



Academic Institutions of Minority Faculty with Science, Engineering, and Health Doctorates

by Joan S. Burrelli¹

Science, engineering, and health (SEH) doctorates awarded by U.S. institutions to minorities (Asians, blacks, Hispanics, and American Indians/Alaska Natives) have been increasing in number and as a percentage over the past two decades. Nevertheless, both minority doctorate numbers and minority faculty numbers remain low, especially in the leading research institutions. Data on SEH doctorate recipients show that blacks, Hispanics, and American Indians/Alaska Natives, as a group, earned about 3,300 SEH doctorates from U.S. universities in 2008, 9% of all SEH doctorates (table 1). Asians earned about 10,900 SEH doctorates in 2008, 31% of all SEH doctorates, most of which (81%) were earned by temporary visa holders.²

This InfoBrief examines the characteristics of minority faculty with SEH doctorates, the types of schools from which they earn their doctorates, the types of schools in which they teach, and how they compare with nonminority faculty.

Among employed SEH doctorate holders in 2008, higher percentages of blacks (58%) and Hispanics

(55%) than of most other racial/ethnic groups (34%–47%) were employed in education in a variety of settings and appointments (table 2).^{3,4} Differences in field of doctorate account for some of the differences in employment by sector. Black, Hispanic, and American Indian/Alaska Native doctorate holders

are more likely than white and Asian doctorate holders to have doctorates in the social and behavioral sciences, fields in which academic employment is prevalent (NSF/SRS 2011).

Of the approximately 291,000 SEH doctorates employed in educational

TABLE 1. Science, engineering, and health doctorates awarded, by race/ethnicity and citizenship: 2008

Race/ethnicity	All doctorate recipients	U.S. citizen or permanent resident	Temporary visa holders	Citizenship unknown
All races/ethnicities	34,921	19,974	13,070	1,877
White	17,689	15,037	2,623	29
Asian	10,946	2,044	8,894	8
Underrepresented minority	3,255	2,135	1,109	11
Two or more races	382	347	34	1
Other/unknown race/ethnicity	2,649	411	410	1,828
Percent distribution				
All races/ethnicities	100.0	100.0	100.0	100.0
White	50.7	75.3	20.1	1.5
Asian	31.3	10.2	68.0	0.4
Underrepresented minority	9.3	10.7	8.5	0.6
Two or more races	1.1	1.7	0.3	0.1
Other/unknown race/ethnicity	7.6	2.1	3.1	97.4

NOTES: Underrepresented minority includes American Indian/Alaska Native, Black/African American, and Hispanic. Other/unknown race/ethnicity includes Native Hawaiian/Other Pacific Islander, those who indicated "no" to the Hispanic ethnicity item but did not indicate race, and those who did not provide race/ethnicity.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Earned Doctorates, 2008.

TABLE 2. Employed science, engineering, and health doctorate holders, by race/ethnicity and sector of employment: 2008

Race/ethnicity	All sectors	Education	Business or industry	Self-employed, not incorporated	Nonprofit	Government
All employed doctoral scientists and engineers	651,200	291,200	213,400	41,000	42,900	62,600
White	484,900	224,800	142,300	36,300	33,200	48,300
Asian	117,300	40,000	59,500	2,300	6,800	8,700
Black	19,400	11,200	3,800	900	1,000	2,500
Hispanic	20,300	11,100	5,000	1,000	1,200	2,000
Two or more races	7,200	3,300	2,100	400	600	900
Other race	2,100	1,000	600	100	100	200
	Percent distribution					
All employed doctoral scientists and engineers	100.0	44.7	32.8	6.3	6.6	9.6
White	100.0	46.4	29.3	7.5	6.8	10.0
Asian	100.0	34.1	50.7	2.0	5.8	7.4
Black	100.0	57.7	19.6	4.6	5.2	12.9
Hispanic	100.0	54.7	24.6	4.9	5.9	9.9
Two or more races	100.0	45.8	29.2	5.6	8.3	12.5
Other race	100.0	47.6	28.6	4.8	4.8	9.5

