Overview of the Electrical Engineering and Computer Sciences Department at UC Berkeley

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A Brief History of EECS at UC Berkeley

- 1868: UC Berkeley chartered with Colleges of Mechanic Arts, Mining and Civil Engineering
- 1875: Frederick Hesse appointed to head the College of Mechanic Arts
- 1892: Dean Hesse hired Clarence Cory as assistant professor of mechanical and electrical engineering.
- 1890s: Cory and Joseph LeConte installed electrical equipment for research, and extended service to supply light and power to the entire campus from the laboratory plant.
- 1901: Cory made dean of the College of Mechanics (until 1930)
- 1930: Colleges of Mechanics and Civil Engineering were combined to form the College of Engineering, containing the Department of Mechanical and Electrical Engineering.
- 1942: College of Mining was merged into the College of Engineering, containing the Division of Electrical Engineering.
- 1950: Cory Hall was completed and named after Clarence Cory.
- 1958: Division of Electrical Engineering became the Department of Electrical Engineering.
- 1968: Dept. of Computer Science was established in the College of Letters and Science.
- 1973: Department of Electrical Engineering and Computer Sciences was formed from a merger of EE and CS departments.

http://www.eecs.berkeley.edu/department/history.shtml
EECS @ UC Berkeley Today

• ~100 affiliated faculty, plus >20 active emeriti faculty, professors in residence and adjunct professors
  • We teach >95% of all student credit hrs within the dept!
  • >10 winners of UCB Distinguished Teaching Award

• ~550 graduate students
  • ~55% EE, ~45% CS

• ~2,000 undergraduate students
  • includes ~750 upper-division students in the College of Letters & Science Computer Science program
Information Science and Technology

Software
- integrated products
- application HW/SW
- system software
- logic / architecture
- circuits
- devices
- structures
- materials
- physics

Hardware

Technology
Academic Reputation

Undergraduate Programs:
Electrical/Electronic/Communications Engineering
#1: MIT   #2: Stanford   #3: Berkeley
Computer Science
#1: Berkeley/CMU/MIT/Stanford (4-way tie)

Graduate Programs:
Electrical/Electronic/Communications Engineering
#1: Berkeley/MIT/Stanford (3-way tie)
Computer Science
#1: Berkeley/CMU/MIT/Stanford (4-way tie)
Our Mission

• Educate future leaders in academia, government, industry and entrepreneurial pursuit, through a rigorous curriculum of theory and application that develops the ability to solve problems, individually and in teams.

• Create knowledge of fundamental principles and innovative technologies, through research within the core areas of EECS and in collaboration with other disciplines, that is distinguished by its impact on academia, industry and society.

• Serve the communities to which we belong, at local, national and international levels, with an awareness of our ethical responsibilities to our profession and to society.
Undergraduate Programs

Two programs in two Colleges, one mission:

• BS in EECS (College of Engineering)
  • Greater emphasis on physics and math
• BA in CS (College of Letters and Science)
  • Greater emphasis on humanities and social sciences

The major coursework is the same!
EECS/CS Major Coursework

Deep Upper Division

- Theory
- Artificial Intelligence
- Graphics and HCI
- Databases
- Computer Systems
- Security
- Networking
- Architecture

Other Requirements:
- College breadth
- Ethics
- Electives

Broad Lower Division

- CS61A
- CS61B
- CS61C
- CS70
- EE20
- EE40
Lower Division Courses

• EE
  • EE 20N: Structure and Interpretation of Signals and Systems
  • EE 40: Introduction to Microelectronic Circuits

• CS
  • CS61A: Structure and Interpretation of Computer Programs
  • CS61B: Data Structures

• EECS
  • CS61C: Great Ideas of Computer Architecture
  • CS70: Discrete Math and Probability
Undergraduate Instructional Laboratories

Electronics Design Lab
(Cory Hall)

Computing Lab
(Soda Hall)
Culture: Competition vs. Collaboration

- Project focus → teamwork
- Rigor and balance
Faculty – Student Contact

- Every EECS course is taught by a professor

- Each undergraduate student selects a faculty advisor to meet each semester

- Faculty and TA office hours held weekly

- Undergraduates can participate in research projects

- Faculty-student social events

Sample web page from HKN, the student honor society which manages course evaluations.

