



## Changes and Trends in the College

Engineering College Council  
Kent Fuchs

April 20, 2006

### Overview

- Changes in Leadership
- Areas of Focus
  - Energy Initiative
  - Biomedical Engineering
- U.S. News Graduate Program Rankings
- Undergraduate Education
  - Curriculum Transformation
  - Experiential Learning
- Facilities
- Quantitative Progress

## President David J. Skorton



- 12<sup>th</sup> president of Cornell University, effective July 1, 2006
- President of University of Iowa, March 2003 – June 2006
- Vice President for Research and External Affairs 2000 – 2003
- Vice President Research 1992-2000
- Professor, University Iowa since 1980 - Internal Medicine, Electrical & Computer Engineering, and Biomedical Engineering
- Cardiologist
- Jazz musician

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## Department Chairs & Directors



Joel Brock, Applied & Engineering Physics



Michael Walter, Biological & Environmental Engineering



Michael Shuler, Biomedical Engineering



Paulette Clancy, Chemical & Biomolecular Engineering



James Gossett, Civil & Environmental Engineering



Charles Van Loan, Computer Science



Teresa Jordan, Earth & Atmospheric Sciences



Clifford Pollock, Electrical & Computer Engineering



Emmanuel Giannelis, Materials Science & Engineering



Lance Collins, Mechanical & Aerospace Engineering



James Renegar, Operations Research & Industrial Engineering



Timothy Healey, Theoretical & Applied Mechanics

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## Deans



Deborah Cox, Strategic Planning,  
Assessment, & New Initiatives



Betsy East,  
Student Services



David, Gries,  
Undergraduate Programs



Cathy Long,  
Administration



Marsha Pickens,  
Alumni Affairs & Development



Michael Spencer,  
Graduate Programs



Zellman Warhaft,  
Diversity & Faculty  
Promotions

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## Recent Awards

- New NAE Members
  - Toby Berger, ECE
  - Jean-Yves Parlange, BEE
- TR35-MIT Technology Review's Top 35 Researchers for 2005
  - Rajit Manohar, ECE
  - Matthew DeLisa, CBE
- MacArthur Genius Award
  - Jon Kleinberg, CS



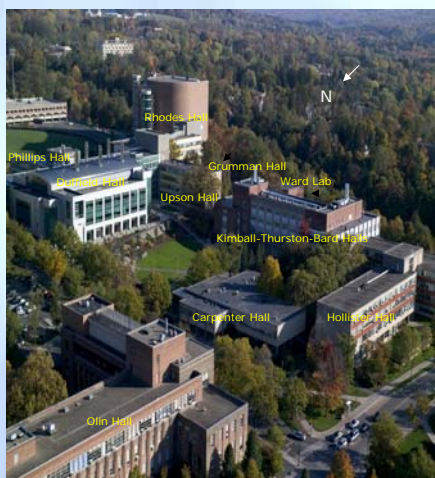
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## Changes Initiated

- **ORIE proposed name change**
  - from Operations Research & Industrial Engineering
  - to Operations Research & Information Engineering
- **Refocusing College's Office of Research and Graduate Studies**
  - Jeffrey Newman, New Director of Research and Graduate Studies
    - Infotonics Technology Center Inc.,
      - Legal Counsel, 2005
      - Director, Intellectual Property & Business Arrangements, 2003-04
    - Radiodetection Corp., Bristol, UK
      - Vice President, Intellectual Property Rights, 2001

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## College of Engineering Key Facts



- **4,150 Students (2900 BS, 400 MEng, 850 MS/PhD)**
  - **250 Faculty (215 fte)**
  - **600 Employees (Including Faculty)**
  - **14 Undergraduate Majors**
  - **21 Graduate Fields (MEng, MS/PhD)**
  - **\$160M Total Budget**
  - **\$112M Research Expenditures**
- Over Last 3 Years**
- **2000 BS Degrees Awarded**
  - **1200 MEng Degrees Awarded**
  - **625 MS/PhD Degrees Awarded**

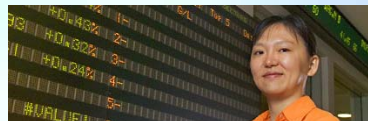
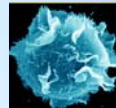
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## New Faculty in Past Three Years



## Innovation in Research

- Systems biology and biomedical engineering
- Nanomaterials, nanoscience, and nanodevices
- Energy, environment, and sustainable development
- Information, computation, and communication
- Advanced materials
- Complex systems and networks



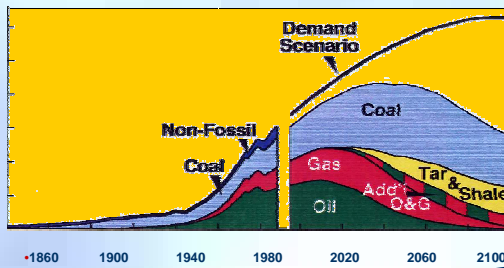
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# Energy Initiative

The College will lead in:

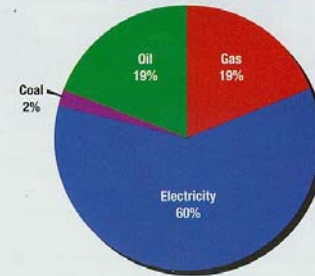
- The development of new energy systems
- Impact on the environment
  - Goal to raise a \$15M endowment
  - Search for a senior faculty member is underway

The world population in 2050 will be 50% greater than today and energy consumption will triple.



