



National Center for Women &  
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# Mentoring for Engineering Academia

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# Introduction

**Problem:** Diversity (*specifically women and underrepresented minorities*) in general population is not reflected in academic engineering.

**Why** is this a problem?

**Because** contributes to lack of diversity in profession — in research, development, and general practice

**Why** is this a problem?

Lots of reasons ⇒

- Wasted potential, especially in light of shortage of sufficient talent in engineering  $\Rightarrow$  impact on economy, national infrastructure, national defense.
- Outsourcing research and development means losing leadership.
- Diversity improves climate for research and development: wider variety of background, experience, ideas
- Violates basic optimization principle: the bigger and richer the set over which you optimize, the better the result.
- Lack of diversity in part due to subtle and pernicious bias, myths and barriers. Patently and unacceptably unfair.

Numbers are awful, e.g., only 8.2% of PhDs granted in EE in the US during 1985-2001 were women.

Women faculty numbers equally bad:

University of Delaware	0%	UC Berkeley	11%
UCSD	2%	Penn State	11%
USC	4%	Stanford	11%
Cal Tech	5%	Cornell	13%
UT Austin	5%	University of Washington	20%
Princeton	7%	Duke	30%
University of Michigan	7%		

Percentage of Women on a few EE/ECE/EECS Faculties in 2002

New data (Donna Nelson) show the universities with fewer women generally toward the bottom of the rankings for research expenditures.

**Table 8. Tenured/Tenure Track Faculty at the Top 50 Electrical Engineering Departments by Race/Ethnicity, by Gender, and by Rank (FY 2007)\***

