2009 Annual Survey of the Mathematical Sciences in the United States

(Second Report)

Report on the 2008–2009 New Doctoral Recipients
Starting Salary Survey of the 2008–2009 New Doctoral Recipients

Richard Cleary, James W. Maxwell, and Colleen A. Rose

This report presents a statistical profile of recipients of doctoral degrees awarded by departments in the mathematical sciences at universities in the United States during the period July 1, 2008, through June 30, 2009. The report includes an analysis of the fall 2009 employment plans of 2008–09 doctoral recipients and a demographic profile summarizing characteristics of citizenship status, gender, and racial/ethnic group as provided by the doctoral-granting departments beginning in late spring 2009. In addition, we present the starting salaries and other employment information from the new doctoral recipients that responded to the "Employment Experiences of New Doctoral Recipients" (EENDR) questionnaire.

A Preliminary Report on the 2008–2009 New Doctoral Recipients, published in the *Notices of the AMS*, February 2010, pages 250–58, presented survey results with information concerning 1,430 new doctoral recipients based on data received from departments as of September 1, 2009. Here we incorporate information on an additional 175 doctoral recipients from departments that responded too late to have the information included in the Preliminary Report. In addition, we update this information using data obtained from 755 new doctoral recipients who responded to the EENDR questionnaire, sent in early October 2009 to all new doctoral recipients.

The names and thesis titles of the 2008–2009 doctoral recipients reported on in the First Report were published in "Doctoral Degrees Conferred" (*Notices*, February 2010, pages 281–301). A supplemental listing of the 175 additional new doctoral recipients appears at the end of this report on pages 882–886.

Table 1: Number of Departments Responding to Doctorates Granted Survey

Group I (Pu)*	25 of 25 including	0 with no degrees
Group I (Pr)	23 of 23 including	0 with no degrees
Group II	56 of 56 including	3 with no degrees
Group III	81 of 81 including	20 with no degrees
Group IV	89 of 92 including	7 with no degrees
Statistics	55 of 57 including	3 with no degrees
Biostatistics	34 of 35 including	4 with no degrees
Group Va	21 of 21 including	0 with no degrees

* See "Definitions of the Groups" on page 882.

Table 1 provides the number of departments responding to the 2009 Survey of New Doctoral Recipients. The total number of departments responding in time for inclusion in this report was 295, 43 more than were included in the 2009 Preliminary Report and 32 more than the total number responding for inclusion in the 2009 New Doctoratal Recipients Report (formerly the Second Report). Groups I, II, III, and Va achieved a 100% response rate; the Data Committee thanks all departments for their efforts. No adjustments were made in this report for the three nonresponding departments. Definitions of

Richard Cleary is professor and chair of the Department of Mathematics at Bentley University. James W. Maxwell is AMS associate executive director for special projects. Colleen A. Rose is AMS survey analyst.

Highlights

There were 1,605 doctoral recipients from U.S. institutions for 2008–2009, up 227 (16%) from the previous year, continuing an upward trend that began in 2002–2003. This is the highest number of new Ph.D.'s ever reported. This year's response rate for Group IV, reflecting added outreach to Group IV departments, is partly responsible for the increase. The Group IV departments that responded in 2009 but not in 2008 reported awarding 80 new doctorates. However, the 264 departments that responded in both years reported an increase of 145 in the number of new doctorates awarded, a 10.5% increase.

The final unemployment rate was 4.9% for all 2008–2009 doctoral recipients and 3.8% for females. Both percentages reflect increases over last year's percentages (3.8% and 2.3%, respectively) which where the lowest reported since the early 1990s.

The number of new doctoral recipients who are U.S. citizens is 742, up 120 (19%) from last year's number and 246 (50%) from 2004–2005. This is the highest number of U.S. citizens reported over the past eleven surveys. The percentage of U.S. citizens among all doctoral recipients is 46%, up from 44% last year. The number of new doctoral recipients who are not U.S. citizens is 863, up 107 (14%) from last year's number and up 137 (19%) from 2004–2005.

Females totaled 532 (33%) of all new doctoral recipients, up in number and percentage from 435 (32%) last year. Of the 742 U.S. citizen new doctoral recipients, 227 are female (31%).

Of the 1,411 new doctoral recipients whose employment status is known, 1,334 reported having employment in fall 2008, with 87% (1,226) finding employment in the U.S., down slightly from 88% last year. Non-U.S. citizens accounted for 49% of those employed in the U.S. (last year this percentage was 50%). The percentage of non-U.S. citizens employed in the U.S. has declined four consecutive years.

The number of new doctoral recipients hired into U.S. academic positions in fall 2009 reached 861, up 14% from last year and the highest such number reported over the past twenty-seven years. Indeed, each of the numbers reported for the past four falls exceeds any number reported during the period from fall 1982 through fall 2005.

The number of new doctoral recipients taking positions in U.S. business/industry and government was 305 in fall 2009, a 13% increase from last year's number. This group constitutes 26% of all the new doctoral recipients employed in the U.S. (the same as last year).

There were 755 new doctoral recipients responding to the EENDR survey; of the 644 who found employment in the U.S., 49% reported obtaining a permanent position (the same as last year but down from 53% in fall 2006).

The percentage of temporarily employed respondents who reported taking a postdoctoral position in the U.S. decreased from 77% in fall 2008 to 72% in fall 2009, but the number increased from 172 to 234.

