

Update on the 1999 Survey of New Doctoral Recipients

Information about recipients of doctoral degrees awarded between July 1, 1998, and June 30, 1999, was collected from doctorate-granting departments in late spring 1999 and from a follow-up census of individual degree recipients beginning in October. The "1999 Annual Survey First Report" (*Notices of the AMS*, February 2000, pages 231-43) presents the survey results obtained about new doctoral recipients from the departments. Here we update the earlier figures on the basis of the follow-up census of the doctoral recipients themselves.

The names of the 1998-99 doctoral recipients and their thesis titles were published in "Doctoral Degrees Conferred" (*Notices of the AMS*, February 2000, pages 253-271). A supplement to this list appears at the end of this report.

Table/Figure 1 shows the fall and final counts of new doctoral recipients in the mathematical sciences awarded by U.S. institutions from 1992 through 1999. This year's final count of 1,135 represents a decrease of 3.5% from the 1,176 doctorates awarded

during 1997-98. Numbers in this table/figure have been revised from previous reports to exclude new doctorates data from Group Vb departments, which are no longer surveyed.

Citizenship status is known for all of the 1,135 new doctoral recipients. The final count of new doctoral recipients who are U.S. citizens is 560. The percentage of 1998-99 new doctoral recipients who are U.S. citizens is 49.3%, up slightly from the reported 48.1% of the past year, and is the largest percentage reported by the Annual Survey since 1986-87. The

final count of new doctoral recipients who are non-U.S. citizens decreased from 639 to 575 and was well below the record high of 679 reported in the final count for 1992-93. Pages 235-37 of the First Report present further information related to the citizenship of the 1998-99 new doctoral recipients. Also see Table 4G in this report.

Of the 560 U.S. citizen new doctoral recipients, 188 are women and 372 are men. The 188 women new doctoral recipients comprise 33.6% of the U.S. citizen total for 1998-99, an increase over last year's count of 163, which was 27.8% of the U.S. citizen new doctoral recipients, even though the total number of new doctorates for 1998-99 is down slightly from last year. The number of U.S. citizen men, 372, decreased by 51 (12.1%) from 1997-98.

Tables 2A and 2B display updates of employment data, found in these same tables in the First Report, for the fall count of 1998-99 doctoral recipients plus two additional doctoral recipients reported late. These tables are partitioned by field of thesis research and by the survey group of their degree department. At the time of this Second Report, the fall 1999 employment status of 1,021 of the 1,135 doctoral recipients was known.

The fall 1999 unemployment rate for new doctoral recipients, based on information gathered by the time of the Second Report, was 4.7%. The unemployment rate rose steadily in the early 1990s and reached its all-time high of 10.7% in 1994 and held that rate through 1995. It began to decrease in 1996 and dropped off in 1997 to 3.8%. Last year it was 4.9%. All of these rates are still well above the rates of the 1970s and 1980s. The counts on which these rates are determined do not include those new doctoral recipients whose fall employment status was unknown at the time of the Second Report. Figure 3 presents the fall 1978 through fall 1999 trend in the final fall unemployment rate of new doctoral recipients. Note that prior to 1999, the unemployment rate for Group Vb is included in the total unemployment rate for each year.

Of the 1,021 new doctoral recipients whose employment status is known, 59.7% found academic employment in the U.S. (including 3.1% in research institutes and other nonprofits). Another 10.0% took academic employment in other countries. These same figures for 1997-98 were 52.2% (including 2.9% in research institutes and other nonprofits) and 11.0%

While employment of 1998-99 doctoral recipients by U.S. Ph.D.-granting institutions increased by 27.8% from the corresponding figure for 1997-98, employment by research institutes, government, and business and industry decreased by 24.3% (including a decrease of 27.0% in employment by business and industry).

