

Mathematics Faculty, Mathematics Students

Why Do They Look So Different?

Shirley M. Malcom, PhD



Pathway to the Professoriate

- Interest
- Capacity
- Inspiration
- Preparation: research (yes); teaching (?)
- Encouragement and support
- “Permission”

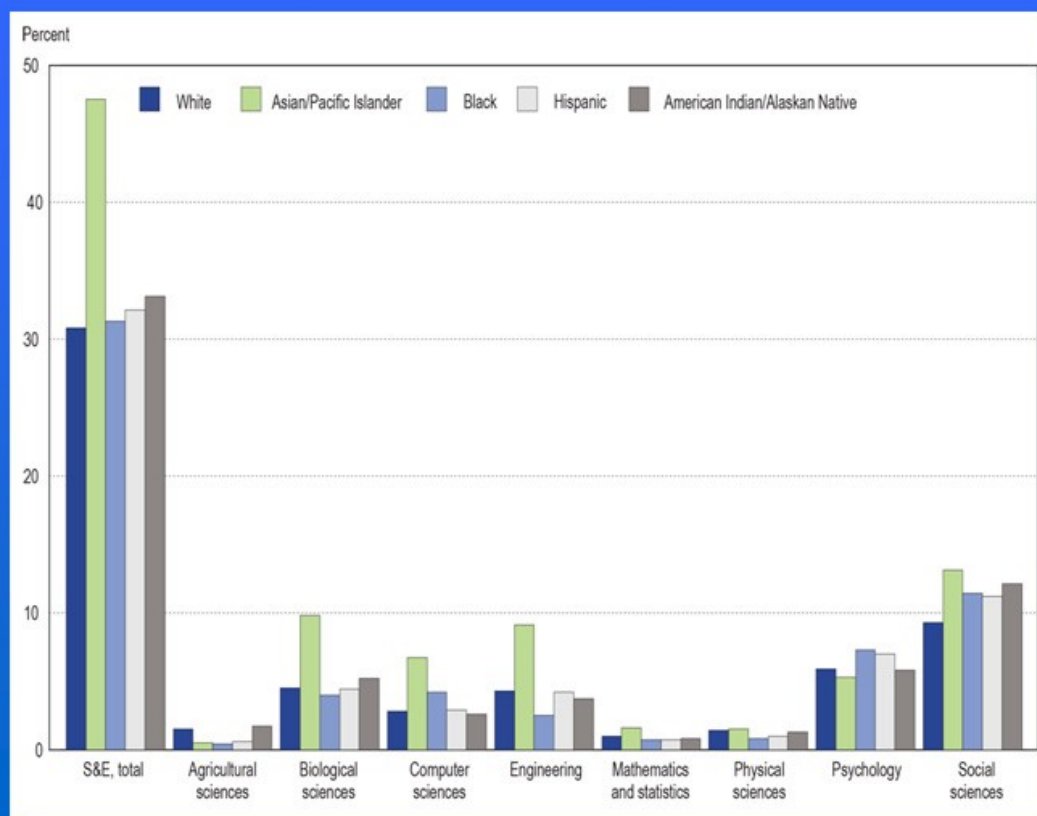
Academic Preparation

- Baccalaureate origins
- PhD production

The PhD...Necessary, But Not Sufficient

- Building capacity (the nature of doctoral education)
- Requirements for consideration
- Requirements for selection

Science and engineering bachelor's degrees as share of all bachelor's degrees awarded, by race/ethnicity: 2005



SOURCE: *Women, Minorities and Persons With Disabilities in Science and Engineering (May 2008)*



Top 100 Graduate Degree Producers 2007

Total Minority Doctoral Degrees -Mathematics and Statistics

Rank	Institution	State	2004- 2005	Men	Women	Total	% Grads	% Chg
1	University of California-Los Angeles	Calif.	1	4	3	7	23%	600%
2	University of California-Berkeley	Calif.	4	4	2	6	19%	50%
3	Wayne State University	Mich.	0	5	0	5	83%	na
3	Cornell University	N.Y.	2	2	3	5	19%	150%
5	University of Illinois at Chicago	Ill.	2	3	1	4	22%	100%
5	University of Chicago	Ill.	1	4	0	4	17%	300%
5	Stanford University	Calif.	2	3	1	4	15%	100%
5	Duke University	N.C.	3	4	0	4	40%	33%
5	Claremont Graduate University	Calif.	1	3	1	4	67%	300%
10	University of Maryland-College Park	Md.	4	2	1	3	10%	-25%
10	University of California-San Diego	Calif.	1	3	0	3	21%	200%
10	Rice University	Texas	4	2	1	3	15%	-25%
10	Massachusetts Institute of Technology	Mass.	0	2	1	3	13%	na

Source: DiverseEducation.com

MATHEMATICS FACULTY, MATHEMATICS STUDENTS

Why Do They Look So Different?



