore Van Duzer, **Professor Emeritus.** Superconductor Electronics. Research Profile [here](http://vcresearch.berkeley.edu/faculty/theodore-van-duzer)

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William J. Welch, **Professor Emeritus.** Nano-Optoelectronics, Electromagnetics/Plasmas. Research Profile [here](http://vcresearch.berkeley.edu/faculty/william-j-welch)

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Eugene Wong, **Professor Emeritus.** Communications & Networking (COMNET). Research Profile [here](http://vcresearch.berkeley.edu/faculty/eugene-wong)

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**Business Administration Faculty**

Cameron Anderson, **Professor.** Status hierarchies, psychology of power, self and interpersonal perception. Research Profile [here](http://facultybio.haas.berkeley.edu/faculty-list/anderson-cameron)

Ned Augenblick, **Assistant Professor.** Theoretical and empirical analysis of online markets. Research Profile [here](http://facultybio.haas.berkeley.edu/faculty-list/augenblick-ned)
Aaron Bodoh-Creed, Assistant Professor. Industrial organization, market design, psychology and economics. Research Profile (http://facultybio.haas.berkeley.edu/faculty-list/bodohcreed-aaron)

Severin Borenstein, Professor. Energy policy and climate change, electricity deregulation, airline competition, oil and gasoline market pricing and competition. Research Profile (http://facultybio.haas.berkeley.edu/faculty-list/borenstein-severin)

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Jennifer Chatman, Professor. Organizational culture and firm performance, group demographics, norms in social groups. Research Profile (http://facultybio.haas.berkeley.edu/faculty-list/chatman-jennifer)

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Carl Shapiro, Professor. Design and use of patents, anti-trust economics, intellectual property and licensing. Research Profile (http://faculty.bio.haas.berkeley.edu/faculty-list/shapiro-carl)

Stephen Shortell, Professor. Organizational correlates of quality and outcomes of care, evaluation of total quality management and community-based health improvement initiatives. Research Profile (http://sph.berkeley.edu/stephen-shortell)

Nora Silver, Adjunct Professor.

Richard Sloan, Professor. Accounting information and stock returns, earnings management, role of analysts and auditors as information intermediaries. Research Profile (http://faculty.bio.haas.berkeley.edu/faculty-list/sloan-richard)

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Research Profile (http://facultybio.haas.berkeley.edu/faculty-list/stanton-richard)

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David Teece, Professor. Role of product and process development, intellectual property, competitive performance, innovation and organization of industry.
Research Profile (http://facultybio.haas.berkeley.edu/faculty-list/teece-david)

Laura Tyson, Professor. Changes in global economy, emerging market economies, US trade policy.
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James Wilcox, Professor. Banking, business conditions, conversions.
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Candace Yano, Professor. Supply chain management, service systems management, production-quality interface issues, marketing-production interface issues.
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Morten Hansen, Affiliated Professor.

Robert Merges, Affiliated Professor.

Lecturers

Wasim Azhar, Continuing Lecturer.

Homa Bahrami, Senior Continuing Lecturer.

Cristina Banks, Senior Continuing Lecturer.

Sara Beckman, Senior Lecturer SOE.

Steven Blank, Continuing Lecturer.

Rada Brooks, Continuing Lecturer.

David Charron, Continuing Lecturer.

John Danner, Continuing Lecturer.

Timothy Dayonot, Senior Continuing Lecturer.

Stephen Etter, Continuing Lecturer.

William Falik, Continuing Lecturer.

William Fanning, Continuing Lecturer.

C. Sean Foote, Continuing Lecturer.

Peter Goodson, Continuing Lecturer.
Ernest Gundling, Continuing Lecturer.
Lynne Heinrich, Continuing Lecturer.
Daniel Himelstein, Continuing Lecturer.
Andrew Isaacs, Senior Continuing Lecturer.
Arina Isaacson, Continuing Lecturer.
Gregory La Blanc, Continuing Lecturer.
Samuel Olesky, Continuing Lecturer.
Arturo Perez-Reyes, Continuing Lecturer.
John (Jack) Phillips, Continuing Lecturer.
Mark Rittenberg, Continuing Lecturer.
David Robinson, Senior Continuing Lecturer.
Alan Ross, Continuing Lecturer.
Leo Helzel, Adjunct Professor Emeritus.
Hayne Leland, Professor Emeritus.
James Lincoln, Professor Emeritus.
Robert SN, Associate Professor Emeritus.
Robert Edelstein, Professor Emeritus.
Edwin Epstein, Professor Emeritus.
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Mark Garman, Professor Emeritus.
Michael Gerlach, Associate Professor Emeritus.
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Robert Aaker, Professor Emeritus.
K. Roland Artle, Professor Emeritus.
Alan Cerf, Professor Emeritus.
Alan Ross, Continuing Lecturer.
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Lynn Upshaw, Continuing Lecturer.
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Joseph Garbarino, Professor Emeritus.
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Rashi Glazer, Professor Emeritus.
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