NOTES: Numbers rounded to nearest 100. Detail may not add to total because of rounding. Other race includes American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

institutions in 2008, approximately 221,000 were faculty in universities and colleges (table 3). Of these, 13% were Asian, 4% were black, 4% were Hispanic, 1% were two or more races, and less than 1% were all other race/ethnicity (American Indian/Alaska Native or Native Hawaiian/Other Pacific Islander). Because the fraction of SEH doctorates awarded to minorities has increased over time, minorities are a higher percentage of faculty with recent SEH doctorates than they are of all faculty with SEH doctorates. Among faculty who received SEH doctorates in 2005 or later, 22% were Asian, 5% were black, 6% were Hispanic, 2% were two or more races, and less than 1% were all other race/ethnicity.

Differences in years since doctorate are likely to account for some of the differences by race/ethnicity in rank and tenure. Smaller percentages of black, Hispanic, and Asian doctoral faculty with SEH doctorates than of white faculty are full professors, and larger percentages are assistant professors. Similarly, smaller percentages of black, Hispanic, and Asian faculty than of white faculty are tenured. As is the case

with field of doctorate, faculty with SEH doctorates differ by race/ethnicity in field of employment. A higher percentage of black faculty than of most other faculty with SEH doctorates are employed as faculty in S&E-related occupational fields, including the health sciences, or in non-S&E occupational fields (figure 1). A lower percentage of Asian than of most other faculty with SEH doctorates are employed as social science faculty, and a higher percentage are computer science, mathematics, or engineering faculty.

Minority faculty with SEH doctorates also differ in citizenship status and sex. About one-third of black, 37% of Hispanic, 91% of Asian, and 11% of white SEH doctoral faculty members are non-U.S. born, most of them being naturalized citizens (table 3). Higher percentages of black and Hispanic faculty with SEH doctorates are women than is the case for white and Asian faculty.

From What Types of Schools Did They Earn Their Doctorates?

Most (79%) faculty with SEH doctorates employed in U.S. academic

institutions earned their doctorates at institutions in the Carnegie Classification category of research universities with very high research activity (RUVH). Lower percentages of black faculty than of white, Asian, or Hispanic faculty earned their doctorates at RUVH institutions, and higher percentages earned them at academic institutions in the other two Carnegie Classification categories of doctorate-granting institutions (research universities, high research activity [RUH], and doctoral/research universities [DRU]) (table 4).

Where Are They Employed?

Among all faculty with SEH doctorates employed in U.S. academic institutions in 2008, a total of 36% were employed in RUVH institutions, 24% were employed in other doctorate-granting institutions (either RUH or DRU) or medical schools, and 21% were employed in master's-granting institutions (table 5). Minority faculty follow a similar pattern, with one notable exception. Black faculty with SEH doctorates differ from most other racial/ethnic groups in that a lower percentage were employed in RUVH institutions

TABLE 3. Selected characteristics of faculty with science, engineering, and health doctorates: 2008