Oil and Gas Investments Up to \$200 Billion per Year  
World Energy Investment, 2001-2030

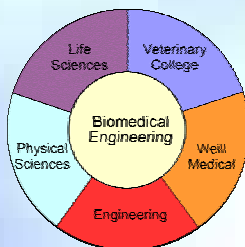
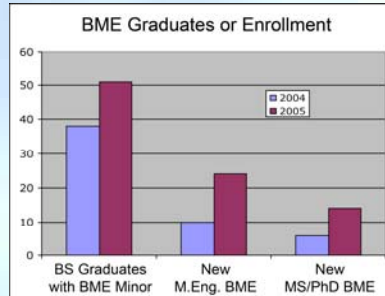
Total World Energy Investment: \$16 Trillion



Source: IEA

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# Department of Biomedical Engineering



- Combining an understanding of molecular detail and cellular behavior to create new diagnostics and therapies
- Focus on biomaterials, biomedical diagnostics, computational biology, drug design and delivery, biomedical mechanics, nanobiotechnology, imaging
- Undergraduate Minor (6 courses)
- MEng and MS/PhD Programs (10 courses)
- Diversity - 48% women and 20% under-represented minorities

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## Biomedical Engineering Goals

- Become the very best BME department in molecular/cellular imaging and nanobiotechnology
- Be the lead partner with the Weill Cornell Medical College to advance interdisciplinary research and education
- Locate the department in the New Life Sciences building
- Grow the department to 15 faculty members



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## Biomedical Engineering Faculty

- **Michael Shuler**, Professor, BME/CBE and Chair BME - Systems Biology, Design, Production & Metabolism
- **David Skorton**, Professor and President of Cornell – Biomedical Instrumentation and Diagnostics
- **Larry Bonassar**, Assoc. Professor BME/MAE and Assoc. Chair, BME - Biomedical Mechanics
- **Warren Zipfel**, Assoc. Professor, BME - Biomedical Instrumentation and Diagnostics
- **David Putnam**, Asst. Professor, BME/CBE – Biomaterials, Drug Delivery, Design, Production & Metabolism
- **Chris Schaffer**, Asst. Professor, BME - Biomedical Instrumentation & Diagnostics, Systems Biology
- **Peter Doerschuk**, Professor, BME (Starting July 1, 2006) – Systems and Computational Biology; Biomedical Instrumentation and Diagnostics
- **Cynthia Reinhart-King**, Asst. Professor, BME (Starting July 1, 2007) – Cellular Biomedical Engineering; Biomedical Mechanics

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## ORIE in New York City

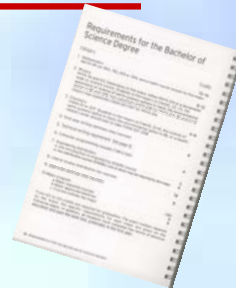
- Ithaca – NYC collaboration (Broad Street)
- Putting ideas into practice: academia, industry, end users
- Cornell Institute for Disease and Disaster Preparedness
- Impact on research, education, faculty, and students
- \$3.5M in support (\$700K internal)



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## Undergraduate Programs

- Curriculum Transformation
  - Common Core
  - Majors
- Experiential Learning
- Environmental Engineering
- ABET Accreditation Review



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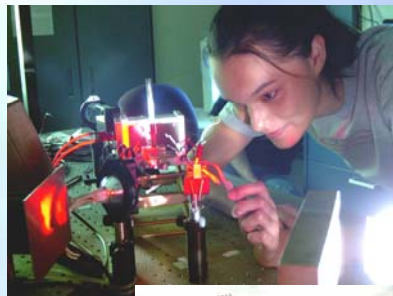
## Curriculum Transformation

- Faculty Steering Committee presented initial findings to the engineering faculty in December 2005
- A second faculty task force (Shef Baker, Chair, MSE; David Caughey, MAE; Mike Duncan, CBE; Bruce Kusse, AEP; Andy Ruina, TAM; Charles Seyler, ECE; Lisa Schneider, Learning Initiatives)

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## Goal: Every Student Participate in Experiential Learning

- International study and internships
- Cooperative Education Program internships
- Field-based programs
- Undergraduate research
- Project teams



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Example:

## International Partnerships

- Europe
  - École Centrale, France
  - Cantabria, Spain
- Asia
  - IIT Kanpur, India
  - Tsinghua Univ., China
  - Hong Kong Univ. of Science and Technology



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Example:

## Undergraduate Research 05-06

**Engineering in Action**

Real World Problems ... Innovative Solutions

**UNDERGRADUATE RESEARCH GRANTS**

For Engineering Students

**Locate a Faculty Mentor Today!**

**QUESTIONS**   
Engineering Learning Initiatives  
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167 Olin Hall  
607-255-9622  
eng-learning@cornell.edu

[www.engineering.cornell.edu/ugresearch](http://www.engineering.cornell.edu/ugresearch)

- Student Grant Program
  - \$206K (college funds and donor gifts)
  - Funded 157 students during the academic year and summer
- Faculty Grant Program
  - Goal to fund new undergraduate researchers in faculty labs
  - \$100K awarded to 23 faculty
  - Sponsoring 30 students

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Example:

## Solar Decathlon

- Designed and built 300 sq ft Solar House,
- Placed 2<sup>nd</sup> in Washington, D.C. competition
- 70 students on the team  
Engineering, Architecture, JGSM, CALS,  
Arts and Sciences, etc.....
- Funding: Cornell, DOE, friends



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Example:

## Engineers for a Sustainable World



“I work with Engineers for a Sustainable World here at Iowa, and I know that (ESW) started at Cornell.”

The Cornell Sun - 2/27/06

*David Skorton*

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Example:

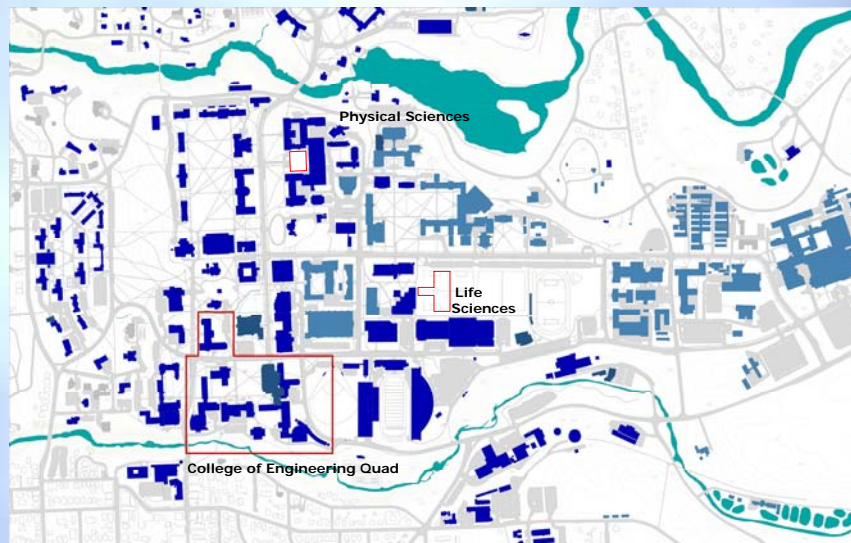
## Engineers for a Sustainable World Honduras Water Supply Project