Table/Figure 1: U.S. New Doctoral Recipients, Fall and Final Counts, 1992 to 1999

Year	Fall	Final
1992-93	1104	1116
1993-94	1025	1034
1994-95	1148	1157
1995-96	1098	1099
1996-97	1123	1130
1997-98	1163	1176
1998-99	1133	1135

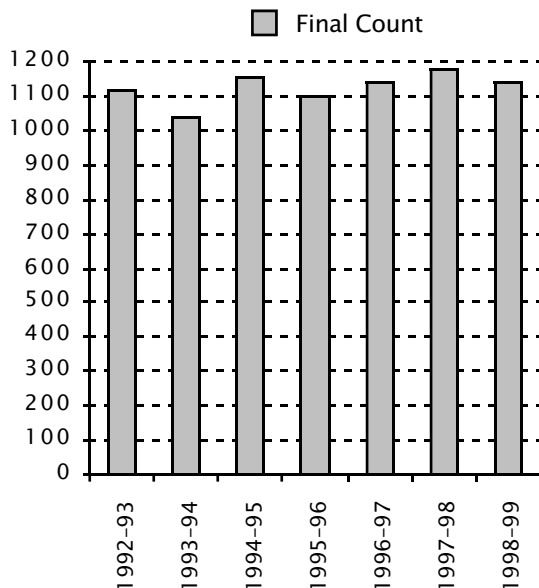


Table 2A: Fall 1999 Employment Status of 1998-99 U.S. Doctoral Recipients in the Mathematical Sciences, Updated April 2000

TYPE OF EMPLOYER	FIELD OF THESIS												TOTAL	
	Algebra Number Theory	Real, Comp., Funct., & Harmonic Analysis	Geometry/Topology	Discr. Math./Combin./Logic/Comp. Sci.	Probability	Statistics	Applied Math.	Numerical Analysis/Approximations	Linear Nonlinear Optim./Control	Differential, Integral, & Difference Equations	Math. Education	Other/Unknown		
Group I (Public)	23	9	22	11	3	0	3	4	1	12	0	0	88	
Group I (Private)	13	6	14	2	3	1	7	3	0	6	0	0	55	
Group II	16	12	9	5	2	0	4	7	1	6	0	0	62	
Group III	5	2	3	1	0	8	1	0	1	5	2	0	28	
Group IV	1	0	0	0	1	43	0	0	0	2	0	0	47	
Group Va	0	0	1	2	0	2	6	3	2	3	0	0	19	
Master's	14	9	11	4	0	6	2	3	1	2	2	0	54	
Bachelor's	34	15	19	22	3	10	8	9	1	14	3	1	139	
Two-Year College	4	2	2	2	2	1	0	2	0	3	0	0	18	
Other Academic Dept.	3	3	4	7	2	20	12	5	3	3	6	0	68	
Research Institute/ Other Nonprofit	6	1	0	0	4	13	1	3	1	3	0	0	32	
Government	1	7	1	0	5	13	3	5	0	3	0	1	39	
Business and Industry	10	5	15	15	8	70	22	18	5	16	0	1	185	
Non-U.S. Academic	18	15	11	11	3	21	5	5	1	12	0	0	102	
Non-U.S. Nonacademic	1	2	2	0	4	5	2	1	0	2	0	0	19	
Not Seeking Employment	3	2	5	2	0	4	0	1	0	1	0	0	18	
Still Seeking Employment	9	8	6	1	4	9	6	0	0	5	0	0	48	
Unknown (U.S.)	6	4	8	7	6	28	7	5	1	2	2	0	76	
Unknown (non-U.S.) ¹	4	1	6	3	0	15	5	2	0	1	0	1	38	
COLUMN TOTAL	171	103	139	95	50	269	94	76	18	101	15	4	1135	
COLUMN SUBTOTALS	Male	125	77	107	73	34	173	67	58	13	78	10	2	817
	Female	46	26	32	22	16	96	27	18	5	23	5	2	318

