

PLANS FOR POSTDOCTORAL RESEARCH APPOINTMENTS AMONG RECENT U.S. DOCTORATE RECIPIENTS

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Postdoctoral appointments came into use in American higher education in the 1870s, when the U.S. higher-education system began to adopt the European model of the research university. They originally were used mostly in the biological sciences, and postdoctoral scholars (hereafter, postdocs) worked and trained on relatively large-scale laboratory-based projects in universities.² Since then, the range of disciplines supporting postdoctoral appointments has expanded, and the number of new research Ph.D.s accepting these appointments has increased (National Academies 2000).

This *InfoBrief* draws on data from the past decade of the Survey of Earned Doctorates (SED) to examine recent trends in the numbers of new doctorate recipients from U.S. institutions who accept postdoctoral positions. Because these positions can be broadly defined, this analysis relies on data provided by new doctorate recipients who reported having definite plans to take a position as a postdoctoral fellow, postdoctoral research associate, trainee or intern, or to do other postgraduate study. The data include only individuals who received research doctorates in the United States and do not reflect postdocs as a whole, as many U.S. post-

doctoral positions are filled by persons who earned their doctorates outside of the United States (CPST 2002).

Trends by Field of Doctorate

The number of new Ph.D.s pursuing postdoctoral appointments has increased in all fields of study since 1982, especially those outside the biological sciences (table 1). Each year for the past 10 years, more than 7,000 persons with newly earned doctorates from U.S. universities have become postdocs. Among doctorate recipients with definite commitments after graduation,³ the proportion taking postdoctoral positions increased substantially between 1982 and 1993 and has remained between 28 and 30 percent since 1993 (table 1).

The percentage of new doctorate recipients who go into postdoctoral positions varies greatly by field of study and other job-market characteristics. In 2002 the percentages ranged from 74 percent (biological sciences) to about 6 percent (education) (figure 1).

Within fields, the proportion of doctorate recipients going to postdoctoral positions has also varied over the past decade, a function of changing numbers of awards and postdoctoral positions. Between 1993 and 2002, the

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²There is no precise definition of "postdoc," but the term generally refers to a person who holds a temporary appointment, usually awarded in academe, industry, or government, for the purpose of gaining additional education and training in research.

³The total number of new research doctorate recipients from U.S. universities was 39,955 in 2002, and over the past decade it has ranged from a low of 39,800 in 1993 to a high of 42,654 in 1998. The percentage of the total reporting a definite commitment to postdoctoral study or other employment was 65.5 percent in 2002. That figure fluctuated between 60 and 62 percent from 1993 to 1998 and has increased since then.



TABLE 1. New doctorate recipients with definite commitments to postdoctoral study or research, by broad field of doctorate: 1982, 1993–2002