- Improving water treatment technologies so communities can afford safe, clean water
  - Creating new knowledge with laboratory research
  - Demonstrating the technologies with a portable pilot plant
  - Building prototype plants for small communities
  - Transferring the technology to Honduran institutions



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## College of Engineering Footprint



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## Participating in New Facilities

- Nanosciences
- Life Sciences
- Physical Sciences
- Information Sciences



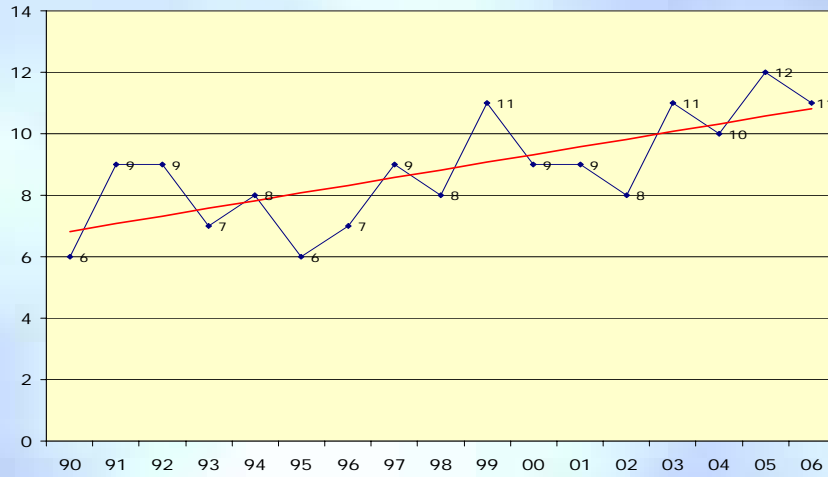
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## Information Sciences Building

- \$25M gift from Bill and Melinda Gates Foundation
- Computer Science, Information Sciences, Computational Biology, Computer Graphics, Theory Center, Operations Research
- Project Feasibility 60K – 150K NSF; \$50M - \$125M
- Further study of site capacities and resulting program scope in progress
- Student accessibility to site is a primary consideration

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## Cornell Engineering Graduate Rank in U.S. News



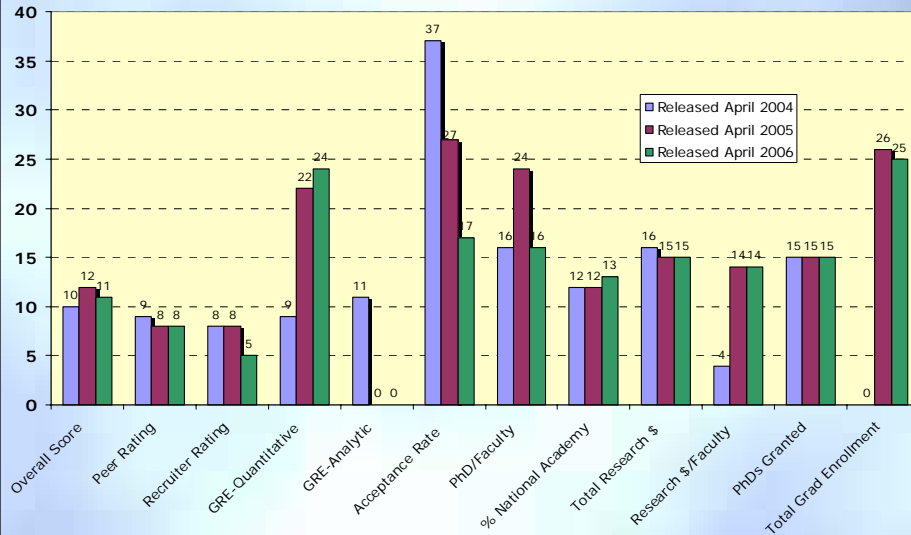
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## U.S. News Top Engineering Graduate Schools - Released April 2006

Rank	School	Score	Peer	Recruiter	GRE	Rate	PhD Stdn	%Nat.	Research Expenditures		PhD's	05 Total
					Quant	Accept.	Per Faculty	Acad.	Total	Per Faculty	Granted	Grad Enrollment
1	MIT	100	4.9	4.8	775	25.4%	4.4	13.2%	\$ 224.8	\$ 622.7	273	2,717
2	STANFORD	95	4.9	4.6	778	35.8%	5.1	14.8%	\$ 142.7	\$ 689.3	260	3,218
3	UC-BERKLEY	86	4.8	4.6	773	17.5%	4.5	21.0%	\$ 118.0	\$ 477.8	201	1,694
4	GEORGIA TECH	85	4.5	4.3	760	33.8%	4.1	5.0%	\$ 202.2	\$ 426.6	275	3,685
5	U OF ILLINOIS	82	4.5	4.3	773	19.9%	4.1	2.2%	\$ 195.8	\$ 473.0	220	2,507
6	PURDUE	80	4.2	4.1	751	36.5%	4.0	5.1%	\$ 221.6	\$ 676.0	183	2,273
6	U OF MICHIGAN	80	4.5	4.1	770	42.3%	4.4	4.0%	\$ 157.4	\$ 507.6	226	2,390
8	CMU	78	4.3	4.3	772	24.8%	4.4	8.6%	\$ 142.3	\$ 711.7	136	1,570
9	USC	76	3.7	3.6	749	48.5%	5.7	14.1%	\$ 157.4	\$ 965.4	91	3,560
10	CAL TECH	75	4.7	4.6	790	10.9%	5.3	10.1%	\$ 51.2	\$ 538.5	74	577
11	<b>CORNELL</b>	73	4.3	4.3	760	22.4%	4.2	8.7%	\$ 112.2	\$ 544.8	116	1,234
11	UC-SAN DIEGO	73	3.8	3.9	764	21.8%	4.9	11.0%	\$ 128.8	\$ 805.2	68	1,147
13	U OF TEXAS	69	4.2	4.1	760	28.6%	3.7	8.8%	\$ 106.9	\$ 464.6	143	2,059
14	TEXAS A&m	68	3.7	3.7	740	44.4%	3.0	3.5%	\$ 179.0	\$ 675.4	148	2,187
15	UC - LOS ANGELES	66	3.7	3.8	766	34.6%	5.2	11.4%	\$ 88.3	\$ 605.1	137	1,256
15	U OF MARYLAND	66	3.6	3.7	760	24.0%	4.5	5.3%	\$ 145.3	\$ 637.1	149	1,943
15	U OF WISCONSIN	66	4.1	3.8	779	21.2%	3.4	4.5%	\$ 123.2	\$ 528.9	72	1,517