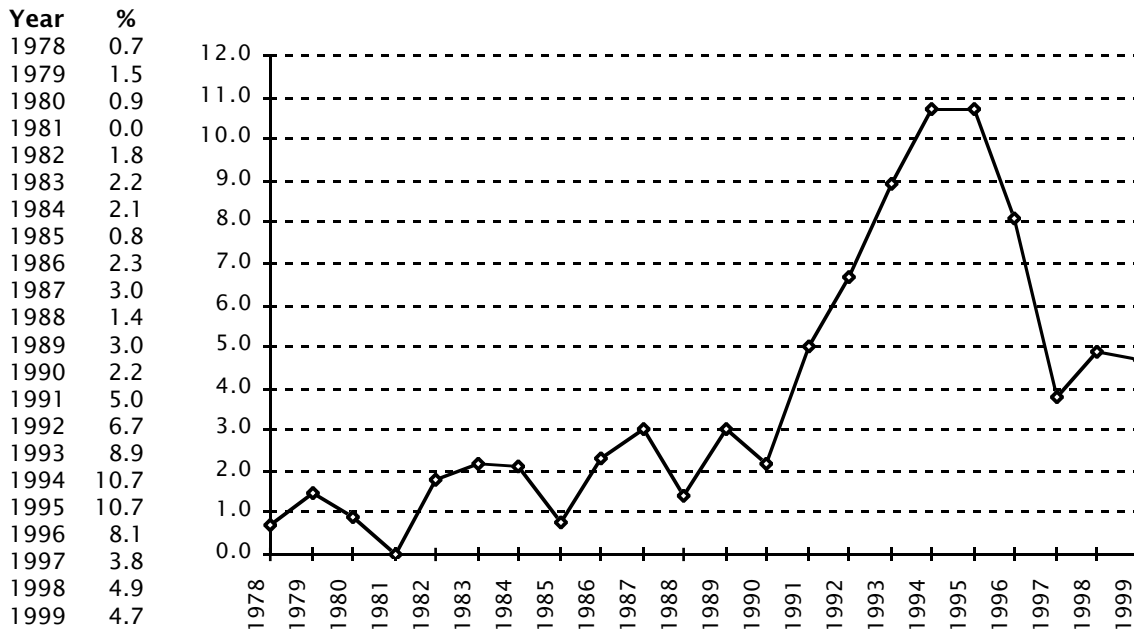
¹ Includes those whose status is reported as "unknown" or "still seeking employment".

Table 2B: Fall 1999 Employment Status of 1998-99 U.S. Doctoral Recipients by Type of Degree-Granting Department, Updated April 2000

TYPE OF EMPLOYER	TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT						ROW TOTAL	ROW SUBTOTAL	
	Group I (Public) Math	Group I (Private) Math	Group II Math	Group III Math	Group IV Statistics	Group Va Applied Math		Male	Female
Group I (Public)	50	23	10	2	0	3	88	63	25
Group I (Private)	17	29	3	1	1	4	55	43	12
Group II	22	6	28	3	1	2	62	43	19
Group III	7	0	4	11	6	0	28	17	11
Group IV	1	2	0	2	40	2	47	27	20
Group Va	3	2	1	0	1	12	19	15	4
Master's	14	3	21	13	3	0	54	40	14
Bachelor's	32	13	54	30	6	4	139	91	48
Two-Year College	5	1	6	4	1	1	18	14	4
Other Academic Dept.	10	5	16	15	15	7	68	48	20
Research Institute/ Other Nonprofit	5	7	3	1	12	4	32	21	11
Government	6	1	11	4	14	3	39	27	12
Business and Industry	32	24	28	21	66	14	185	141	44
Non-U.S. Academic	37	18	18	3	21	5	102	78	24
Non-U.S. Nonacademic	5	2	3	1	7	1	19	16	3
Not Seeking Employment	3	5	1	3	4	2	18	10	8
Still Seeking Employment	15	4	12	5	9	3	48	36	12
Unknown (U.S.)	16	6	14	15	23	2	76	56	20
Unknown (non-U.S.) ¹	12	1	8	4	13	0	38	31	7
COLUMN TOTAL	292	152	241	138	243	69	1135	817	318
COLUMN SUBTOTALS	Male	214	114	175	104	156	53	817	
	Female	78	38	66	33	87	16	318	

¹ Includes those whose status is reported as "unknown" or "still seeking employment".

Figure 3: Percentage of New Doctoral Recipients Unemployed, As Reported in the Respective Annual Survey Second Reports, 1978–1999



ogy, 12.5% took nonacademic employment. For probability or statistics the analogous figure is 40.5%; and for applied mathematics, discrete mathematics, combinatorics, logic, computer science, numerical analysis, approximations, linear, or non-linear optimization the analogous figure is 29.2%.