Field of doctorate	1982	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	Number										
Total with commitments, all fields	21,429	24,480	24,946	24,980	26,073	25,533	26,643	25,990	26,834	27,057	25,984
Total planning postdoctoral study	4,238	7,060	7,275	7,380	7,667	7,092	7,580	7,764	7,652	7,807	7,899
Science and engineering, total	3,918	6,568	6,708	6,774	7,103	6,551	6,909	7,010	6,902	6,874	7,003
Engineering	202	724	712	761	819	740	726	735	709	686	798
Physics/astronomy	341	641	684	657	638	580	603	577	524	514	578
Chemistry	524	840	920	873	851	806	843	798	767	750	727
Earth, atmospheric, ocean sciences	126	220	245	216	233	254	247	247	251	259	277
Mathematics	80	167	168	196	217	199	206	259	255	269	284
Computer sciences	15	87	80	112	108	85	86	62	57	70	108
Biological sciences	2,041	2,901	2,877	2,914	3,111	2,859	2,954	3,000	3,045	2,922	2,867
Agricultural sciences	124	196	230	210	217	204	229	237	211	219	233
Psychology	338	591	625	625	698	604	758	823	820	881	794
Social sciences	127	201	167	210	211	220	257	272	263	304	337
Non-science and engineering, total	320	492	567	606	564	541	671	754	750	933	896
Humanities	104	173	180	217	207	182	247	259	269	338	331
Health sciences	72	133	157	164	173	168	175	211	198	249	241
Education	125	136	165	167	125	147	183	215	207	246	228
Professional fields/other	19	50	65	58	59	44	66	69	76	100	96
	Percent										
Total planning postdoctoral study	19.8	28.8	29.2	29.5	29.4	27.8	28.5	29.9	28.5	28.9	30.4
Science and engineering, total	31.7	43.7	43.7	44.3	43.4	40.4	40.9	43.1	41.5	40.8	43.9
Engineering	11.4	25.2	24.1	24.8	22.4	20.3	19.5	22.4	21.1	18.9	24.8
Physics/astronomy	48.8	74.0	72.8	68.7	63.4	58.4	57.9	61.0	57.8	52.7	66.7
Chemistry	39.8	59.3	62.9	65.9	60.7	58.4	56.7	56.1	55.8	52.3	52.9
Earth, atmospheric, ocean sciences	25.9	45.9	47.5	47.9	49.4	46.3	47.0	47.0	50.4	49.0	51.6
Mathematics	15.8	27.1	27.5	29.9	33.7	30.5	28.9	35.9	34.6	38.6	42.5
Computer sciences	9.1	15.9	14.5	18.1	18.1	14.2	14.1	10.7	9.5	12.5	19.7
Biological sciences	72.1	79.8	79.7	80.3	80.1	73.6	75.3	77.9	75.9	75.4	74.4
Agricultural sciences	15.9	31.1	32.4	31.5	32.6	34.5	33.7	34.1	31.9	33.8	38.3
Psychology	16.6	27.8	29.4	30.7	32.6	30.8	35.4	37.9	36.5	39.6	38.8
Social sciences	7.1	11.0	8.9	11.1	11.0	11.1	12.5	13.2	11.8	13.3	15.0
Non-science and engineering, total	3.5	5.2	5.9	6.3	5.8	5.8	6.9	7.7	7.3	9.1	8.9
Humanities	4.8	6.9	7.0	8.0	7.5	6.7	8.4	8.6	8.4	10.0	10.4
Health sciences	15.4	17.0	19.6	20.5	20.5	18.9	18.2	23.2	18.3	23.7	21.1
Education	2.5	3.0	3.7	3.8	2.8	3.5	4.3	5.0	4.8	5.8	5.5
Professional fields/other	1.4	2.9	3.7	3.3	3.6	2.9	4.2	4.6	4.8	6.3	6.1

NOTE: Year designates the 12-month period ending on June 30 of the calendar year cited.

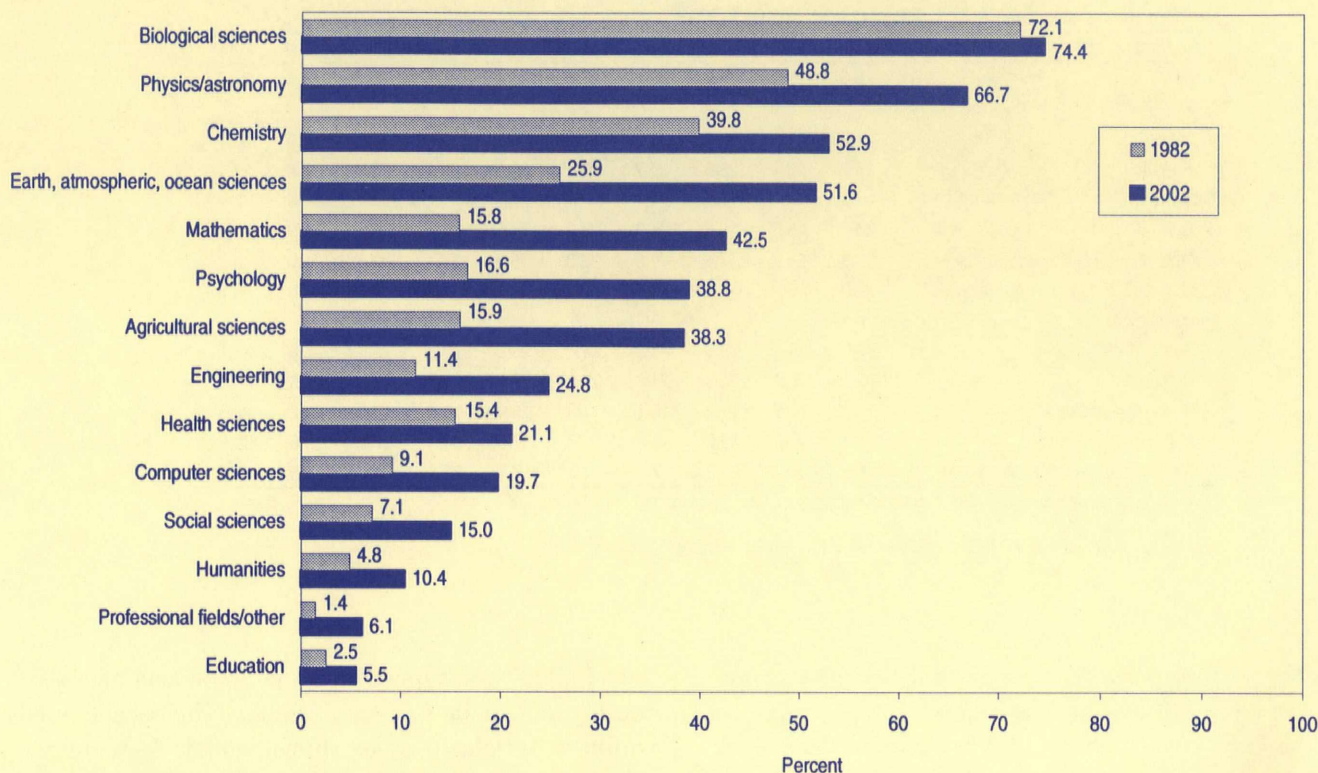
SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2002 Survey of Earned Doctorates.