University	White				Black				Hispanic				Asian				Native American				Total
	Full	Assoc	Asst	Tot	Full	Assoc	Asst	Tot	Full	Assoc	Asst	Tot	Full	Assoc	Asst	Tot	Full	Assoc	Asst	Tot	
Johns Hopkins**	11	-	1	12	-	1	-	1	1	-	-	1	3	1	1	5	-	-	-	0	19
Georgia Tech	43.002	26.003	8	77.005	1	2.001	1	4.001	-	1	1	2	13.001	3.001	5.002	21.004	-	-	-	0	104.010
UC Berkeley	19.001	6.001	6	31.002	-	-	-	0	-	-	1	1	8.002	-	-	8.002	-	-	-	0	40.004
Pennsylvania St**	22.002	8.001	2	32.003	-	-	-	0	1	-	-	1	10.001	3.002	1	14.003	-	-	-	0	47.006
Michigan	28	8.003	7.001	43.004	2	1	-	3	1	-	1	2	4.001	3.001	3	10.002	-	-	-	0	58.006
Illinois Urb Champ**	8	5.002	4	17.002	1	-	1	2	-	-	-	0	4	-	3	7	-	-	-	0	26.002
UC San Diego**	17.001	3	7.001	27.002	-	-	-	0	-	-	-	0	14	3	2	19	-	-	-	0	46.002
Purdue	37.004	10	7.002	54.006	1	-	-	1	-	-	-	0	12	5.001	13.001	30.002	-	-	-	0	85.008
MIT	38.004	8.001	7.001	53.006	2	-	1	3	1	-	-	1	9	6.001	1.001	16.002	-	-	-	0	73.008
UT Austin	29.002	6	10.001	45.003	-	-	-	0	-	-	-	0	10	2.001	7	19.001	-	-	-	0	64.004
UC Santa Barbara	27.002	1	1	29.002	-	-	-	0	-	-	-	0	9.001	3	-	12.001	-	-	-	0	41.003
Southern California	22.002	5	3	30.002	1	-	-	1	-	-	-	0	8.001	-	2	10.001	-	-	-	0	41.003
Virginia Tech	-	13.002	12.002	25.004	1	-	-	1	-	1	1	2	12.001	7	7.001	26.002	-	-	-	0	54.006
Stanford	29.001	9.001	7.001	45.003	-	2	-	2	1	-	-	1	8.001	3	3	14.001	-	-	-	0	62.004
Washington	16.004	9.001	6.002	31.007	-	-	-	0	-	-	-	0	7	1.001	-	8.001	-	-	-	0	39.008
Princeton	13.001	1.001	3	17.002	-	-	-	0	1	-	-	1	10.001	-	2.001	12.002	-	-	-	0	30.004
UCLA	24.002	1	5.001	30.003	-	-	-	0	1	-	-	1	16	2	3	21	-	-	-	0	52.003
Carnegie Mellon	26.001	5.001	2	33.002	2	-	-	2	-	-	-	0	8	2	5.002	15.002	-	-	-	0	50.004
Mississippi St	11.002	5.001	6	22.003	-	-	-	0	-	-	-	0	-	-	2.001	2.001	-	-	-	0	24.004
Drexel**	13.001	4.001	6.001	23.003	1	-	-	1	1	-	1.001	2.001	2	3.001	4	9.001	-	-	-	0	35.005
Vanderbilt**	17	7	5.002	29.002	-	-	1	1	-	-	-	0	3	1	4.001	8.001	-	-	-	0	38.003
Arizona**	15.001	9.002	8.001	32.004	-	-	-	0	-	-	-	0	2	-	6.002	8.002	-	-	-	0	40.006
Ohio St	23.003	11.001	3	37.004	-	-	-	0	1	-	1	2	5	1	2	8	-	-	-	0	47.004
Maryland College Park	36	7.001	7.002	50.003	-	1.001	-	1.001	1	-	-	1	7	5.001	2	14.001	-	-	-	0	66.005
Cornell	16	5.002	7.003	28.005	1	-	-	1	-	-	-	0	4	2	2	8	-	-	-	0	37.005
Arizona St	17.001	13.003	6.001	36.005	-	-	-	0	1	1	-	2	11.002	2	5	18.002	-	-	-	0	56.007
North Carolina St	22.001	5	7	34.001	1	1	1.001	3.001	1.001	-	-	1.001	5.001	-	6.001	11.002	-	-	-	0	49.005
Old Dominion	4	5.001	2	11.001	-	1	-	1	-	1	-	1	5	2	4	11	-	-	-	0	24.001
South Carolina	2	4	1.001	7.001	-	-	-	0	-	-	-	0	2	1	5	8	-	-	-	0	15.001
Wisconsin Madison	24.001	7.001	2.002	33.004	-	-	-	0	-	-	-	0	3	2	6.002	11.002	-	-	-	0	44.006
New Hampshire	6	4	-	10	-	-	-	0	-	-	-	0	1	-	2.001	3.001	-	-	-	0	13.001
Rutgers	10.001	3.001	5.001	18.003	1	1.001	-	2.001	-	-	-	0	6	-	2.001	8.001	-	-	-	0	28.005
Florida	13	5	5	23	-	-	1.001	1.001	-	1	1	2	7.001	4	6.001	17.002	-	-	-	0	43.003
UC Irvine	11	6	11.002	28.002	-	-	-	0	-	-	-	0	8.001	2	-	10.001	-	-	-	0	38.003
Delaware	10	3.001	5	18.001	-	1	-	1	1	1	-	2	3	-	3	6	-	-	-	0	27.001
Clemson	11.001	8	6.001	25.002	-	-	1	1	-	-	-	0	2	-	2	4	-	-	-	0	30.002
Massachusetts Amherst**	10.001	11	4	25.001	-	-	-	0	-	-	-	0	5	1.001	1	7.001	-	-	-	0	32.002
Rice	13.002	1	6.001	20.003	-	-	-	0	-	-	-	0	-	1	1	2	-	-	-	0	22.003
Duke	11.002	4.001	6.002	21.005	-	-	1.001	1.001	-	-	-	0	2	1	2	5	-	-	-	0	27.006
Virginia	10.001	3.001	2	15.002	1	-	-	1	-	-	-	0	3	1.001	2	6.001	-	-	-	0	22.003
South Florida**	13	4	2	19	-	-	-	0	-	-	-	0	1	1	3.001	5.001	-	-	-	0	24.001
Texas A&M	23.002	6	8.001	37.003	1.001	-	-	1.001	2.001	1	1	4.001	6.001	3	11.001	20.002	-	-	-	0	62.007
Minnesota	26	11.001	3	40.001	-	1.001	-	1.001	-	-	-	0	1	2	2	5	-	-	-	0	46.002
West Virginia**	7	8.002	7.002	22.004	-	1	-	1	-	-	-	0	5	3	3	11	-	-	-	0	34.004
UC Davis	13.001	1	4	18.001	1	-	-	1	-	-	-	0	4	2.001	3.001	9.002	-	-	1	1	29.003
Cincinnati**	11	7.002	4	22.002	-	-	-	0	1	-	-	1	6	3	-	9	-	-	-	0	32.002
Florida St	3	4.002	4	11.002	1	-	1	2	-	-	-	0	3	4.001	2.001	9.002	-	-	-	0	22.004
Michigan St**	13	5.001	6.001	24.002	-	-	1	1	-	-	-	0	4.001	4	7	15.001	-	-	-	0	40.003
Cal Tech	8.001	2	-	10.001	-	-	-	0	-	-	-	0	2	-	2.001	4.001	-	-	-	0	14.002
Iowa St	7.001	9.001	4	20.002	-	-	-	0	-	-	-	0	8	7	13.001	28.001	-	-	-	0	48.003
<b>Electrical Eng Total</b>	<b>838.052</b>	<b>311.043</b>	<b>250.036</b>	<b>1399.131</b>	<b>19.001</b>	<b>13.004</b>	<b>10.003</b>	<b>42.008</b>	<b>16.002</b>	<b>7</b>	<b>8.001</b>	<b>31.003</b>	<b>291.017</b>	<b>102.014</b>	<b>173.024</b>	<b>566.055</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2039.197</b>
<b>Percent within race</b>	<b>60%</b>	<b>22%</b>	<b>18%</b>	<b>100%</b>	<b>45%</b>	<b>31%</b>	<b>24%</b>	<b>100%</b>	<b>52%</b>	<b>23%</b>	<b>26%</b>	<b>100%</b>	<b>51%</b>	<b>18%</b>	<b>31%</b>	<b>100%</b>	<b>0%</b>	<b>0%</b>	<b>100%</b>	<b>100%</b>	
<b>Percent of grand total</b>	<b>41.1%</b>	<b>15.3%</b>	<b>12.3%</b>	<b>68.6%</b>	<b>0.9%</b>	<b>0.6%</b>	<b>0.5%</b>	<b>2.1%</b>	<b>0.8%</b>	<b>0.3%</b>	<b>0.4%</b>	<b>1.5%</b>	<b>14.3%</b>	<b>5.0%</b>	<b>8.5%</b>	<b>27.8%</b>	<b>0%</b>	<b>0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>100%</b>
<b>Females in column</b>	<b>6.2%</b>	<b>13.8%</b>	<b>14.4%</b>	<b>9.4%</b>	<b>5.3%</b>	<b>30.8%</b>	<b>30.0%</b>	<b>19.0%</b>	<b>12.5%</b>	<b>0%</b>	<b>12.5%</b>	<b>9.7%</b>	<b>5.8%</b>	<b>13.7%</b>	<b>13.9%</b>	<b>9.7%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>0%</b>	<b>9.7%</b>

