Materials Science and Engineering
at the
University of California, Berkeley

Prof. Daryl C. Chrzan, Chair
Prof. Lane W. Martin, Vice Chair
MSE @ UC Berkeley – Virtual Cal Day 2020
1868 – Charter Year for UC Berkeley
• Initially Three Technical Colleges
  • College of Mining  MSE is 152 years old!
  • College of Mechanics
  • College of Civil Engineering

Pheobe Apperson Hearst (1842-1919)
• Married George Hearst; one son (William Randolph)
• First woman Regent of UC
• 1891 – Funds scholarships for women @ Cal
• 1891 – Funds competition for “campus architectural plan”
• At Oxford University, at the time strapped for funds, a Latin orator said:

"There is brought a report that in California there is already established a
university furnished with so great resources that even to the architects (a lavish
kind of men) full permission has been given to spare no expense. Amidst the most
pleasant hills on an elevated site, commanding a wide sea view, is to be placed a
home of Universal Science and a seat of the muses."

Without materials, there is no engineering
John Galen Howard
• Funded with $900,000 (>22M today) from Pheobe Apperson Hearst to erect first building under architectural plan

Dedicated in memory of George Hearst “a plain honest man and a good miner”
Ludwig Eduard Boltzmann
• Austrian physicist/philosopher; statistical mechanics
• Visited and taught during summer of 1905
• Quoted as saying about Berkeley…

“The loveliest place one can imagine”

“Unlike Berkeley, Stanford University is laid out in a unified, architecturally attractive scheme that seems to me quite unsuitable for educational purposes.”

from “A German Professor’s Trip to el Dorado” – Boltzmann
Published in Physics Today
Reason No. 1: Outstanding Educational Program

UC Berkeley
- #1 (or 2!?!?) Public University (USNWR, Acad. Ranking of World Univ. – #5 overall)
  *UCLA = #11 (Acad. Ranking of World Univ.)

UC Berkeley / College of Engineering
- #3 Engineering school in the world (USNWR)

Materials Science & Engineering Dept.
- #4 / #2 Ugrad/Graduate (USNWR)
- #5 Program (QS World University Rankings)
- #2 Program (Shanghai Rankings)

Students obtain a cutting-edge education grounded in critical foundational concepts and mixed with state-of-the-art information on:

- Ceramics
- Metals
- Polymers
- Electronic Materials
- Biomaterials

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Undergraduate program:

- **Incoming class size**: 45-50
- **Total** = **170-180** (B.S. + Joint)
  - MSE Major: 144
  - Joint Majors: 20 → MechE, ChemE, EECS, BioE, NE
- **Top students, striving for greatness**
  - SATs: 600-800 (averages in 700s)
  - Average GPA: 4.51/4.0
  - Comprehensive review to find the best
- **Incoming class make-up (typical)**
  - Male – 65.7% | Female – 34.3%

Graduate program: 142 Ph.D., 31 M.S. students
Reason No. 3: Outstanding Educators

Faculty size - 18 (core)
- 3 Asst. Professors
- 2 Assoc. Professors
- 13 Professors
- 7 Named Professors
- 6 Nat. Acad. of Eng.
- 3 Nat. Acad. of Sci.
- 3 PECASE
- 1 MacArthur “Genius”
A world-class education and research opportunities with leaders in the field

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Because continuing educational improvement is our goal → a center for MSE education innovation

Faculty-taught courses, cutting-edge concepts brought into the classroom, experts in the classroom and beyond

Hosted the 7th North American Materials Education Symposium
Reason No. 4: Excellent Student Advising and Service

MSE Student Services Advisors

Ms. Ariana Castro  Ms. Medina Kohzad

Faculty Advisors

Prof. Tom Devine  Prof. Kevin Healy  Prof. Junqiao Wu  Prof. Ting Xu  Prof. Lane Martin

• In-house Student Services Advisor → Your advocate and a “one-stop” for all academic needs
• Each year there is a committee of advisors available to you
• Open-door policy, advising before scheduling, one-on-one advising sessions as needed, etc.
• Engineering Student Services in COE

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Reason No. 5: World-Class Research

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Reason No. 6: Excellent Opportunities for Undergraduate Research

Outstanding research facilities

Outstanding students doing cutting-edge work

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Reason No. 7: Excellent Facilities and Resources

- North Reading Room
- Doc Library
- Kresge Engineering Library
- Makerspace, Jacobs Hall
- Undergraduate teaching laboratory facilities

Without materials, there is no engineering
### Reason No. 8: Career Opportunities

#### Jobs
- Alphabet Energy*
- Amazon
- Apple
- Applied Materials
- Bayer Healthcare
- Baxter
- Biotech Company
- Boston Consulting Gp.
- BP
- CBRITE
- Chevron
- Dow
- DPR Construction
- Dupont
- EnerNOC
- Exponent
- Exxon
- First Solar
- Form Factor
- Google
- Hewlett Packard
- Intel
- Imerys
- Imprint Energy*
- Jet Propulsion Lab.
- Johnson & Johnson
- Lam Research
- Lockheed Martin
- Micron Technology
- Millipore Sigma
- Northrup Grumman Sp.
- PlantPV
- Primus Power
- SpaceX
- Tesla
- Thermo Fisher Sci.
- Valero

#### Graduate Schools
- Caltech
- Cambridge
- Carnegie Mellon
- Columbia Univ.
- Cornell Univ.
- GaTech
- Harvard
- MIT
- Northwestern
- Oxford
- Purdue Univ.
- Stanford
- UC Berkeley
- UC Irvine
- UCLA
- UCSB
- UCSD
- Univ. of Florida
- Univ. of Illinois, Urbana-Champaign
- Univ. of Michigan
- Univ. of Minnesota
- Univ. of Pennsylvania
- Univ. Southern Cali.