Doctorate Degrees, 2005-2006

Mathematics Total Minority Doctorates

2005 Rank	Institution	State	03-'04 Total	Preliminary 2004-2005				
				Men	Women	Total	% Grad	% Chg.
1	UNIVERSITY OF MARYLAND-COLLEGE PARK	Md.	1	3	1	4	18%	300%
1	UNIV. OF CALIFORNIA, BERKELEY	Calif.	5	3	1	4	12%	-20%
1	RICE UNIVERSITY	Texas	0	2	2	4	31%	na
4	UNIVERSITY OF FLORIDA	Fla.	0	2	1	3	23%	na
4	UNIVERSITY OF TEXAS AT DALLAS	Texas	0	2	1	3	60%	na
4	HOWARD UNIVERSITY	D.C.	1	1	2	3	100%	200%
4	DUKE UNIVERSITY	N.C.	1	2	1	3	23%	200%
4	CUNY GRADUATE SCHOOL AND UNIV. CTR.	N.Y.	0	3	0	3	43%	na

Source: DiverseEducation.com

Doctorate Degrees, 2005-2006

Mathematics

African American Doctorates

2005 Rank	Institution	State	03-'04 Total	Preliminary 2004-2005				
				Men	Women	Total	% Grad	% Chg.
1	RICE UNIVERSITY	Texas	0	1	2	3	23%	na
1	HOWARD UNIVERSITY	D.C.	1	1	2	3	100%	200%

SOURCE: DiverseEducation.com

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TOP DEGREE PRODUCERS 2007

African American Baccalaureate - Mathematics and Statistics

Rank	Institution	State	Prior Year	Men	Women	Total	%Grads	%Chg
1	Morehouse College	GA	27	26	0	26	96%	-4%
2	Spelman College	GA	21	0	19	19	95%	-10%
3	Chicago State University	IL	12	11	6	17	81%	42%
4	Stony Brook University	NY	12	6	6	12	9%	0%
5	Texas Southern University	TX	4	6	5	11	69%	175%
6	Tennessee State University	TN	8	4	5	9	90%	13%
6	North Carolina State University at Raleigh	NC	11	5	4	9	8%	-18%
6	The University of Texas at Austin	TX	6	4	5	9	5%	50%
6	North Carolina A & T State University	NC	9	3	6	9	100%	0%
6	Georgia State University	GA	9	5	4	9	47%	0%
11	CUNY York College	NY	7	6	2	8	53%	14%
11	South Carolina State University	SC	7	1	7	8	100%	14%
11	Albany State University	GA	10	4	4	8	100%	-20%
11	Saint Augustines College	NC	7	5	3	8	80%	14%
11	Oakwood College	AL	5	4	4	8	89%	60%
16	SUNY at Buffalo	NY	2	4	3	7	10%	250%
16	Fort Valley State University	GA	4	3	4	7	100%	75%
16	Savannah State University	GA	1	4	3	7	100%	600%
16	Coppin State University	MD	3	0	7	7	78%	133%
16	Virginia State University	VA	4	3	4	7	100%	75%
16	University of Michigan-Ann Arbor	MI	3	6	1	7	6%	133%
16	North Carolina Central University	NC	2	4	3	7	100%	250%
16	University of South Carolina-Aiken	SC	6	2	5	7	58%	17%
16	University of Maryland-College Park	MD	5	3	4	7	9%	40%