<table>
<thead>
<tr>
<th>Classes Taught</th>
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<tbody>
<tr>
<td>Sections</td>
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<tr>
<td>EE130 Fall 2013 Section 0</td>
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<tr>
<td>EE230A Fall 2013</td>
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<tr>
<td>EE230M Spring 2013</td>
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<tr>
<td>EE40 Fall 2003</td>
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<tr>
<td>EE130 Spring 2003</td>
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</tbody>
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Research Poster Session

Undergraduate Social Hour
A History of Innovation in Addressing Societal-Scale Problems through Technology

Use-Inspired Fundamental Research

Societal Drivers

Technology Creation

Engineering Science
The Marvell Nanofabrication Laboratory
Distribution of Membership (474 total)

- Bioelectronics
- Optoelectronics
- Nanoelectronics
- Quantum dot growth
- Nanowire growth
- MEMS

- EEECS
- Other UC 4%
- Other Univ. 3%
- LBNL 7%
- BNLA 11%
- MatSci 6%
- Physics 8%
- MCB 0%
- BioE 2%
- ChemE 4%
- Chemistry 6%
- MechE 21%
- EECS 28%

15 nm FinFET (2001)
Berkeley Wireless Research Center

- Established January 1999
- A Partnership of UC Researchers, Industry & Government

Industry members:
- Intel Corporation
- STMicroelectronics
- Infineon Technologies
- Agilent Technologies
- NXP Semiconductors
- Marvell Semiconductor
- Qualcomm, Inc
- Samsung Electronics
- Fujitsu Laboratories
- Toshiba Corporation
- Nokia Research
- Panasonic Research
- KETI, Korea
- National Instruments
- InterDigital, Inc
- Robert Bosch LLC

Low-Power 60GHz Transceiver

View of BWRC from outside

View of BWRC from inside
Design and deployment of new technologies for emerging regions:

- Rural network coverage (long-distance low-cost links based on WiFi)
- Telemedicine
- Education
- Power issues (low-power network/computing, low-cost power)

- Funded by the National Science Foundation, with support from Intel, HP, Microsoft, United Nations Development Programme, IIT Delhi, IIT Kanpur, Grameen Bank, Markle Foundation
Industry Partnerships

Benefits to industry:
• Innovative ideas and research results
• Access to top students and faculty

Benefits to university:
• Insight into problems faced by industry and society
• Application of research to solve real-world problems

✓ Ongoing collaboration & knowledge transfer
✓ Mutual goals
✓ Shared leadership
✓ Commitment to long-term strategic partnership

Industry

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UC Berkeley
Industrial Affiliates

- Pixar
- Qualcomm
- National Semiconductor
- Amazon
- Mentor Graphics
- Microsoft
- IBM
- Vodafone
- Intel
- Agilent Technologies
- PARC
- Google
- Synopsys
- DUST Networks
- Linear Technology
- BDTi
- Yahoo!
- Sandia National Laboratories
- Adobe
- Xilinx
- Lockheed Martin
- Hitachi Global Storage Technologies
Creating industries, not just companies
According to industry leaders, Berkeley grads:

“... stand out” as “self-starters” who “graduate with street smarts.”

“... have more of a go-get-it attitude or a can-do attitude” than graduates from some other top schools.

“... form a very diverse mix of students, from a wide range of backgrounds.”

..and (we hope)

exhibit honesty, leadership, courage, consideration for humanity, and high standards of professional ethics.
Summary

• EECS spans Information Science and Technology
  ▪ Our integrated EE and CS undergraduate program offers students flexibility, with an emphasis on teamwork and research opportunities

• Berkeley EECS is a vibrant and dynamic community, distinguished by its impact on academia, industry, and society.
  • Strong tradition of collaboration