#### Professional Schools
- Law – Univ. of Michigan, Univ. of New Mexico
- Finance – UC Berkeley

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**Break down:** 40-50% Jobs | 40-50% Graduate School (Tech.) | 5-10% Other
Reason No. 9: Close-knit Departmental Community

• A “small school” feel, in a “big school” environment
• Peer-to-peer support → MSEA, advising, mentoring, information…
• Opportunities to get involved → Expand your horizons
• Opportunities to give back to your community

Find your home in MSE @ UCB
Reason No. 10: Because you can never start working on getting that great parking spot too early...

The only school with enough Nobel Laureates to have to have a special parking permit for them...

Without materials, there is no engineering
Tailoring your education to you...

Reworked curriculum in MSE

- New curriculum designed to provide flexibility – reduced requirements, increased electives → You decide what you want to learn in upper level

5 Year B.S. / M.S.

- For MSE @ UC Berkeley undergraduates only
- Unique program → 4 (B.S.) + 1 (M.S.) year program
- Professionally oriented → Prepares students for careers in eng./eng. management within business, government, industrial sectors
- Interdisciplinary study → independent research coupled to coursework
- Individualized education in research/presentations and professional development (resumes, interviewing, negotiating, …)

Joint Majors and Minors

- Stand at the intersection of fields and disciplines
- Different from Double Majors, designed to be completed in 4 years
- MSE + MechE, ChemE, EECS, BioE, NE | Minors in many fields
### We take the value of education seriously...

<table>
<thead>
<tr>
<th></th>
<th>UC Berkeley Residents</th>
<th>UC Berkeley Non-Residents</th>
<th>Stanford (2019-2020)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition and fees</td>
<td>$14,254</td>
<td>$44,008</td>
<td>$52,857</td>
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<tr>
<td>Books &amp; supplies</td>
<td>$870</td>
<td>$850</td>
<td>$1,245</td>
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<tr>
<td>Room &amp; board</td>
<td>$17,220</td>
<td>$17,220</td>
<td>$16,433*</td>
</tr>
<tr>
<td>Personal &amp; Misc.</td>
<td>$1,876</td>
<td>$1,876</td>
<td>$2,130</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$34,220</strong></td>
<td><strong>$63,954</strong></td>
<td><strong>$72,665</strong></td>
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<tr>
<td><strong>ESTIMATED COSTS</strong></td>
<td><strong>(dorm)</strong></td>
<td><strong>(dorm)</strong></td>
<td><strong>(dorm)</strong></td>
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</tbody>
</table>

*Standard allowance for all aid applicants; actual may be higher

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A University built by the people, for the people of California, the Nation, and the World...
### 5 Year B.S. / M.S.

For MSE & UC Berkeley undergraduates only

- **4 (B.S.) + 1 (M.S.) year program** → unique program
- M.S. → professionally-oriented, prepares students for careers in eng./eng. management within the business, government, and/or industrial sectors
- Emphasizes interdisciplinary study → independent project coupled to coursework

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**Semester 1: 17 Units**

- Chem. 1A(L) or 4A (4)
- Math 1A (4)
- Reading & Comp. A1 (4)
- MSE 45 + MISE 45L (3+1)

**Semester 2: 15-16 Units**

- Chem 1B(L) (4)
- Math 1B (4)
- Phys. 7A (4)
- Humanities/Social Sci. (3-4)

**Semester 3: 16 Units**

- E 7 (4)
- Math 53 (4)
- Phys. 7B (4)
- Reading & Comp. B1 (4)

**Semester 4: 15 Units**

- MSE 151 (3)
- Phys. 89 (4)
- Humanities/Social Sci. (3-4)
- Math/Stats/Data Elect. (3-4)*

**Semester 5: 16-17 Units**

- E 40 (4)
- MSE 102 (3)
- ME C85 (3)
- Eng. Elective (3-4)

**Semester 6: 14 Units**

- MSE 103 (3)
- MSE 104 (4)
- MSE 111 (4)
- Humanities/Social Sci. (3-4)

**Semester 7: 15-17 Units**

- MSE 130A (3)
- MSE 12X (3)
- MSE 112 (3)
- Humanities/Social Sci. (3-4)

**Semester 8: 15-17 Units**

- Elective (3)
- Elective (3)
- Elective (3)
- Elective (3-4)

*Semester 5 – Select one of the following: Eng. 117; Any upper division Math course (excluding 151, 152, 153, 160, and anything 190 and higher); Any upper division Stats course (excluding 157 or anything 190 and higher); IEOR 172; Data Science 100

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Thank you for your time.

Questions?