Characteristic	All races/ ethnicities	White	Asian	Black	Hispanic	Two or more races	Other race
All faculty with SEH doctorates	221,000	173,600	27,600	8,300	8,300	2,600	700
Year of doctorate							
Pre-1970	10,200	9,000	900	S	100	S	S
1970–1974	16,900	15,000	1,000	300	400	200	S
1975–1979	22,300	19,600	1,500	700	300	300	S
1980–1984	23,700	20,500	2,000	600	500	200	S
1985–1989	27,600	22,200	2,900	1,000	1,000	400	S
1990–1994	32,100	23,900	5,000	1,200	1,500	400	100
1995–1999	35,900	27,000	5,000	1,600	1,700	400	200
2000–2004	36,200	26,000	5,900	2,000	1,700	400	200
2005 or later	16,100	10,400	3,500	800	1,000	300	100
Rank							
Professor	97,600	81,500	9,400	2,300	3,200	1,100	200
Associate professor	60,000	47,000	7,200	2,900	2,200	500	200
Assistant professor	56,200	39,600	10,100	2,800	2,700	800	300
Instructor	7,200	5,600	1,000	300	200	S	S
Tenure							
Not applicable: no tenure at institution	7,100	5,500	800	300	200	200	S
Not applicable: no tenure for position	13,300	10,400	1,700	600	400	100	S
Tenured	134,800	110,100	13,800	4,400	4,700	1,400	300
On tenure track but not tenured	46,600	32,600	8,600	2,200	2,300	700	200
Not on tenure track	19,300	15,000	2,600	800	600	100	S
Faculty occupational field							
Computer and mathematical scientists	22,600	15,800	5,400	600	700	100	S
Biological, agricultural, and other life scientists	47,100	37,700	5,700	1,100	1,900	600	S
Physical and related scientists	28,500	23,500	3,000	600	1,000	300	100
Social and related scientists	55,500	45,200	3,700	3,000	2,400	900	300
Engineers	20,100	13,800	4,700	600	700	200	S
S&E-related occupations	21,900	17,200	2,900	1,100	400	200	S
Non-S&E occupations	25,400	20,500	2,200	1,300	1,100	300	100
Citizenship							
U.S. citizen, native	171,000	155,000	2,400	5,700	5,200	2,100	600
U.S. citizen, naturalized	29,700	10,900	14,600	1,700	2,100	300	S
Non-U.S. citizen, permanent resident	15,700	6,300	7,800	800	700	S	S
Non-U.S. citizen, temporary resident	4,600	1,400	2,800	100	300	S	S
Sex							
Female	70,300	54,800	7,600	3,600	3,100	1,000	200
Male	150,800	118,900	20,000	4,700	5,200	1,600	400

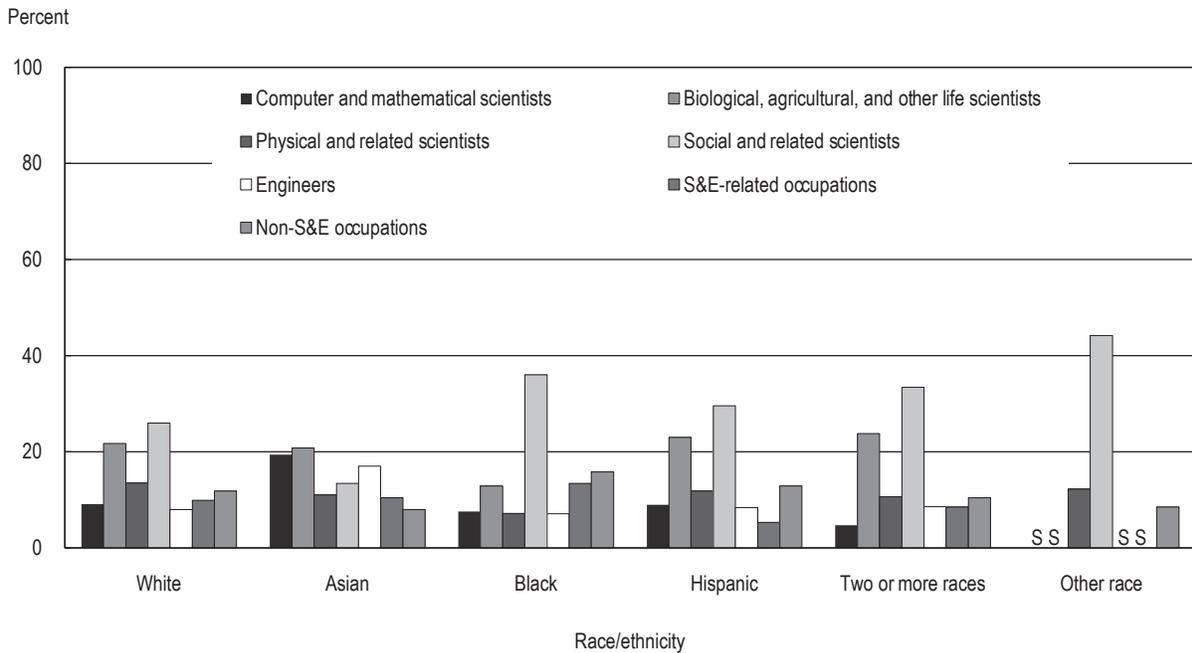
S = suppressed for reliability or confidentiality.