broad fields of biology; physics; chemistry; and earth, atmospheric, and ocean sciences were the fields where postdocs were most prevalent: between 46 and 80 percent of new doctorate recipients with definite commitments in these fields moved into postdoctoral positions after graduation. Although the proportion of doctorate recipients in the field of earth, atmospheric, and ocean sciences who accept postdoctoral appointments has increased somewhat over the past decade, the proportion of their counterparts in chemistry, biology, and

physics/astronomy declined between 1993 and 2002. Recipients of doctorates in mathematics and psychology were substantially more likely to be committed to a postdoctoral position in 2002 than in 1993 (table 1).

The SED collects basic demographic information on new doctorate recipients each year, and this enables analysis of trends in postdoctoral plans for selected sub-populations. Overall trends in the proportions of new Ph.D.s taking postdoctoral positions, by sex, citizenship

FIGURE 1. Percentage of doctorate recipients with definite commitments who plan postdoctoral study or research, by broad field of study: 1982 and 2002



SOURCE: NSF/NIH/USED/NEH/USDA/NASA, Survey of Eamed Doctorates.

status, and race/ethnicity, are shown in table 2. The proportion of new Ph.D.s planning on postdoctoral positions has fluctuated between 30 and 33 percent for men and has risen from 25 to about 27 percent for women. The narrowing gap between men and women may reflect a number of factors, including the increasing representation of women in science and engineering (S&E) fields, like biology, that have traditionally had high proportions of postdocs, and the relatively high representation of women in fields like psychology, where the number of postdocs has increased.

Among doctorate recipients from U.S. universities, non-U.S. citizens plan on postdoctoral appointments in greater proportions than do U.S. citizens (table 2). For the past six years, the citizenship category with the highest percentage of postdocs has been non-U.S. citizens with temporary visas, followed by those with permanent visas. The greater likelihood of non-U.S. citizens planning postdoctoral positions is partly a reflection of their higher concentration in the S&E fields that

support higher proportions of postdocs, but the higher rates for non-U.S. citizens relative to U.S. citizens are also evident within other S&E fields. Additional factors appear to contribute to the attractiveness of postdoctoral positions to non-U.S. citizens.

Trends in Sources of Support

The 2002 SED showed that universities were expected to be the main source of support for 42 percent of those with definite plans for a postdoctoral position, followed by the U.S. government (33 percent). Although the remaining sources of support are combined in table 3, the full tabulations show that in 2002, private foundations were cited as the main source of support by 6 percent of postdocs, other nonprofit organizations by 4 percent, business or industry by 4 percent, and other (unnamed) sources by 5 percent. The remaining 6 percent indicated that they did not know the source of their support, possibly reflecting uncertainty about how to classify support from a U.S. government grant to a university-based research program.