SOURCE: DiverseEducation .com

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TOP DEGREE PRODUCERS 2007

Asian American Baccalaureate -Mathematics and Statistics

Rank	Institution	State	Prior			Total	%Grads	%Chg
			Year	Men	Women			
1	University of California-Los Angeles	CA	123	61	52	113	43%	-8%
2	University of California-Berkeley	CA	114	61	47	108	46%	-5%
3	Stony Brook University	NY	63	32	22	54	39%	-14%
4	The University of Texas at Austin	TX	38	38	13	51	27%	34%
5	University of California-Irvine	CA	40	21	26	47	52%	18%
6	University of Washington-Seattle Campus	WA	33	26	15	41	27%	24%
7	University of California-San Diego	CA	26	13	19	32	34%	23%
8	University of California-Riverside	CA	17	13	18	31	36%	82%
9	University of California-Davis	CA	25	12	15	27	33%	8%
10	University of Illinois at Urbana-Champaign	IL	19	14	5	19	16%	0%
10	University of Michigan-Ann Arbor	MI	12	13	6	19	16%	58%
12	Rutgers University-New Brunswick/Piscataway	NJ	27	12	6	18	20%	-33%
13	San Jose State University	CA	12	5	11	16	52%	33%
13	Columbia University in the City of New York	NY	9	11	5	16	21%	78%
15	New York University	NY	8	8	7	15	23%	88%
15	University of Chicago	IL	9	11	4	15	18%	67%
15	University of California-Santa Barbara	CA	19	10	5	15	17%	-21%
15	Harvard University	MA	16	8	7	15	22%	-6%
19	SUNY at Binghamton	NY	10	7	7	14	29%	40%
19	San Diego State University	CA	10	7	7	14	23%	40%
21	California State University-Fullerton	CA	6	3	10	13	31%	117%
21	University of Houston	TX	7	8	5	13	30%	86%
21	CUNY Queens College	NY	12	3	10	13	25%	8%

SOURCE: DiverseEducation.com

TOP DEGREE PRODUCERS 2007

Hispanic American Baccalaureate - Mathematics and Statistics

Rank	Institution	State	Prior			%Grads	%Chg	
			Year	Men	Women			Total
1	University of California-Los Angeles	CA	38	20	9	29	10.98%	-23.68%
2	The University of Texas at San Antonio	TX	15	6	18	24	45.28%	60.00%
3	The University of Texas at Austin	TX	23	17	6	23	11.98%	0.00%
3	University of California-Riverside	CA	11	10	13	23	27.06%	109.09%
5	The University of Texas-Pan American	TX	11	14	7	21	75.00%	90.91%
6	The University of Texas at El Paso	TX	7	13	6	19	86.36%	171.43%
6	Texas A & M International University	TX	18	4	15	19	95.00%	5.56%
8	The University of Texas at Brownsville	TX	32	7	10	17	89.47%	-46.88%
9	California State University-San Bernardino	CA	13	6	10	16	32.00%	23.08%
9	University of California-Santa Barbara	CA	15	8	8	16	18.18%	6.67%
11	University of New Mexico-Main Campus	NM	6	9	5	14	28.57%	133.33%
11	San Diego State University	CA	7	6	8	14	22.58%	100.00%
13	California State University-Dominguez Hills	CA	4	4	7	11	47.83%	175.00%
14	Florida International University	FL	13	7	3	10	62.50%	-23.08%
14	Sul Ross State University	TX	6	7	3	10	76.92%	66.67%
14	California State University-Los Angeles	CA	9	5	5	10	50.00%	11.11%
14	University of Florida	FL	8	5	5	10	12.99%	25.00%
14	University of California-Berkeley	CA	14	8	2	10	4.27%	-28.57%
14	University of California-Irvine	CA	5	9	1	10	11.11%	100.00%
20	Kean University	NJ	6	5	4	9	31.03%	50.00%
20	Texas State University-San Marcos	TX	3	3	6	9	15.52%	200.00%
20	California State University-Long Beach	CA	16	7	2	9	16.36%	-43.75%

SOURCE: DiverseEducation .com

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Total Minority Baccalaureate - Mathematics and Statistics