S&E = science and engineering; SEH = science, engineering, and health.

NOTES: Numbers rounded to nearest 100. Detail may not add to total because of rounding. Faculty include full, associate, and assistant professors and instructors. Other race includes American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. Faculty in health sciences are included in S&E-related occupations. Non-S&E faculty include faculty in business, management, education, arts and humanities, and other fields.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

FIGURE 1. Doctoral faculty with science, engineering, and health doctorates, by faculty occupational field and race/ethnicity: 2008



S = suppressed for reliability or confidentiality.

S&E = science and engineering.

NOTES: Faculty include full, associate, and assistant professors and instructors. Other race includes American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. Faculty in health sciences are included in S&E-related occupations. Non-S&E faculty include faculty in business management, education, arts and humanities, and other fields.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

TABLE 4. Faculty with science, engineering, and health doctorates, by Carnegie Classification of the institution from which they earned their doctorate: 2008

Carnegie Classification of doctorate-granting institution	Total	White	Asian	Black	Hispanic	Two or more races	Other race
All institutions	221,000	173,600	27,600	8,300	8,300	2,600	700
Research university (very high research activity)	174,900	138,900	21,900	5,200	6,400	2,100	500
Research university (high research activity)	34,600	26,400	4,100	2,300	1,300	400	200
Doctoral/research university	4,500	3,500	400	400	200	S	S
Medical school	5,100	3,400	1,000	200	300	100	S
Other/unclassified	2,000	1,500	200	200	100	S	S
		Percent distribution					
All institutions	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Research university (very high research activity)	79.1	80.0	79.3	62.7	77.1	80.8	71.4
Research university (high research activity)	15.7	15.2	14.9	27.7	15.7	15.4	28.6
Doctoral/research university	2.0	2.0	1.4	4.8	2.4	S	S
Medical school	2.3	2.0	3.6	2.4	3.6	3.8	S
Other/unclassified	0.9	0.9	0.7	2.4	1.2	S	S

S = suppressed for reliability or confidentiality.

NOTES: Numbers rounded to nearest 100. Detail may not add to total because of rounding. Faculty include full, associate, and assistant professors and instructors. Other race includes American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. Carnegie Classification used here is 2005 version of Carnegie Foundation for the Advancement of Teaching's basic classification scheme of academic institutions.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

TABLE 5. Faculty with science, engineering, and health doctorates, by Carnegie Classification of employer: 2008

Carnegie Classification of employer	Total	White	Asian	Black	Hispanic	Two or more races	Other race
All institutions	221,000	173,600	27,600	8,300	8,300	2,600	700
Research universities (very high research activity)	79,800	62,300	11,600	1,900	2,700	1,100	200
Research universities (high research activity)	33,200	26,100	4,600	800	1,300	300	100
Doctoral/research universities	9,500	7,500	1,000	700	200	S	100
Medical schools	10,200	7,700	1,500	400	600	100	S
Master's institutions	46,800	36,700	5,000	2,400	1,900	600	200
Baccalaureate institutions	20,500	17,600	1,100	800	700	200	100
2-year institutions	7,900	6,300	700	400	500	S	S
Other/missing	13,100	9,500	2,200	800	500	200	S
	Percent distribution						
All institutions	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Research universities (very high research activity)	36.1	35.9	42.0	22.9	32.5	42.3	28.6
Research universities (high research activity)	15.0	15.0	16.7	9.6	15.7	11.5	14.3
Doctoral/research universities	4.3	4.3	3.6	8.4	2.4	S	14.3
Medical schools	4.6	4.4	5.4	4.8	7.2	3.8	S
Master's institutions	21.2	21.1	18.1	28.9	22.9	23.1	28.6
Baccalaureate institutions	9.3	10.1	4.0	9.6	8.4	7.7	14.3
2-year institutions	3.6	3.6	2.5	4.8	6.0	S	S
Other/missing	5.9	5.5	8.0	9.6	6.0	7.7	S

S = suppressed for reliability or confidentiality.