TABLE 2. Percentage of new doctorate recipients with definite commitments to postdoctoral study or research, by demographic characteristic and year of doctorate: 1993–2002

Demographic characteristic	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total	28.8	29.2	29.5	29.4	27.8	28.4	29.9	28.5	28.9	30.4
Sex										
Male	31.5	31.6	32.4	31.9	29.6	29.8	31.8	30.2	29.9	32.7
Female	24.7	25.4	25.3	25.7	25.0	26.5	27.2	26.3	27.6	27.4
Citizenship										
U.S. citizen	25.5	25.5	25.6	25.2	24.3	24.9	26.7	25.9	26.9	27.4
Non-U.S. citizen, permanent visa	33.9	44.8	47.4	40.5	33.0	36.3	36.4	30.8	31.0	33.0
Non-U.S. citizen, temporary visa	39.0	36.7	36.8	39.2	37.7	38.0	39.1	36.3	34.3	38.3
Race/ethnicity										
White, non-Hispanic	25.6	25.4	25.6	25.3	24.4	25.2	26.8	25.6	26.8	27.1
Hispanic	25.9	26.0	26.6	24.8	22.3	24.2	26.2	28.3	27.6	26.9
Black, non-Hispanic	16.4	17.5	17.2	15.1	17.3	15.9	18.4	18.3	22.2	22.6
Asian/Pacific Islander	38.8	48.7	48.9	44.5	36.3	37.9	39.9	37.4	35.9	38.8
American Indian/Alaskan Native	14.5	25.3	25.5	17.5	11.2	17.4	23.8	20.3	17.8	17.6

NOTE: Year designates the 12-month period ending on June 30 of the calendar year cited.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2002 Survey of Earned Doctorates.

For the postdoc population as a whole, the 10-year-trend data in table 3 show that the relative shares supported by the U.S. government and other sources decreased, and the share supported by universities increased. Similar patterns of decrease and increase occur in S&E and non-S&E fields, but support from the U.S. government has been consistently less, and support from colleges and universities consistently more, for non-S&E fields than for S&E fields.

Comparing sources of support in 2002 for postdocs by field of doctoral study (table 3), the U.S. government was the main source for over one-third of postdocs in the fields of biological sciences (41 percent); earth, atmospheric, and ocean sciences (40 percent); physics and astronomy (40 percent); agricultural sciences (35 percent); health sciences (34 percent); and chemistry (34 percent). In S&E fields, the lowest levels of U.S. government postdoctoral support that year were in mathematics (22 percent) and social sciences (20 percent). In non-S&E fields, U.S. government support for postdocs was even lower: 11 percent for education, 9 percent for professional/other fields, and 6 percent for humanities.

Over one-third of postdocs in 2002 in every S&E field reported that universities were their main source of support. Universities supported almost two-thirds (64 percent) of mathematicians taking postdoctoral posi-

tions in 2002 and supported about 50 percent of engineering and social science postdocs. The decade trends within most fields of study shown in table 3 generally follow the overall pattern of increases in the proportions of postdocs supported mainly by university funds.

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TABLE 3. Percentage of those with definite commitments to postdoctoral study, by main source of financial support and broad field and year of doctorate: 1993–2002