Rank	Institution	State	Prior			Total	%Grads	%Chg
			Year	Men	Women			
1	University of California-Los Angeles	CA	166	84	63	147	56%	-11%
2	University of California-Berkeley	CA	129	72	49	121	52%	-6%
3	The University of Texas at Austin	TX	67	60	24	84	44%	25%
4	Stony Brook University	NY	82	40	32	72	51%	-12%
5	University of California-Irvine	CA	46	31	27	58	64%	26%
5	University of California-Riverside	CA	33	25	33	58	68%	76%
7	University of Washington-Seattle Campus	WA	41	31	15	46	31%	12%
8	University of California-San Diego	CA	38	22	22	44	47%	16%
9	University of California-Santa Barbara	CA	38	19	15	34	39%	-11%
10	University of California-Davis	CA	31	15	18	33	41%	6%
11	University of Michigan-Ann Arbor	MI	15	23	8	31	26%	107%
12	San Diego State University	CA	18	14	16	30	48%	67%
13	The University of Texas at San Antonio	TX	19	8	21	29	55%	53%
13	University of Illinois at Urbana-Champaign	IL	30	20	9	29	25%	-3%
15	Rutgers University-New Brunswick/Piscataway	NJ	33	17	10	27	30%	-18%
16	Morehouse College	GA	27	26	0	26	96%	-4%
17	New York University	NY	14	11	13	24	36%	71%
18	California State University-Long Beach	CA	34	12	11	23	42%	-32%
18	University of Chicago	IL	11	18	5	23	27%	109%
20	University of Houston	TX	19	13	9	22	50%	16%
20	University of Florida	FL	21	13	9	22	29%	5%
20	The University of Texas-Pan American	TX	12	14	8	22	79%	83%

SOURCE: DiverseEducation .com

TOP DEGREE PRODUCERS 2007

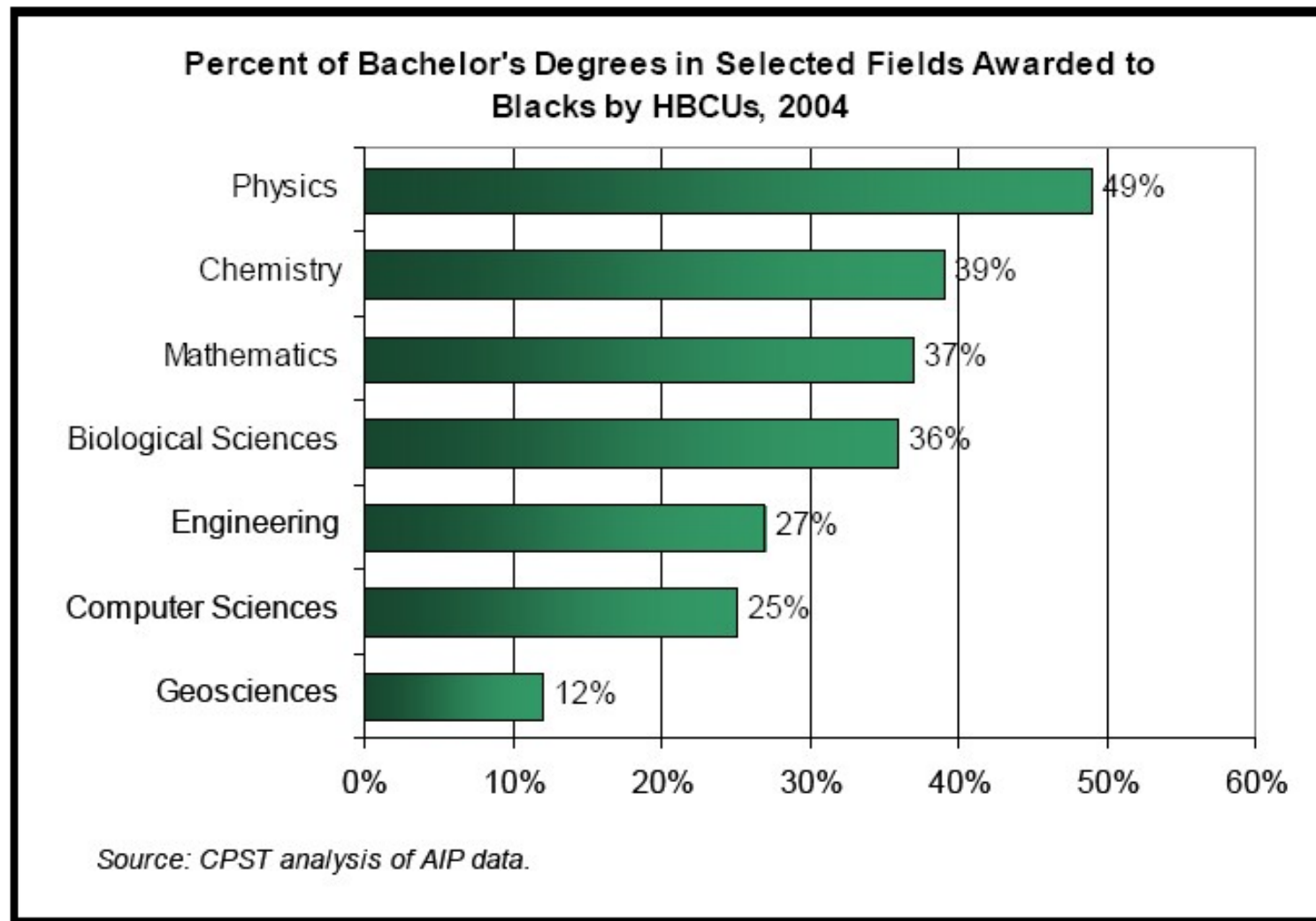
Native American Baccalaureate - Mathematics and Statistics

