Welcome

Engineering Insights 2008
UC Santa Barbara works with corporate affiliate member companies, facilitating the highest level of access and partnership with faculty, students, and campus leadership to further collaborations in research, recruiting, and facility usage.

**Creating opportunities by**
- Increasing your visibility
- Hosting you for a day of interaction

**Facilitating your connection to:**
- Top undergraduate and graduate students
- Internationally-renowned faculty
- State of the art facilities
- Senior department and school administration

**Leveraging your investment in:**
- Scholarship and student support
- Recruiting events

Visit the Corporate Affiliates Table in the tent to learn more
UC Santa Barbara
Engineering

Mission

To educate the next generation of technology leaders.

To leverage our interdisciplinary and entrepreneurial strengths to create breakthroughs in knowledge and in technology that illuminate major issues and address pressing needs of society.
College of Engineering
Facts and figures to know...

- 146 faculty
- 10 graduate programs
- 674 graduate students
- 1319 undergraduate students
- $90M+ research expenditures FY2007
- 24 Interdisciplinary research centers and Institutes
- 153 CA companies putting UC Santa Barbara research to work.
- 175 high technology start-ups
Unique attributes that give us an advantage

**Entrepreneurial Culture**
- Identify opportunities and react quickly
- Combine disciplines to solve complex problems
- Leverage expertise to discover innovative solutions
- Move discoveries beyond the laboratory

**Interdisciplinary Approach**
- Unique attributes that give us an advantage

**Industry Alliance**
- UCSB Connections with California R&D Firms
  - 153 Companies Put UC Research to Work

**Technology Leadership**
Faculty are recognized as leaders in their fields

- #1 in US – % of faculty in National Academy of Engineering
- Faculty represent some of the most highly cited (# citations per paper) in their fields: (ISI Thomson, Academic US ranking)
  - Materials science, #1 (FY00–04)
  - Mechanical engineering, #3 (FY99–03)
  - Engineering, #2 (FY97–01)
  - Electrical and electronic engineering, #1 (FY98–02)
  - Conducting polymers, #1 (FY91–00)
  - Nanotechnology research, #3 (FY92–02)
  - Wireless/Mobile Networks, #11 (FY95–05)
- Papers authored by UC Santa Barbara lead the UC system in impact (Thomson Scientific)
- Notable faculty distinctions:
  - 2 Nobel Laureates (4 total in the Engineering and the Sciences)
  - 27 members of the National Academy of Engineering
  - 7 members of the National Academy of Sciences (26 total in Engineering and the Sciences)
- Over 30% of Engineering faculty have worked in start-up ventures
- Over $7 billion in M&A and over $650 million in venture funding for UCSB spin-offs in past 36 months
Areas where current COE activities will transform society

**Interdisciplinary Work**

- New Materials Research, Wide-Band-Gap Semiconductors
- Institute for Collaborative Biotechnologies, Systems Biology
- Nanotechnology
- Electronics and Photonics
- Control and Dynamical Systems; Computational Science and Eng’ng
- Technology Management

**Long-Term Results (5–10 years)**

- Solid State Lighting Aimed at Replacing the Light Bulb, Energy Efficiency.
- Nano–Electronics and Photonics; New Means of Energy Conversion, Generation and Storage/
- Optical Communications, Silicon Photonics, New Ways of Computing, Spintronics.
- Energy Efficient Buildings, Networks, Data Centers
- Business and Management Education Integrated with Technology: A New Model for Master’s Degree in Business
Technology Leadership

College of Engineering’s Technology Management Program (TMP)

Mission:
Create a world class technology management program within UC Santa Barbara’s COE to educate and prepare men and women for leadership positions in new, early stage and growth oriented technology driven companies; to create and advance new knowledge; and to influence the future direction of technology management and entrepreneurial education and practice for the benefit of society. The aim over the next few years is to build the curriculum of Technology Management into a distinctive and nationally recognized brand of business and management education. The Technology Management Masters Degree will be a one-year program, aimed to accelerate the careers of engineers, scientists and others entering or working in the technology business sector.
Solid State Lighting and Display Center

Focus on advancing new semiconductor–based energy efficient lighting and display technologies through partnerships with key industry leaders. 2000 Nobel Prize winner, Herb Kroemer, conceived of practical applications for semiconductor heterojunctions, making applications such as solid–state lighting, CD players and cell phones possible.

Includes 10 International Corporations

Over $35 million in funding

Mitsubishi Chemical – Center for Advanced Materials at UC Santa Barbara

Unique industry collaboration between Mitsubishi Chemical and UCSB – clear research alignment with potential product outcomes.

Over $22 million committed, leveraged by UC Discovery grants

40+ patent disclosures to date – 86% improvement over current investments in technology inventions for research institutions.
Institute for Collaborative Biotechnologies

World-renowned researchers in the fields of bio-inspired technology and bio-engineering focused on tackling big issues with broad applications.

Over $50 million in funding from ARMY Research Office grant, academic participation led by UC Santa Barbara and includes MIT and California Institute of Technology. Renewal confirmed for five more years at $70 million.

Includes 9 Industry collaborators and 3 Government agencies
What is UC Santa Barbara’s distinctive role in the global approach to energy issues?
The Facts

- **Some facts are undisputed.** The energy crisis is more about demand than supply.

- About 80% of energy needs are now supplied by burning hydrocarbons (oil, coal and natural gas).

- Though the annual production rate of hydrocarbons may peak in the next few decades, the duration of the supply is several hundred years.
The High Cost of Cheap COAL

Coal is king again. Oil supplies are tight and natural gas prices are spiking, but coal could light our houses and power our factories for centuries. The price of this energy abundance could be high, however, as two stories on the following pages show. The Coal Paradox surveys the threat to global climate that legions of new coal-burning power plants would pose—a threat that new technologies could blunt. When Mountains Move describes a different hurt, for which there is no cure: landscapes and communities ravaged by our hunger for cheap coal.

The cleanest power plant is the one you don’t build

RAW POWER | Utah’s Hunter plant burns 14,000 tons of coal daily, generating enough electricity for a small city. Steam wafts from 600-foot stacks along with tens of thousands of tons of climate-warming CO₂ a day.
The Facts

• Reliance on fossil fuels, among its many ill effects, produces
  – (a) the release of about 7 billion tons of carbon into the atmosphere each year, and
  – (b) export of US wealth at a rate of $1 billion per day (assuming $90/barrel).

• Demand is why oil and gasoline prices have climbed so high.
The Facts

• Demand outside the U.S. is increasing even more rapidly than it is here, especially in the developing world.
Announcing:
The Institute for Energy Efficiency at UC Santa Barbara
John Bowers, Director
UC Santa Barbara
Institute for Energy Efficiency

Focus Areas of Technology

**Lighting and Displays**
- Illumination
- Display of information

**Computing and Networks**
- Data computation and delivery
- Energy-efficient electronics
- Energy-efficient networking

**Energy Conversion, Transmission and Storage**
- Photovoltaics
- Thermoelectrics
- Catalysis
- Batteries
- Fuel cells

**Dynamics of Energy Efficiency**
- Integrated building systems
- Energy harvesting and off-grid generation
- Data centers

**Transportation Materials**
- Ultrahigh temperature systems
- Ceramic composites, intermetallics and barrier coatings

Encompassing more than $10 million annual research activity