Of the 1,135 doctoral degrees awarded in the mathe-

Among those 1998–99 doctoral recipients taking employment in the U.S., 26.9% took nonacademic employment (government or business and industry). This is down from 35.3% in

mathematical sciences between July 1, 1998, and June 30, 1999, 39.1% (444) were awarded by Group I departments, 21.2% (241) by Group II, and 12.2% (138) by Group III.

Table 4A: Number of New Doctoral Recipients Taking Positions in Business and Industry by Type of Degree-Granting Department, Fall 1998 and Fall 1999

Group	I (Pu)	I (Pr)	II	III	IV	Va	Total
Fall 1998	37	27	44	25	75	26	234
Fall 1999	32	24	28	21	66	14	185

Tables 4A through 4G first appeared in the First Report for 1998–99, although they do not have the same table numbers in that report. They have all been updated with information obtained from the individual new doctoral recipients using a follow-up questionnaire. Here are a few things we can glean from these tables.

1997–98. This is a substantial change from the past few years and is almost certainly due to the fact that more academic jobs were available in the U.S. for fall 1999. Among new doctoral recipients who are known to have employment, the number taking nonacademic employment (U.S. government, U.S. business and industry, and non-U.S. nonacademic) varied significantly by field of thesis. Of those whose field of thesis was algebra/number theory; real, complex, functional, or harmonic analysis; or geometry/topol-

Table 4C: U.S. Academic Positions Filled by New Doctoral Recipients by Type of Hiring Department, Fall 1998 and Fall 1999

Group	I–III	IV	Va	M&B	Other	Total
Fall 1998	187	36	5	203	116	547
Fall 1999	233	47	19	193	118	610

Forty-nine fewer new doctoral recipients accepted jobs in business and industry compared to last year, a drop of 20.9%. Sixty-three more new doctoral recipients were hired in U.S. academic institutions than last year, an increase of 11.5%. Group I, II, and III departments hired 46 more new doctoral recipients this year than they did last year, an increase of 24.6%, while the number of new doctoral recipients hired by Group M and B departments is down by 10 (4.9%). New doctoral recipients from Group I Public departments have the highest unemployment rate this year at 5.7%, while those

Table 4B: Number of New Doctoral Recipients Taking U.S. Academic Positions by Type of Degree-Granting Department, Fall 1998 and Fall 1999

Group	I (Pu)	I (Pr)	II	III	IV	Va	Total
Fall 1998	133	100	138	61	85	30	547
Fall 1999	166	91	146	82	86	39	610

from Group I Private departments have the lowest unemployment rate at 2.8%. Table 4F shows that academic doctoral departments, Groups I through Va, hired 50% U.S. citizens, and the same thing is true for the hiring for nonacademic positions in the U.S. For academic positions

Table 4D: Percentage of Female New Doctoral Recipients Produced by and Hired by Doctoral-Granting Departments, 1998-99

%	I (Pu)	I (Pr)	II	III	IV	Va	Total
Produced	26.7	25.0	27.4	23.9	35.8	23.2	28.0
Hired	28.4	21.8	30.6	39.3	42.6	21.1	30.4

other than in the doctoral departments, about two-thirds of the new doctoral recipients hired were U.S. citizens. Table 4G shows the citizenship of the 1,135 new doctoral recipients and the fact that 834 new doctoral recipients found jobs in the U.S. this year.

Of the 1,133 new doctoral recipients reported in the First Report, the 977 whose addresses were known were sent the Employment Experiences of New Doctoral Recipients (EENDR) survey in October 1999, and 590 (60.4%) responded. The response rates varied considerably among the various subgroups of new doctorates defined by their employment status as reported by departments. They ranged from 63.9% for those employed in academia in the U.S. down to 37.5% for individuals in the U.S. whose employment status was unknown to the department.

The EENDR gathered details on employment experiences not available through departments. The rest of this section presents the additional information available on this subset of the 1998-99 doctoral recipients.