Rank	Institution	State	Prior Year	Men	Women	Total	%Grads	%Chg
1	Northeastern State University	OK	3	3	2	5	36%	67%
2	East Central University	OK	0	1	2	3	38%	na

SOURCE: [DiverseEducation .com](http://DiverseEducation.com)

MATHEMATICS FACULTY, MATHEMATICS STUDENTS

Why Do They Look So Different?



We Can't Find Any?

- Not just the challenge of small numbers
- Find and grow the people you would want as colleagues
- The situation for women belies the claim

Women's Presence in the Mathematics Pool, 2003-04

B.S. degrees
(Math & Statistics) = 46.0%

M.S. degrees = 45.1%

Ph.D.'s = 28.1%

Faculty of Major Research Institutions

Racial Distribution of B.S. Recipients (2005) versus Faculty (FY 2007)

Discipline	% B.S. Degrees	Black		% B.S. Degrees	Hispanic		% B.S. Degrees	Native American	
		% Faculty			% Faculty			% Faculty	
		Top 100	Top 50		Top 100	Top 50		Top 100	Top 50
Chemistry	8.3%	1.5%	1.3%	7.7%	2.1%	2.2%	0.7%	0.3%	0.2%
Math	6.4%	1.5%	0.9%	6.1%	1.7%	1.3%	0.6%	0.1%	0.0%
Computer Science	12.5%	0.9%	0.7%	7.5%	1.8%	1.8%	0.6%	0.0%	-
Astronomy	1.4%	1.0%	1.0%	6.1%	1.2%	1.2%	1.1%	-	-
Physics	4.5%	0.7%	0.8%	4.9%	1.8%	1.6%	0.9%	0.1%	0.0%
Chemical Eng.	6.3%	2.1%	2.3%	7.7%	3.3%	3.2%	0.7%	0.2%	0.1%
Civil Eng.	3.8%	1.8%	1.8%	9.8%	4.3%	4.7%	0.8%	-	-
Electrical Eng.	7.3%	1.7%	2.1%	8.4%	1.7%	1.5%	0.5%	0.0%	0.0%
Mechanical Eng.	3.9%	1.9%	2.0%	7.1%	2.0%	2.3%	0.5%	0.1%	0.1%
Economics	6.4%	1.8%	1.7%	6.3%	4.0%	4.0%	0.4%	0.1%	0.1%
Political Science	10.3%	4.2%	4.1%	9.7%	2.9%	2.7%	0.7%	0.2%	0.1%
Sociology	17.0%	7.9%	7.9%	10.7%	5.2%	4.7%	1.0%	0.4%	0.2%
Psychology	11.4%	3.4%	3.1%	9.5%	3.1%	3.6%	0.7%	0.4%	0.4%
Biological	8.0%	1.4%	1.2%	7.6%	2.5%	2.4%	0.8%	0.2%	0.2%
Earth Sciences	1.8%	0.9%	1.1%	4.1%	2.3%	2.1%	0.7%	0.4%	0.2%

Self-Assessment (Women)

- How many women have received the PhD from the department?
- What percent of current tenured and tenured track faculty are women? At what rank?
- What percent of recent hires (past 5 years) have been women?

Self-Assessment (URMs)

- How many majors?
- How many graduates at B.S. level?
- How many URMs apply for graduate school?
- How many are admitted? Attend?
- How many PhDs?
- How many faculty?

