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Grand Challenges

• Three major Forces
  – World Population Growth (7 Billion people)
    • Energy/Environment
    • Infrastructure
    • Poverty
    • Water
  – Global Market Economies
  – Telecommunications and Aviation Revolution

I-35 Bridge Collapse - Minnesota
The BIG Problem is Over-Consumption

- In about 50 years, we have exhausted about half of a resource (oil) that it has taken 100 million years to create.
- Most productive wells in depletion. Discoveries of an additional 5 mbd needed just to break even.
- Exporter countries are developing a thirst for oil. More than 3 mbd of production will come off line just to support the domestic consumption in OPEC countries, Mexico and Russia.
Who Are We?

UCI Engineering At a Glance

• 22\textsuperscript{nd} Ranked Public Engineering Program
• Ranked 39\textsuperscript{th} overall by USNWR – Grad
• $78M in Research Expenditures
• Average incoming engineering
  \textbf{SAT scores} — 639 (85\textsuperscript{th} Percentile)
  \textbf{GRE scores} — 758/800 (95\textsuperscript{th} Percentile)

Enrollment

• 2793 UG students
• Total Enrollment \textbf{3585}
• 12 Engineering programs (11 accredited)
• 112 Faculty
• 5 Departments
The highest ranked Public engineering programs in the country with less than 125 faculty. Overall only Seven institutions ranked higher. Avg tuition of these 7 is ($37,422)

- 12 National Academy members. 1/3 of faculty are Fellows of key societies
- Nations Largest Micro-Fluidics Center
- Nations Largest Fuel Cell Research Center
- Nations best Biophotonics Institute (Beckman Laser)
- Most Innovative Cardiovascular Center (Edwards LifeSciences)
Strategic Vision of the School of Engineering:

**Vision: Excellence and Distinction in Research and Educational Programs**

- **Partnerships for Success:** with Industry, Our Alumni, other Units on campus and key Universities
  - Partnerships with Key Industrial partners and NGO’s
  - Novel Partnerships with SoB, SoM, SoPS, and other Schools
  - Novel Partnerships with Global universities and alumni
  - Better partnerships and training for staff

- **Competitive Distinction thru Experiential Learning** will produce commercially productive students
  - Student project groups as a platform for experiential learning
  - Collaborations with innovative companies for experiential learning
  - Globalization of the SoE curriculum
  - Establish the First Year Engineering Program

- **Focus Research and Innovation:** focused on programmatic thrust related to engineering challenges
  - Develop process to Identify 3 focused thrust
  - Process for increasing success for large block grant proposals
  - Develop novel strategies to improve research
  - Develop IP Ecosystem to turn ideas into IP

- **Reinvent and Retool the brand:** Rebrand engineering as the technology and innovation campus
  - Novel Marketing techniques
  - Benchmark competitors to improve perception
  - Develop Surveys to highlight strengths and weaknesses
  - Differentiation from other UC Schools
  - Short course, certificate and distance learning program development

- **In Alignment with current strategic plan**
Key Metrics

**Number of Undergrads**
- 33% Increase in 5 years

**Number of Graduate Students**
- 22% Increase in 5 years

**Research Expenditures**
- 32% Increase in 5 years
Biomedical Engineering

- Number of Faculty: 21
- Number of Undergraduate Students: 578
- Number of Graduate Students: 140
- Biomedical Computational Technologies
- Biomedical Fluorescence Spectroscopy
- Biomedical Image Processing
- Biomedical Nanoscale Systems
- Biomedical Signal Processing
- Cardiovascular Technologies
- Medical Diagnostic Devices
- Micro / Nano Fluidics
- Single Cell Analysis Systems
- Tissue Engineering
- Biophotonics

Shrink Nanotechnology

Laser therapy for port-wine skin (BLI)

Microfluidic Pump (MF3)

Heart Valve Dynamics (Edwards)
Chemical Engineering and Materials Science

- Number of Faculty: 15
- Number of Undergraduate Students: 260
- Number of Graduate Students: 86
- Bio-Nano-Materials
- Biophotonics
- Ceramic Materials Engineering
- Complex fluids and Colloids
- Drug Delivery Engineering
- Environmental Microbiology and Engineering
- Molecular Biotechnology and Recombinant cell technology
- Nanostructured Materials and Nanotechnology
- Optoelectronic Devices and Materials

Lignocellulosic Biomass to Polymers and Fuels
Civil and Environmental Engineering

- **Number of Faculty:** 22
- **Number of Undergraduate Students:** 575
- **Number of Graduate Students:** 126
- Earthquake Engineering
- Hydrology/Hydrometeorology/Remote Sensing
- Smart Materials and Structures
- Structural Systems Reliability
- Sustainable built and natural environment
- Transportation Driven pollution control
- Transportation Systems Engineering
- Water and Wastewater Treatment
- Water Chemistry and Reuse
Electrical Engineering and Computer Science

- Number of Faculty: 36
- Number of Undergraduate Students: 484
- Number of Graduate Students: 306
- Analog/RF IC design
- Communications
- Computer architecture
- Embedded systems
- Nano/biotechnology
- Photonics/MEMS technology
- Power electronics
- Signal processing
- System software
- Wireless communications and networks
Mechanical and Aerospace Engineering

- Number of Faculty: 25
- Number of Undergraduate Students: 787
- Number of Graduate Students: 117
- Aerospace Systems: Propulsion and Dynamics
- Combustion and Thermophysics
- Energy Systems / Fuel Cell Technologies
- Environment and Sustainability
- Fluid Mechanics and Turbulence
- Micro/Nano-mechanics
- Miniaturization Engineering
- Optimization and Control
- Robotics and Machine Learning
- Structures and Solid Mechanics
- Systems & Design
Major Research Centers, Institutes & Facilities Affiliated with The Henry Samueli School of Engineering

- California Institute for Telecommunications and Information Technology (Calit2)
- Integrated Nanosystems Research Facility (INRF)
- California Plug Load Research Center (CalPlug)
- LifeChips
- Micro/Nano Fluidics Fundamentals Focus Center (MF3)
- Center of Excellence for Electron Microscopy
- Center for Pervasive Communications and Computing
- Center for Embedded Computer Systems
- The Edwards Lifesciences Center for Advanced Cardiovascular Technology
- Beckman Laser Institute (BLI)
- Center for Hydrometeorology and Remote Sensing
- Advanced Power and Energy Program (APEP)
  - The National Fuel Cell Research Center (NFCRC)
  - UCI Combustion Laboratory
- Institute of Transportation Studies
- Center for Advanced Monitoring and Damage Inspection