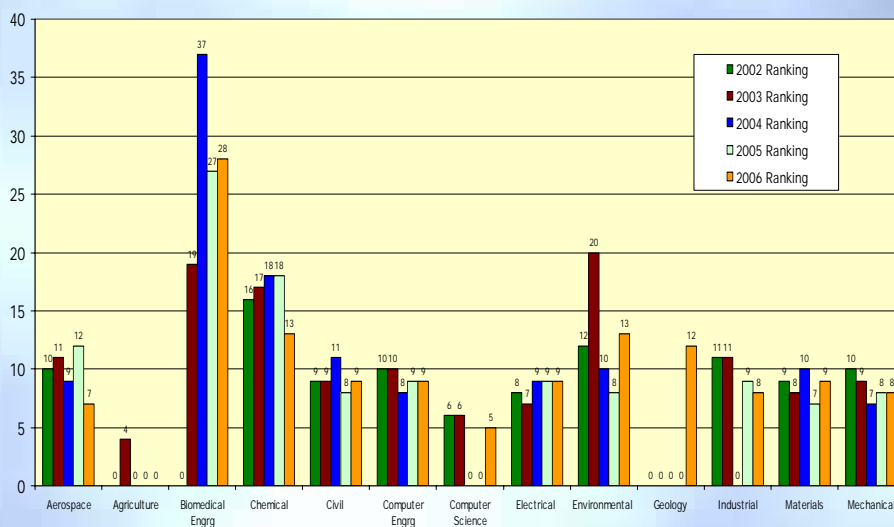
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## U.S. News Rank by Individual Criteria 2004 -2006



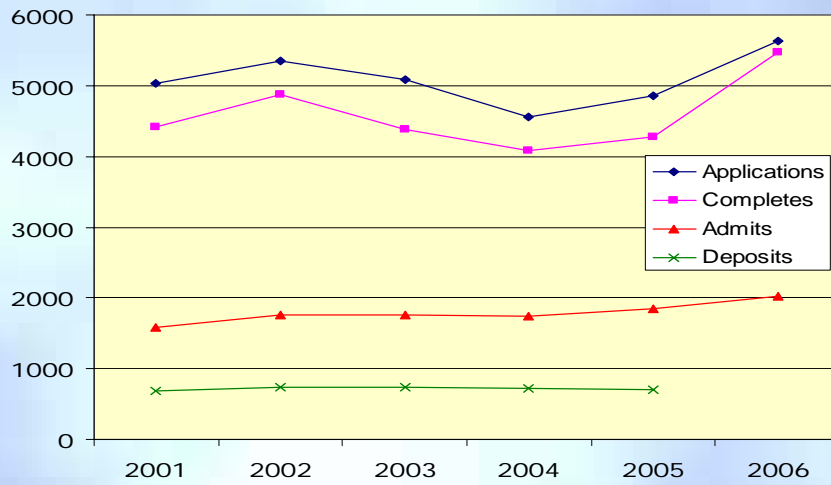
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## U.S. News Graduate Specialty Rankings 2002-06



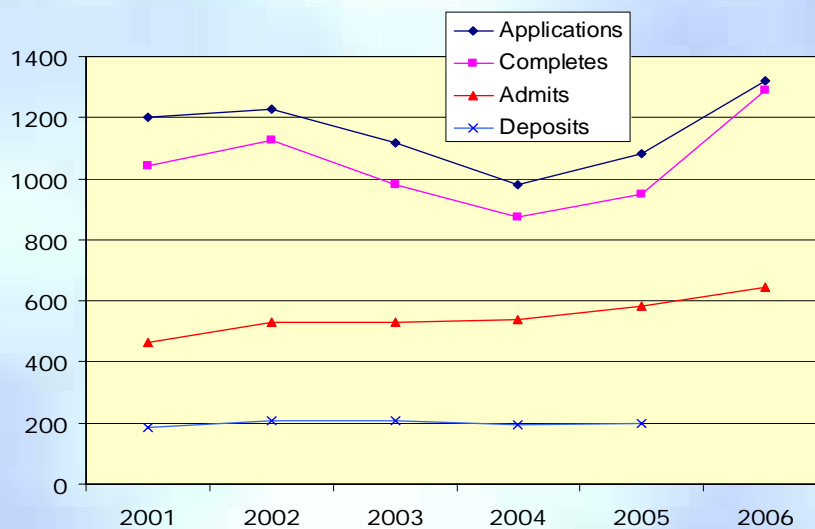
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## Total Applications for Undergraduate Admission