2003-04 Mathematical Sciences Bachelors

Women	=	46.1%
African Americans	=	6.0%
Hispanics	=	5.2%
American Indians	=	0.5%
Asians/PIs	=	9.5%
Whites	=	73.7%
Temporary Residents	=	5.0%

Women received:

- 57.0 % of 784 bachelor's degrees to African Americans
- 45.6 % of 676 bachelor's awarded to Hispanics
- 37.3 % of 59 bachelor's awarded to American Indians
- 46.1 % of 1,244 bachelor's awarded to Asians/PIs
- 45.6 % of 9,639 bachelor's awarded to Whites

Doctorates (Mathematical Sciences), 2003-04

Total 1,075

Temporary Residents	=	48.9%
African Americans	=	2.0%
Hispanics	=	5.1%
Asians/PIs	=	10.6%
Whites	=	37.0%

The bottom line of the story: There is a pathway through the sciences, through the education system. At each stage of the pathway, we're losing critical talent. This is not good given the changing demographics. The faculty is looking less like the student body as the student body becomes more diverse.

Shirley Malcom – Why Students and Faculty Look So Different

- Best way to learn mentoring is to be mentored
- Most grad programs see themselves as research institutions that also teach. The skill of teaching is also important to master.
- Culture of grad programs is that you need permission to join. If your parents were mathematicians you feel like you have permission to join. If you look a certain way you feel that you have permission to join. It's hard to imagine yourself in a place where no one else looks like you. It feels like you are waiting for permission to join. You feel like you need a special invitation.
- The PhD is necessary, but it is not sufficient. Learning starts when you get the PhD.
- HBCUs graduate a disproportionate percentage of students in the math and sciences
- Problem with the “we can't find minorities” argument. You need to find and grow people you want as colleagues. You know where they are studying – HBCUs.
- Statistics suggest that women are on parity with men at bachelors and masters level – yet less than 1/3 at the PhD level.
- What to do about these statistics? Look at how you bring people onto the faculty. Signals need to go to minorities and women that there is a place for them, not just at HBCUs but at major research institutions because these are the schools with graduate students.
- Faculty need to know that intellectual capacity resides with more than just one ethnic group.
- Don't just address the number or percentage of faculty you bring in, address the process by which people hire faculty.

Karen Uhlenbeck – University of Texas (She had no slides or power point)

- Women and Math is a program sponsored by the Institute for Advanced Study, Princeton
- Peer group of women mathematicians who were produced in the 60's and 70's noticed that there were not many young women following in their footsteps
- Most high school teachers and adjunct professors (at research institutions) were women, but numbers dropped rapidly at tenure track level
- Karen was founder of Park City Math Institute in 1991. Was having difficulties attracting a respectable percentage of women math teachers at every level except for high school teachers. Needed a program to address this. So started the Institute for Advanced Studies Make a Difference.
- Aptitude tests show women and men are about equal in mathematics. Women drop out of pipeline rather than fail out. Why?
- Howard Georgi, a physicist at Harvard suggests that assertiveness and singlemindedness are essential for success in sciences. These are traits that traditionally women do not have or are suppressed.
- Studies show the number of women in math vary by country and culture
- Deviation on aptitude test is larger among males than females. Taking this into account, we expect at least 1/3 of teachers in math to be female
- The Program – Institute for Advance Studies was founded in 1994
- Offers 2 weeks of advanced graduate courses in a particular topic chosen each year.
- Offers 2 one-week advanced undergraduate courses in topics not usually available in undergraduate curriculum
- Offers a standard research seminar
- Offers a colloquium by a distinguished local faculty
- Offers as daily science seminar
- What they have learned from the Institute: 1) the importance of having a peer group, 2) the existence of a body of women research mathematicians, 3) the positive experience of working and learning in a predominately female environment, 4) the importance of mentoring younger women, 5) the need to find an older woman mentor, 6) the importance of having a safe forum to share “war” stories, 7) the importance of a place where hopes and fears can be articulated, 7) women have the power to help each other.
- Problems: faculty, especially at elite institutions, cannot comprehend the benefits of having an all women's peer group; undergrads are, to a large extent, naïve – you cannot make it through grad school naïve about the balance of life issues, etc.; finding permanent funding for IAS