NOTES: Numbers rounded to nearest 100. Detail may not add to total because of rounding. Faculty include full, associate, and assistant professors and instructors. Other race includes American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander. Carnegie Classification used here is 2005 version of Carnegie Foundation for the Advancement of Teaching's basic classification scheme of academic institutions.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

and a higher percentage were employed in master's-granting institutions.

Faculty with SEH doctorates who earned doctorates at RUVH institutions tend to teach at RUVH institutions. Relatively small percentages (less than 15%) of those who earned doctorates at other types of doctorate-granting institutions (either RUH or DRU) are employed at RUVH institutions. Those who earned doctorates from RUH or DRU doctorate-granting institutions are most likely to teach at master's-granting institutions (table 6).

However, among faculty who received their SEH doctorates from RUVH institutions, relatively fewer (31%) of black faculty were employed in RUVH institutions than faculty of most other racial/ethnic groups (39%–48%). A

higher percentage of black faculty (25%) with SEH doctorates from RUVH institutions than of white (20%) or Asian faculty (15%) were employed in master's-granting institutions. The relative prevalence of black faculty in master's-granting institutions is at least partly attributable to their prevalence in historically black colleges and universities (HBCUs) (figure 2), most of which are master's-granting institutions. Although HBCUs are the employers of only 2% of all faculty with SEH doctorates, they are the employers of 24% of black doctoral SEH faculty.

Data Sources and Limitations

This InfoBrief updates a previous publication (NSF 06-318) that was withdrawn in 2010 because of the

discovery of quality issues in racial/ethnicity data from the National Science Foundation's 2003 and the 2006 Survey of Doctorate Recipients (SDR). In this report, the racial/ethnic categories are mutually exclusive. The non-Hispanic white, black, Asian, and American Indian/Alaska Native categories are referred to here as white, black, Asian, and American Indian/Alaska Native, respectively. In tables, American Indians/Alaska Natives and Native Hawaiians/Other Pacific Islanders (excluding those selecting a Hispanic ethnicity) are included in the "other" race/ethnicity category.

The faculty data included in this report refer only to U.S. faculty with doctoral degrees in SEH fields from U.S. institutions. This InfoBrief draws on the 2008 SDR to describe the characteristics of

TABLE 6. Faculty with science, engineering, and health doctorates, by Carnegie Classification of the institution from which they earned their doctorate, Carnegie Classification of employer, and race/ethnicity: 2008 (Percent)