Of the 590 total respondents to the EENDR, 512 were employed in the U.S., 53 were employed outside the U.S., and 25 were unemployed in the U.S. as of the week of October 11, 1999. Among those employed in the U.S., 485 were employed full-time and 27 were employed part-time. Of the 27 reporting part-time employment, 13 reported that they were working

part-time because a suitable full-time job was not available. Five also reported they were working

Table/Figure 4E: Percentage of Unemployed New Doctoral Recipients by Type of Degree-Granting Department, Fall 1998 and Fall 1999

%	I (Pu)	I (Pr)	II	III	IV	Va	Total
Fall 1998	5.4	3.7	7.0	8.9	3.1	1.4	4.9
Fall 1999	5.7	2.8	5.5	4.2	4.3	4.5	4.7

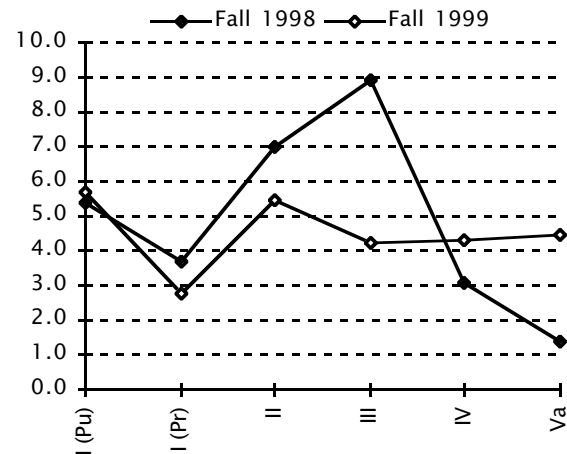


Table 4F: New Doctoral Recipients Having Employment in the U.S. by Type of Employer and Citizenship

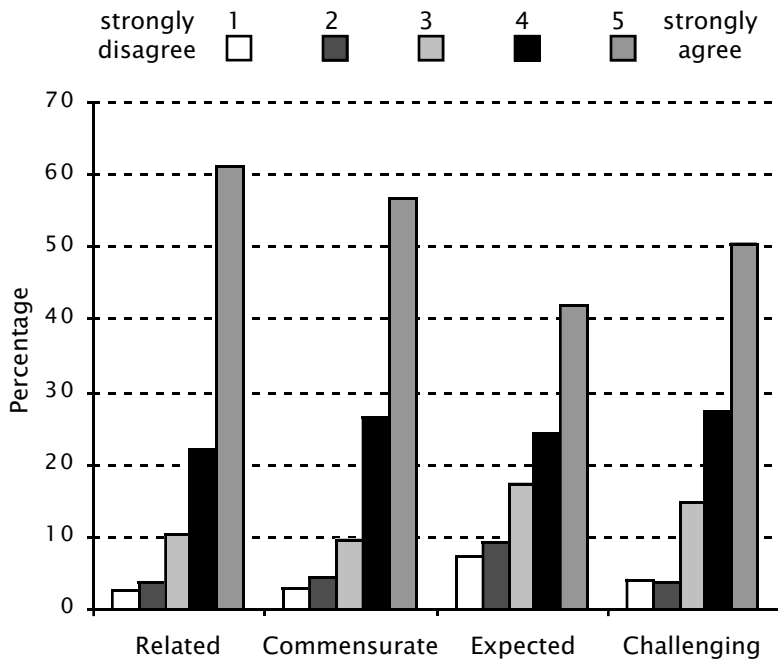
Employer	U.S.	Non-U.S.	Total
U.S. Academic, Groups I-Va	151	148	299
U.S. Academic, Other	209	102	311
U.S. Nonacademic	113	111	224
Total	473	361	834

Table 4G: Employment Status of 1998-99 U.S. New Doctoral Recipients by Type of Citizenship

TYPE OF EMPLOYER	CITIZENSHIP				TOTAL DOCTORAL RECIPIENTS
	U.S. CITIZENS	NON-U.S. CITIZENS			
		Permanent Visa	Temporary Visa	Unknown Visa	
U.S. Employer	473	70	280	11	834
U.S. Academic	360	45	198	7	610
Groups I, II, III, and Va	132	14	104	2	252
Group IV	19	7	18	3	47
Non-Ph.D. Department	197	20	61	1	279
Research Institute/Other Nonprofit	12	4	15	1	32
U.S. Nonacademic	113	25	82	4	224
Non-U.S. Employer	18	4	91	8	121
Non-U.S. Academic	14	2	80	6	102
Non-U.S. Nonacademic	4	2	11	2	19
Not Seeking Employment	10	1	7	0	18
Still Seeking Employment	22	3	23	0	48
SUBTOTAL	523	78	401	19	1021
Unknown (U.S.)	36	10	23	7	76
Unknown (non-U.S.) ¹	1	0	29	8	38
TOTAL	560	88	453	34	1135

¹ Includes those whose status is reported as "unknown" or "still seeking employment".