Main source of support	All fields	Science and engineering											Non-science and engineering				
		Total	Engineering	Physics/astronomy	Chemistry	Earth, atmospheric, ocean sciences	Mathematics	Computer sciences	Biological sciences	Agricultural sciences	Psychology	Social sciences	Total	Humanities	Health sciences	Education	Professional fields/other
U.S. government																	
1993	37.8	38.9	31.4	40.0	36.4	45.8	24.4	21.4	44.1	32.1	35.5	19.8	21.4	11.0	42.2	19.8	13.6
1994	38.7	40.0	33.9	39.7	35.6	49.2	20.9	32.9	45.6	28.5	38.0	20.0	21.4	9.1	47.4	11.0	16.7
1995	39.6	40.9	33.8	40.4	35.8	52.6	20.1	37.3	46.7	32.8	37.0	29.3	25.1	12.2	47.4	12.3	25.0
1996	37.3	38.7	34.6	35.8	38.5	52.2	22.0	26.4	44.3	25.5	32.5	20.1	19.0	6.7	37.2	16.7	9.1
1997	37.9	39.4	32.1	45.2	37.7	48.0	18.6	34.1	44.9	28.4	33.9	20.9	19.7	7.7	38.7	13.6	11.4
1998	37.7	39.1	33.3	40.8	34.5	50.8	17.3	41.8	45.9	30.4	31.3	23.6	22.4	10.1	44.8	17.0	17.0
1999	36.6	38.2	34.9	41.7	36.3	51.2	19.5	29.0	44.2	24.5	31.5	20.9	20.6	8.9	44.3	11.1	17.2
2000	36.9	38.8	32.4	38.4	34.8	51.2	22.7	20.8	45.7	26.8	33.5	22.1	19.3	7.4	42.3	10.5	12.3
2001	32.2	34.4	28.1	38.3	31.5	42.7	17.8	32.8	40.8	30.1	29.1	13.8	15.2	4.8	39.1	10.5	7.1
2002	33.1	35.4	27.4	39.7	33.9	39.8	22.3	27.0	41.3	34.9	31.7	20.3	16.5	5.5	34.0	10.8	8.6
College or university																	
1993	30.9	30.8	43.1	36.7	34.7	28.5	51.9	42.9	23.9	38.5	24.0	37.4	33.6	35.5	25.9	27.9	45.5
1994	31.3	31.0	41.1	38.3	37.8	29.0	52.8	35.5	23.0	40.7	23.7	42.5	35.9	47.6	22.1	27.6	42.6
1995	31.3	31.1	43.1	38.3	37.2	26.1	57.7	33.6	22.5	37.3	27.8	30.9	33.3	39.4	28.9	30.4	41.7
1996	31.2	30.5	40.3	39.8	32.1	26.3	58.0	44.3	22.5	45.3	25.5	43.1	40.2	46.9	31.7	36.0	40.0
1997	31.7	31.1	43.7	35.5	37.1	28.7	57.3	32.9	23.0	41.7	26.8	40.0	39.2	48.4	34.5	25.9	59.1
1998	32.6	31.7	42.2	39.1	35.7	32.8	62.4	30.4	22.8	42.4	30.5	42.3	42.6	56.4	29.4	35.9	45.3
1999	33.2	32.9	42.7	38.5	34.2	26.4	60.9	51.6	25.6	41.0	31.9	42.2	38.0	46.4	29.1	29.1	42.2
2000	34.4	33.6	43.1	41.9	37.6	27.6	57.8	54.7	25.3	45.9	32.4	47.3	43.6	53.1	30.9	35.4	50.7
2001	38.6	37.7	40.8	43.7	37.8	38.0	65.2	41.8	31.2	45.4	36.0	56.2	48.2	60.3	31.9	35.3	54.1
2002	42.2	40.9	50.6	45.4	41.3	38.7	63.5	44.1	34.7	46.6	36.7	50.4	51.7	66.4	38.1	46.8	52.7
Other/unknown																	
1993	32.2	31.2	27.7	24.2	28.9	25.7	23.7	35.7	32.0	29.4	40.5	42.9	45.1	53.5	31.9	52.3	40.9
1994	30.9	29.7	25.7	23.4	26.6	21.8	26.4	31.6	31.4	30.8	38.2	37.5	42.7	43.3	30.5	61.4	40.7
1995	29.9	28.8	23.2	22.3	27.0	21.3	22.2	29.1	30.8	29.9	35.2	39.8	41.6	48.4	23.7	57.2	33.3
1996	31.9	31.1	25.5	24.5	29.4	21.5	20.0	29.2	33.2	29.2	42.0	36.8	40.8	46.4	31.1	47.4	50.9
1997	30.4	29.5	24.2	19.3	25.2	23.2	24.1	32.9	32.1	29.9	39.2	39.1	41.1	44.0	26.8	60.5	29.5
1998	29.7	29.2	24.4	20.1	29.7	16.4	20.3	27.8	31.3	27.2	38.2	34.1	34.9	33.5	25.8	47.1	37.7
1999	30.2	28.8	22.4	19.9	29.5	22.3	19.5	19.4	30.2	34.5	36.5	36.9	41.5	44.8	26.6	59.8	40.6
2000	28.7	27.6	24.5	19.7	27.6	21.2	19.5	24.5	29.0	27.3	34.0	30.6	37.1	39.5	26.8	54.1	37.0
2001	29.2	27.9	31.1	18.0	30.8	19.2	17.0	25.4	27.9	24.5	34.9	30.0	36.6	34.8	29.0	54.2	38.8
2002	24.7	23.7	22.0	14.9	24.8	21.5	14.2	28.8	24.0	18.5	31.7	29.3	31.8	28.1	27.9	42.3	38.7

NOTE: Percentages may not add to 100 because of rounding.

SOURCE: NSF/NIH/USED/NEH/USDA/NASA, 2002 Survey of Earned Doctorates.

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