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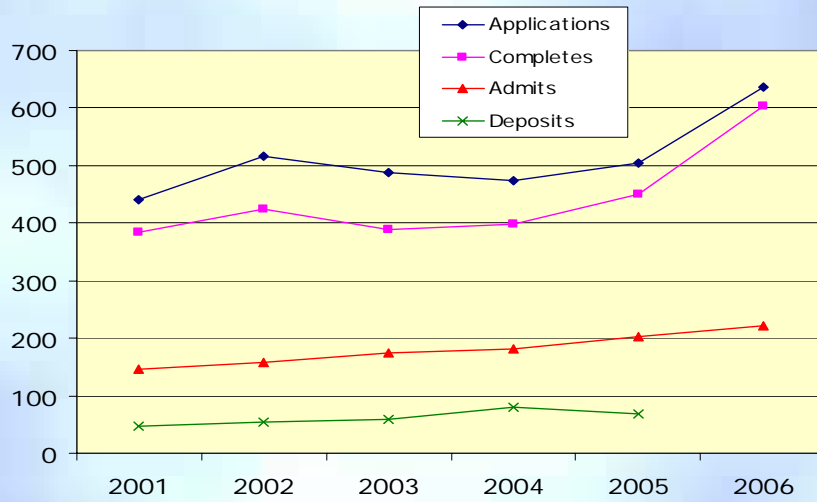
## Applications - Women



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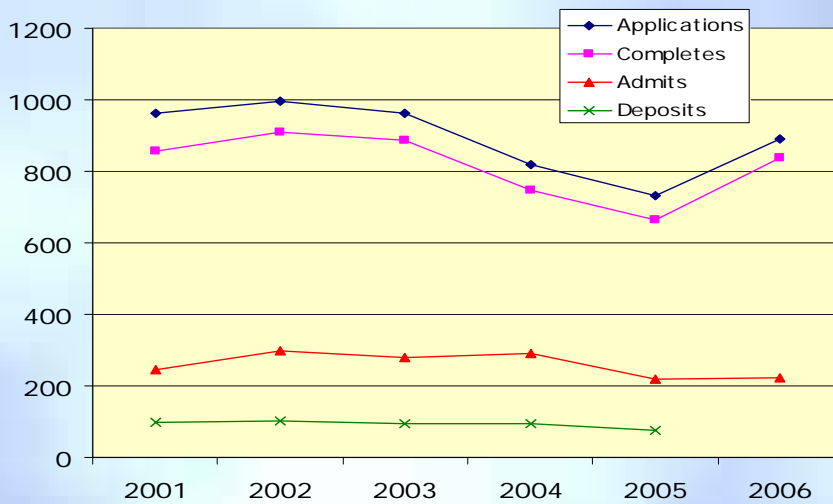


## Applications - Underrepresented Minorities



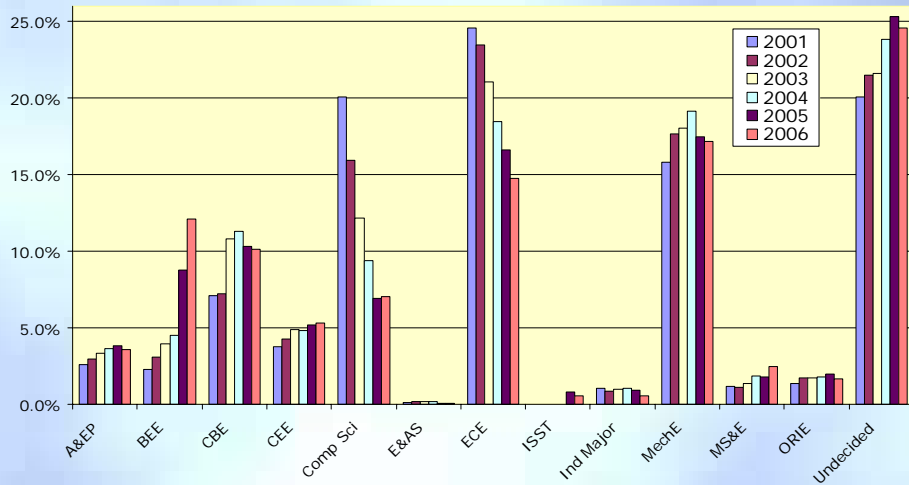
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## Applications - International



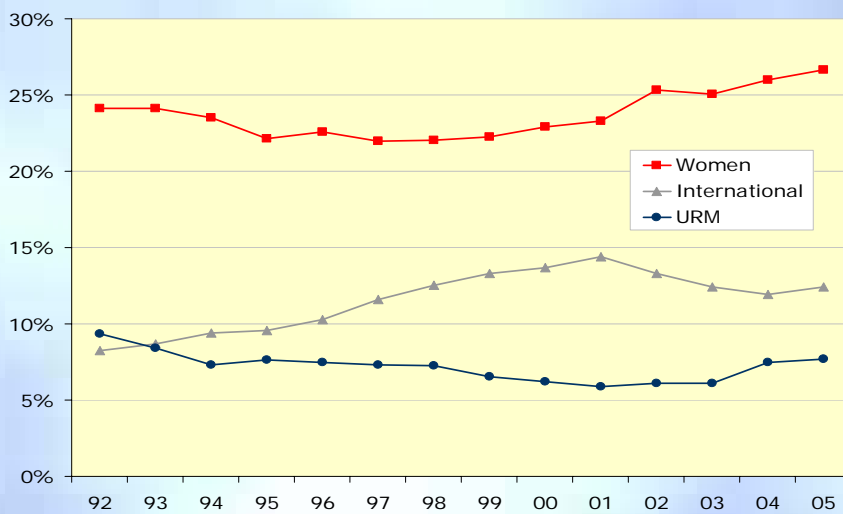
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## Fall Freshman Engineering Applications by Interest



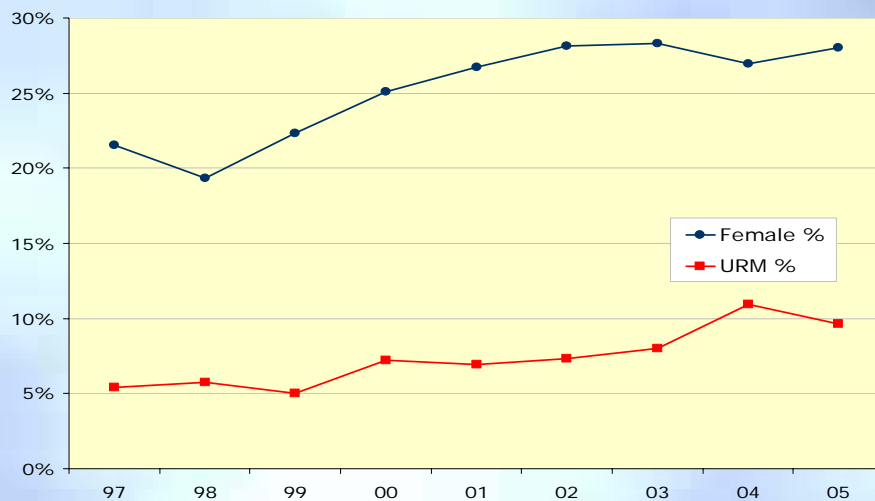
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## Undergraduate Women, Minorities and International