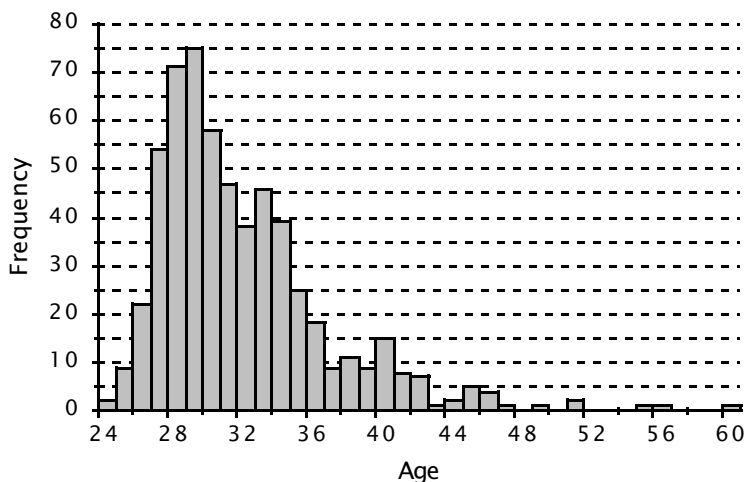
Figure 5: Distribution of Job Satisfaction



part-time while they pursued additional education.

Among the 512 employed in the U.S., 273 reported obtaining a permanent position and 237 a temporary position (2 individuals did not answer this question). Of the 237 in temporary positions, 101 (42.6%) reported taking temporary employment because a suitable permanent position was not available and 155 (65.4%) classified their position as postdoctoral. Furthermore, among those in postdoctoral positions, 37.4% responded that they took the position be-

Figure 6: Age Distribution of New Doctoral Recipients



cause a suitable permanent position was not available.

Among the 273 who reported obtaining a permanent position in the U.S., 59.3% were employed in academia (including 4.0% in research institutes and other nonprofits), 36.6% in business or industry, and 4.0% in government. Women held 31.1% of the permanent positions.

Among the 237 individuals with temporary employment in the U.S., 94.1% were employed in academia (including 5.1% in research institutes and other nonprofits), 0.4% in business or industry, and 5.5% in government.

Among the 53 individuals employed outside the U.S., 83.0% were employed in academia (including 13.2% in research institutes and other nonprofits), 15.1% in business or industry, and 1.9% in government. Seven of those employed outside the U.S. were U.S. citizens, and three were U.S. permanent residents.

The most frequently used job search resources were electronic at 58.0%, periodicals (newsletters, magazines, and journals) at 44.5%, informal channels (networking with colleagues or friends) at 43.3%, and faculty advisor at 42.9%. The remaining types of resources are used much less often, each below 18%. When asked to indicate the single most effective job search resource, 43.8% chose electronic resources. The next highest was informal channels at 18.2%, followed by periodicals at 9.4%. Not surprisingly, 74.6% reported using two or more of these methods. The AMS's Web site, e-MATH, was the most frequently mentioned electronic resource. The *Notices of the AMS* was the most frequently mentioned publication, followed by *Amstat News*, the *Chronicle of Higher Education*, and then the publications of other mathematical societies.

Figure 5 presents the distribution of responses to the following set of four statements to which doctoral recipients were asked to indicate their degree of agreement or disagreement regarding the position they obtained for fall 1999. Response options ranged from 5 for "strongly agree" down to 1 for "strongly disagree".

1. The position is related to my field.
2. The position is commensurate with my education and training.
3. The position is similar to what I expected to be doing when I began my doctoral program.
4. The position is professionally challenging.

Figure 6 gives the age distribution of the 582 new doctoral recipients who responded to this question. The median age of new doctoral recipients was 30.5, while the mean age was 31.8. The first and third quartiles were 28 and 34 respectively. These figures are almost identical to those reported last year.