\*By electrical engineering research expenditures FY2004, NSF, www.nsf.gov/statistics/nsf06323/tables.htm#rd7; numbers after decimals designate females. \*\*At least some data are from sources other than department chair. Reference: "The Nelson Diversity Surveys" Nelson, D. J.: Norman, OK, 2007; http://cheminfo.chem.ou.edu/faculty/djn/diversity/top50.html



7 of the 9 Women in the 2002 UW EE Department

Some do better than others!

Serious problems of **pipeline** and **pool**.

Critical bottleneck: engineering faculty —

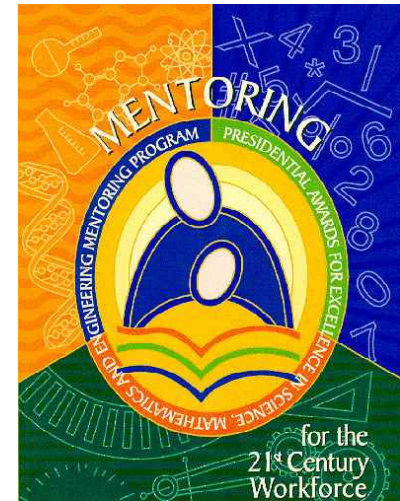
★ small numbers can have a major impact ★

**Some (interrelated) ways to improve the faculty numbers:**

- Outreach
- Recruiting across a wide spectrum, **fair and open searches**
- Creating a productive and fulfilling environment
- **Mentoring** of students, faculty, and *colleagues*

# Why am I here?

Nominated by former students for Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring (PAESMEM)



# Benefits of mentoring a diverse group

*to mentor*

- See previous slide — pride and joy in seeing protégés succeed
- See previous slide — Successful protégés make the mentor look good!
- Help create professional colleagues with mutual interests, expand network
- Future peers to whom one can refer other protégés
- Grandstudents and greatgrandstudents . . .

*and besides, it's our job* — we can not just mentor replicas of ourselves — the numbers do not work!

# Benefits of mentoring diverse groups

*to institution*

- Retention of female undergraduate and graduate students
- Identification of potential female hires
- High yield from hiring offers to female faculty
- Research — productive female faculty
- Teaching — productive female faculty

That is the *why*, the breakout session will consider the *what* and *how* of mentoring:

- What is mentoring?
- Mentoring students, faculty, peers, and administration
- Key topics, e.g.
  - Fundamentals
  - Faculty and family strategies
  - Mentoring for academic leadership
  - Fair and open searches,
  - Building a mentoring system
- Resources (e.g., <http://paesmem.stanford.edu>, <http://birs07.stanford.edu>)