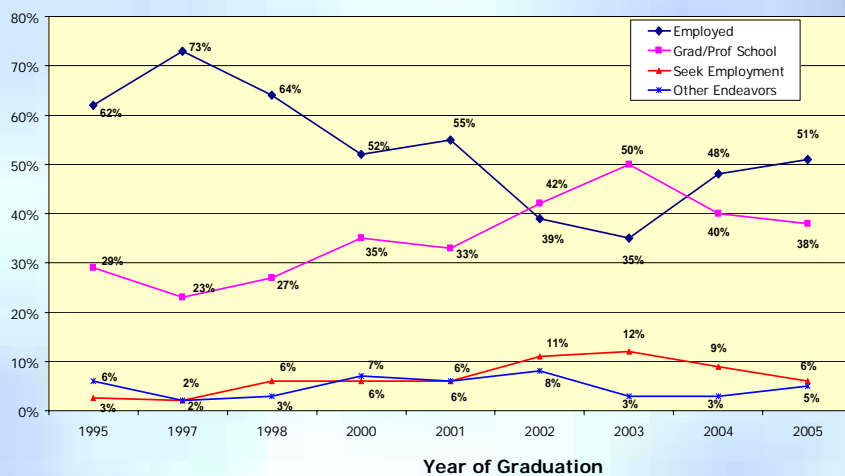
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## First Year Undergraduate Women and Minorities



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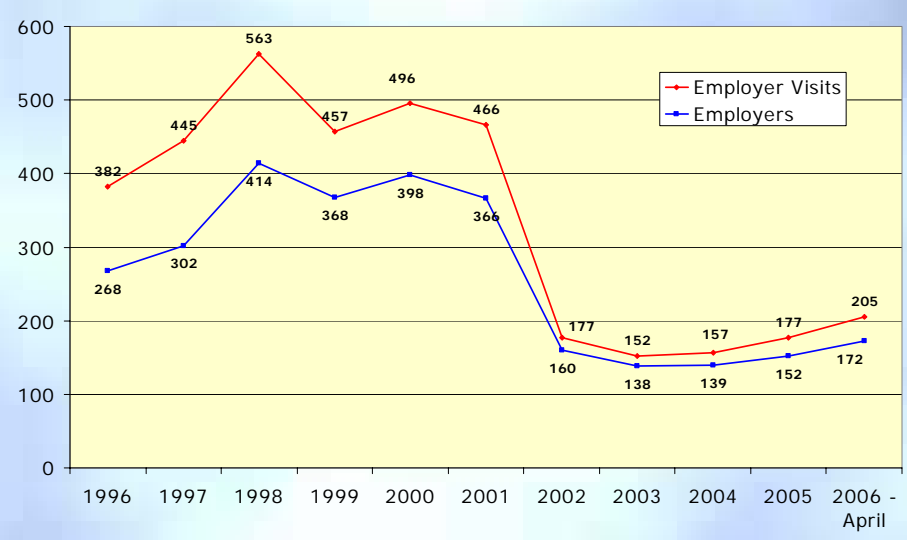
## Undergraduate Post Graduate Activities



*(Note: University Survey Process Changed in 1998, moving from odd- to even-numbered Years, and annually after 2000-- No Survey Was Produced in 1999.)*

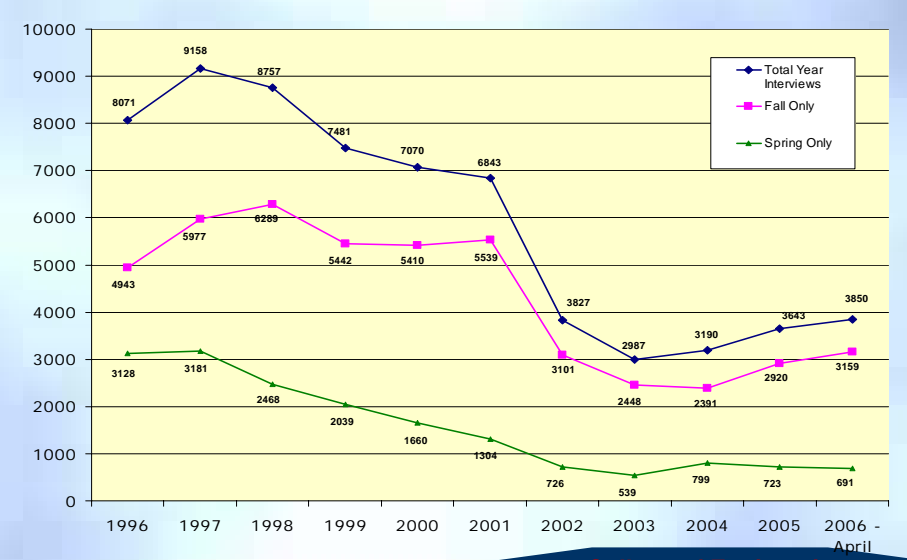
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# Employer Recruitment Visits