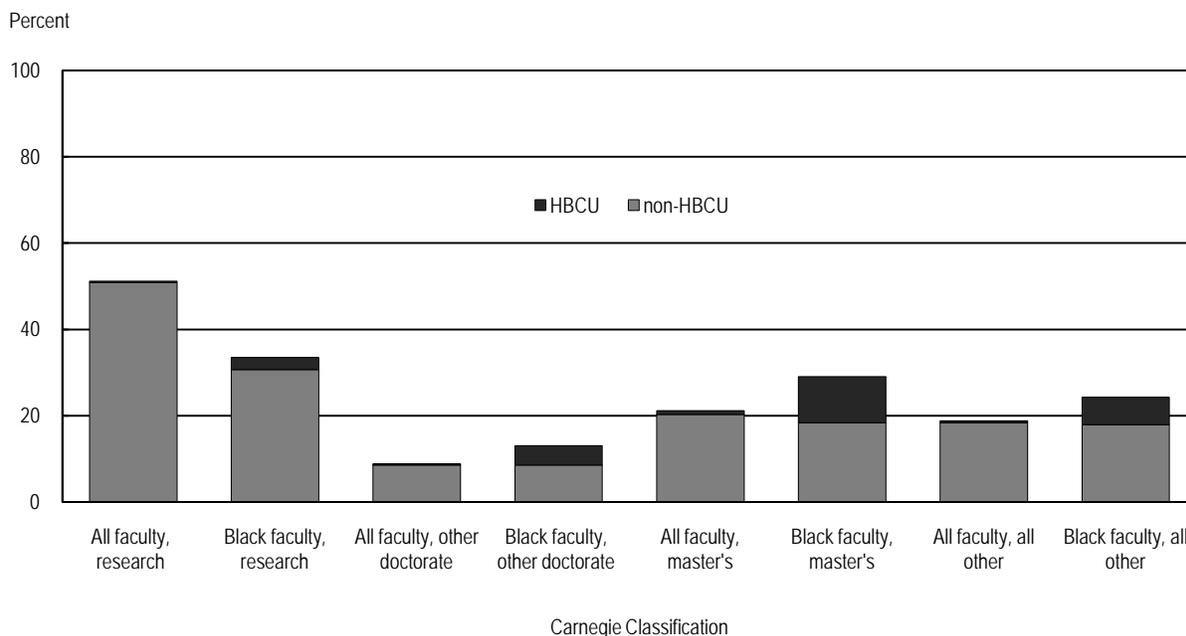
Carnegie Classification of doctorate-granting institution and race/ethnicity	All faculty (number)	Carnegie Classification of employer							
		Research universities (very high research activity)	Research universities (high research activity)	Doctoral/ research universities	Medical schools	Master's institutions	Bacca-laureate institutions	2-year institutions	Other
All institutions	221,000	36.1	15.0	4.3	4.6	21.2	9.3	3.6	5.9
White	173,600	35.9	15.0	4.3	4.4	21.1	10.1	3.6	5.5
Asian	27,600	42.0	16.7	3.6	5.4	18.1	4.0	2.5	8.0
Black	8,300	22.9	9.6	8.4	4.8	28.9	9.6	4.8	9.6
Hispanic	8,300	32.5	15.7	2.4	7.2	22.9	8.4	6.0	6.0
Two or more races	2,600	42.3	11.5	S	3.8	23.1	7.7	S	7.7
Other race	700	28.6	14.3	14.3	S	28.6	14.3	S	S
Research university (very high research activity)	174,900	41.5	14.2	3.8	4.0	19.4	8.6	3.0	5.4
White	138,900	41.0	14.0	3.7	3.8	19.8	9.6	3.0	5.0
Asian	21,900	47.5	16.9	3.2	4.6	15.5	3.2	1.8	7.3
Black	5,200	30.8	9.6	7.7	3.8	25.0	9.6	3.8	9.6
Hispanic	6,400	39.1	14.1	3.1	4.7	21.9	7.8	4.7	4.7
Two or more races	2,100	47.6	9.5	S	S	19.0	4.8	S	9.5
Other race	500	40.0	20.0	S	S	20.0	S	S	S
Research university (high research activity)	34,600	13.9	20.8	5.2	4.3	30.6	12.4	6.6	6.4
White	26,400	13.6	22.0	5.3	4.5	29.2	12.9	6.4	6.1
Asian	4,100	19.5	17.1	2.4	S	34.1	7.3	7.3	7.3
Black	2,300	8.7	8.7	8.7	4.3	39.1	13.0	8.7	8.7
Hispanic	1,300	7.7	23.1	S	7.7	30.8	15.4	7.7	7.7
Two or more races	400	S	S	S	S	50.0	S	S	S
Other race	200	S	S	S	S	0.0	S	S	S
Doctoral/research university	4,500	8.9	8.9	20.0	4.4	31.1	13.3	4.4	8.9
White	3,500	8.6	8.6	20.0	2.9	28.6	14.3	5.7	8.6
Asian	400	S	S	S	S	S	S	S	S
Black	400	S	S	25.0	S	50.0	S	S	S
Hispanic	200	S	S	S	S	S	S	S	S
Two or more races	S	S	S	S	S	S	S	S	S
Other race	S	S	S	S	S	S	S	S	S
Medical schools and medical centers	5,100	29.4	9.8	3.9	29.4	9.8	3.9	2.0	11.8
White	3,400	32.4	11.8	S	26.5	5.9	5.9	S	11.8
Asian	1,000	20.0	10.0	S	40.0	S	S	S	10.0
Black	200	S	S	S	50.0	50.0	S	S	S
Hispanic	300	33.3	S	S	33.3	33.3	S	S	S
Two or more races	100	S	S	S	S	S	S	S	S
Other race	S	S	S	S	S	S	S	S	S
Other institutions	2,000	25.0	5.0	S	5.0	20.0	15.0	5.0	20.0
White	1,500	20.0	S	S	S	13.3	13.3	S	26.7
Asian	200	S	S	S	S	50.0	S	S	S
Black	200	S	S	S	S	0.0	S	S	S
Hispanic	100	S	S	S	S	S	S	S	S
Two or more races	S	S	S	S	S	S	S	S	S
Other race	S	S	S	S	S	S	S	S	S