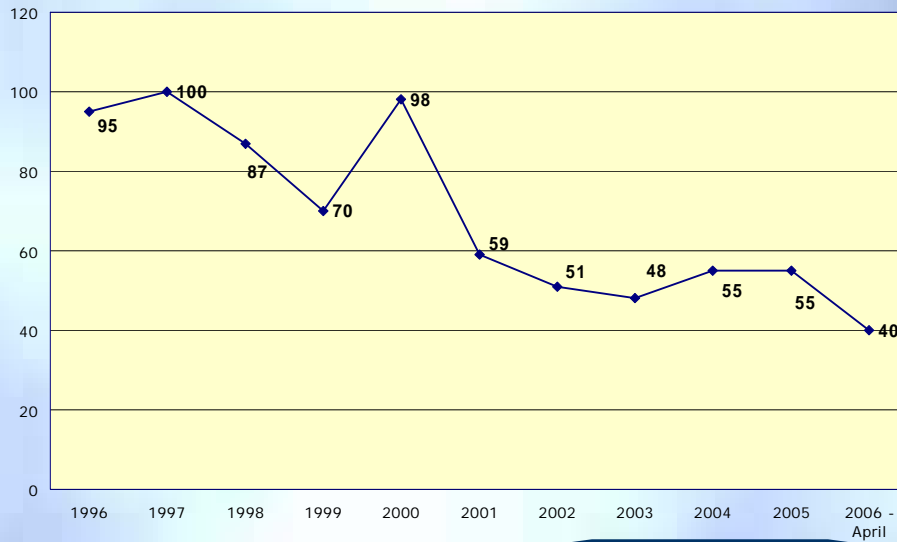
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# Job Interviews



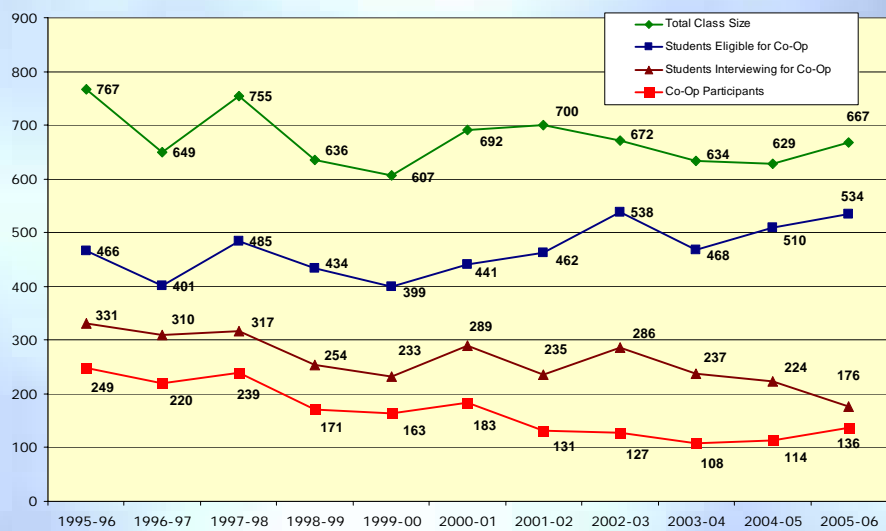
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## Number of Employers Who Hired Co-Op Students



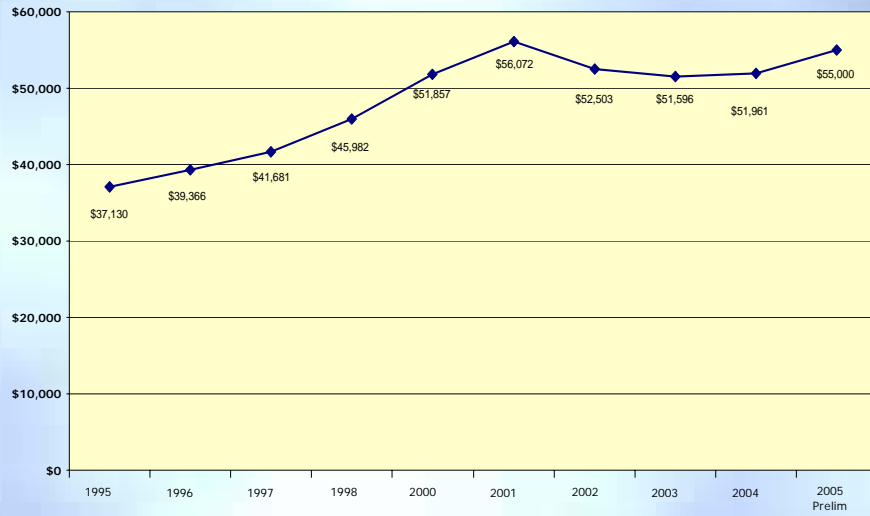
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## Co-Op Student Participants



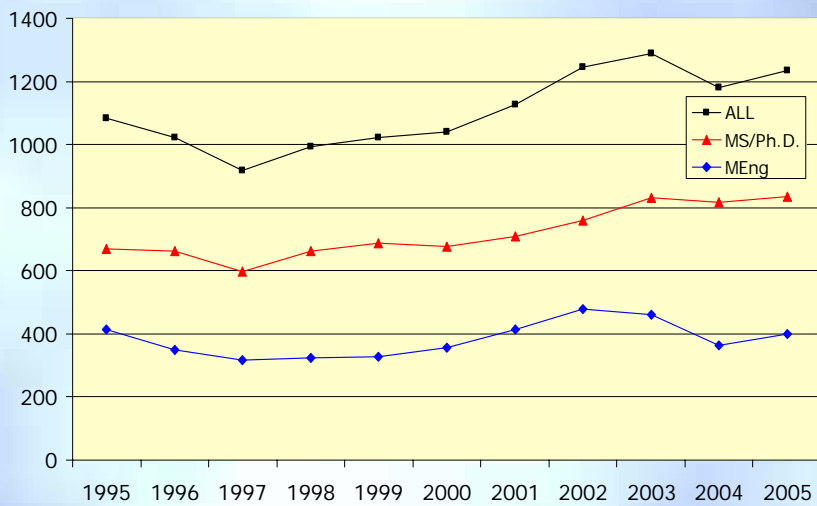
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## Average Undergraduate Salaries



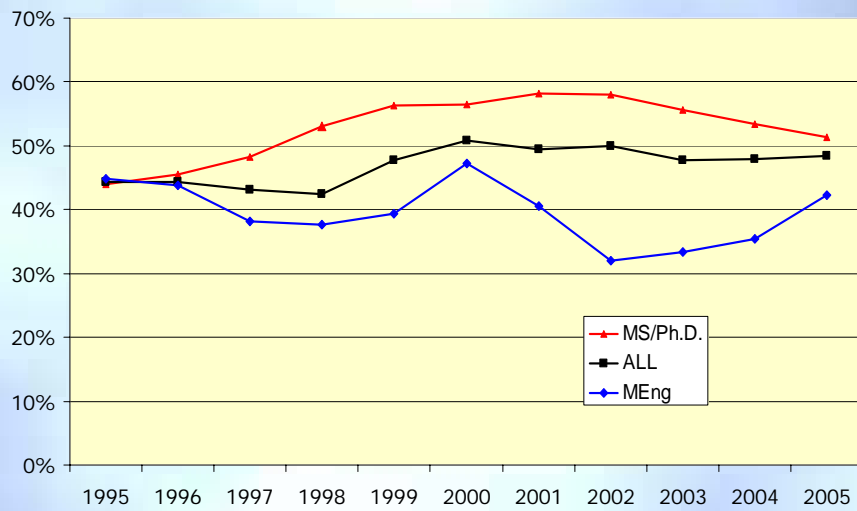
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## Graduate Student Enrollment



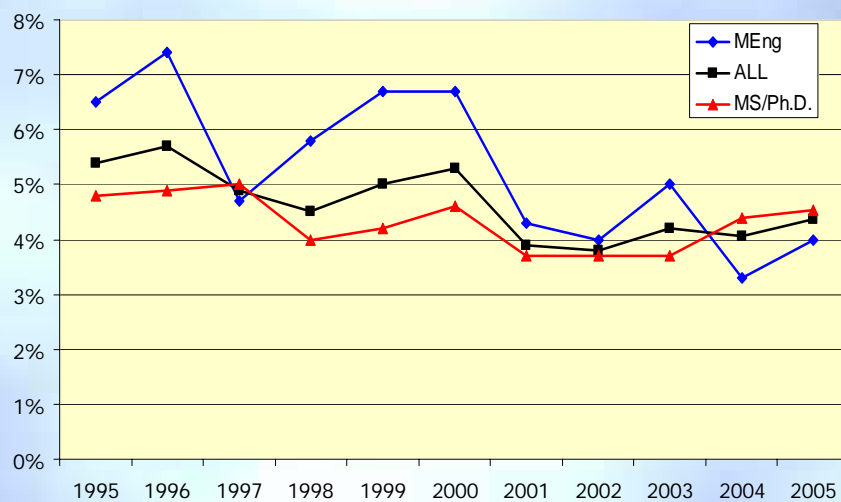
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## Graduate Student Enrollment International



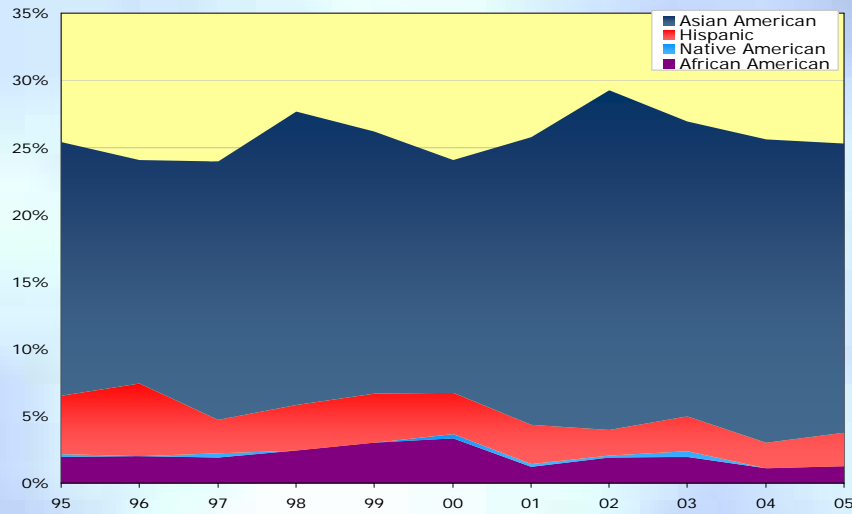
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## Graduate Student Enrollment Underrepresented Minorities



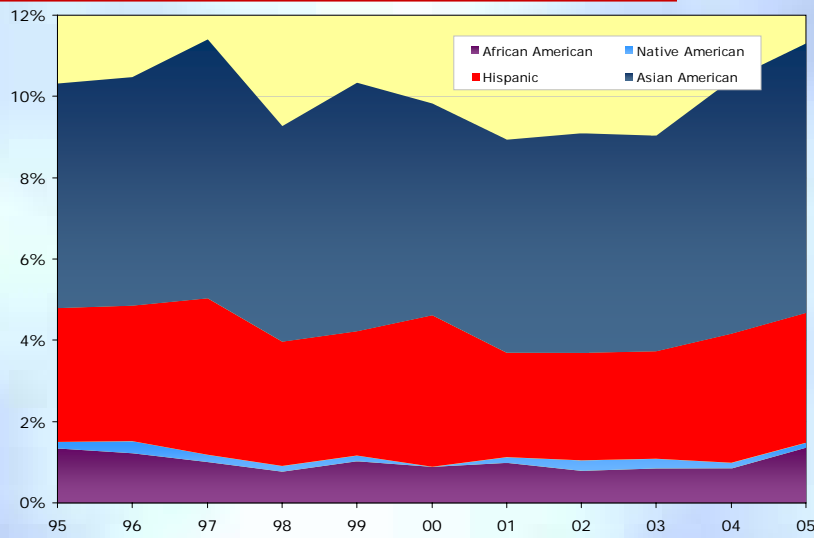
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## Graduate Student Enrollment Ethnicity in MEng Program



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## Graduate Student Enrollment Ethnicity in MS/PhD.



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The image shows a brochure titled "Accelerating Innovation" from the Cornell University College of Engineering. The brochure features a globe in the center, a red and yellow color scheme, and the Cornell University logo. Below the logo, it reads "Cornell University College of Engineering" and includes a quote: "a collaborative academic community that will transform the future." The brochure is set against a blue and white background with a red horizontal line.

# Discussion

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