S = suppressed for reliability or confidentiality.

NOTES: Numbers rounded to nearest 100. Detail may not add to total because of rounding. Faculty include full, associate, and assistant professors and instructors. Other race includes American Indian/Alaska Native, Native Hawaiian/Other Pacific Islander, and two or more races. Carnegie Classification used here is 2005 version of Carnegie Foundation for the Advancement of Teaching's basic classification scheme of academic institutions.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

FIGURE 2. Faculty and black faculty with science, engineering, and health doctorates, by Carnegie Classification of employer and HBCU status: 2008



HBCU = historically black colleges and universities.

NOTES: Faculty include full, associate, and assistant professors and instructors. Research universities include Carnegie categories Research universities (very high research activity) and Research universities (high research activity). Other doctorate-granting institutions include Carnegie categories Doctoral/research universities and medical schools. Carnegie Classification used here is 2005 version of Carnegie Foundation for the Advancement of Teaching's basic classification of academic institutions.

SOURCE: National Science Foundation/National Center for Science and Engineering Statistics, Survey of Doctorate Recipients, 2008.

minority faculty with SEH doctorates. The SDR provides data on people who have earned SEH doctorates from U.S. institutions and who are employed in the United States. The term *faculty* in this report refers to full, associate, and assistant professors and instructors and includes adjunct faculty.

The Carnegie Classification used in this InfoBrief is the 2005 version of the Carnegie Foundation for the Advancement of Teaching's Classification of Institutions of Higher Education. Science, engineering, and health fields include biological/agricultural/environmental life sciences, computer and information sciences, mathematics and statistics, physical sciences, psychology, social sciences, engineering, and health fields.

Notes

1. Joan S. Burrelli (retired), Science and Engineering Indicators Program, National Center for Science and Engineering Statistics (NCSES), National Science Foundation (NSF), 4201 Wilson Boulevard, Suite 965, Arlington, VA 22230. For further information about this report, please contact Jaquelina Falkenheim, NCSES/NSF (jfalkenh@nsf.gov; 703-292-7798).

2. Data on SEH degrees are from the Survey of Earned Doctorates, sponsored by the National Science Foundation, the National Aeronautics and Space Administration, National Endowment for the Humanities, National Institutes of Health, U.S. Department of Agriculture, and U.S. Department of Education.

3. The standard error for "other" race/ethnicity (American Indian/Alaska Native and Native Hawaiian/Other Pacific Islander) is quite large due to small sample sizes. Thus differences between this group and all other racial/ethnic groups are not statistically significant.

4. Employment refers to principal employer during the week of 1 October 2008 and includes both full- and part-time employment.

Reference

National Science Foundation/Division of Science Resources Statistics (NSF/SRS). 2011. *Women, Minorities, and Persons with Disabilities in Science and Engineering: 2011*. Special Report NSF 11-309. Arlington, VA. Available at <http://www.nsf.gov/statistics/wmpd/>.

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