Table 2: Doctoral Recipients: Preliminary and Final Counts

Year	Preliminary	Final
1999-2000	1119	1127
2000-2001	1008	1065
2001-2002	948	960
2002-2003	1017	1037
2003-2004	1041	1081
2004-2005	1116	1222
2005-2006	1245	1311
2006-2007	1157	1333
2007-2008	1235	1378
2008-2009	1430	1605

Table 3: Doctoral Recipients: Citizenship

Year	U.S.	Non-U.S.	TOTAL
2004-2005	496	726	**1222**
2005-2006	552	759	**1311**
2006-2007	576	757	**1333**
2007-2008	622	756	**1378**
2008-2009	742	863	**1605**

Table 4: 2008–2009 Doctoral Recipients by Type of Degree-Granting Department

	Department Group[1]					
	I (Pu)	I (Pr)	II	III	IV	Va
Number	346	225	312	185	434	103
Percent	22%	14%	19%	12%	27%	6%

[1] For definitions of groups see page 882.

Table 5: Doctoral Recipients: U.S. Citizens—Percent Female and Percent Underrepresented Minorities

Year	U.S.	% Female	% URM*
1999-2000	566	29%	5%
2000-2001	532	31%	7%
2001-2002	428	30%	6%
2002-2003	499	32%	6%
2003-2004	459	33%	7%
2004-2005	496	28%	7%
2005-2006	552	28%	8%
2006-2007	576	31%	6%
2007-2008	622	31%	9%
2008-2009	742	31%	6%

* Percentage of underrepresented minorities calculated using Gender, Race/Ethnicity and Citizenship data gathered from granting departments.

Table 6: Fall 2009 Employment Status of 2008–2009 Doctoral Recipients by Type of Degree-Granting Department

TYPE OF EMPLOYER		TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT						TOTAL	Row Subtotals	
		Group I (Public)	Group I (Private)	Group II Math.	Group III Math.	Group IV Statistics	Group Va Applied Math.		Male	Female
Group I (Public)[1]		47	21	11	2	0	3	**84**	70	14
Group I (Private)		26	47	7	3	1	1	**85**	65	20
Group II		29	10	32	5	3	4	**83**	56	27
Group III		9	3	16	20	1	2	**51**	35	16
Group IV		0	0	3	1	61	1	**66**	40	26
Group Va		4	1	0	0	0	9	**14**	13	1
Master's		11	3	22	11	6	2	**55**	35	20
Bachelor's		38	18	64	32	18	6	**176**	99	77
Two-Year College		3	1	7	13	0	3	**27**	19	8
Other Academic Dept.[2]		21	10	22	19	75	19	**166**	101	65
Research Institute/ Other Nonprofit		13	5	8	2	24	2	**54**	31	23
Government		8	2	14	14	36	5	**79**	46	33
Business and Industry		36	19	28	17	107	19	**226**	150	76
Non-U.S. Academic		44	42	26	10	24	9	**155**	120	35
Non-U.S. Nonacademic		3	3	2	2	2	1	**13**	9	4
Not Seeking Employment		4	5	3	1	4	0	**17**	13	4
Still Seeking Employment		19	10	14	10	6	1	**60**	44	16
Unknown (U.S.)		16	8	21	10	36	8	**99**	64	35
Unknown (non-U.S.)[3]		15	17	12	13	30	8	**95**	63	32
TOTAL		**346**	**225**	**312**	**185**	**434**	**103**	**1605**	**1073**	**532**
Column Subtotals	Male	275	174	212	106	232	74	**1073**		
	Female	71	51	100	79	202	29	**532**		

[1] For definitions of groups see page 882.
[2] These are departments outside the mathematical sciences.
[3] Includes those whose status is reported as "unknown" or "still seeking employment".

the various groups surveyed in the Annual Survey can be found on page 882 of this report.

Employment Status of 2008–2009 Doctoral Recipients

Table 2 shows the preliminary and final counts of doctoral recipients in the mathematical sciences awarded by U.S. institutions for the past ten years. This year the total number of new doctoral recipients is 1,605, up from the previous year by 227. This year's increase is in part the result of the higher response rate for the departments in Group IV. The Group IV departments that responded in 2009 but not in 2008 reported awarding 80 new doctorates. However, the 264 departments that responded to the survey in both years reported an increase of 145 in the number of new doctorates awarded. The reader should keep the increased response rate for Group IV in mind when interpreting changes between 2008 and 2009.

Table 3 shows trends in the number of new doctoral recipients for the past five years broken down by U.S. citizens and non-U.S. citizens. This year the number of new doctoral recipients who are U.S. citizens is 742, an increase of 120 (19%) over last year. The number of non-U.S. citizen new doctoral recipients increased by 107 to 863.

Table 5 shows the number of U.S. citizens, receiving degrees, the percentage of U.S. citizen females and the percentage of U.S. citizen underrepresented minorities for the years 1999–2009. Underrepresented minorities include any person reported as having origins in the categories American Indian or Alaska Native, Black or African American, Hispanic or Latino, and Native Hawaiian or Other Pacific Islander.

Tables 6 and 7 each provide a cross-tabulation of the 1,605 new doctoral recipients in the mathematical sciences. These tables contain a wealth of information about these new doctoral recipients, some of which will be discussed in this report. Note that these tables give a breakdown by gender for type of employer , type of degree-granting department, and field of thesis. Additional information is available on the AMS website at `www.ams.org/employment/surveyreports.html`. New doctoral recipients are grouped by field of thesis using the Mathematical Reviews 2010 Mathematics Subject Classification list. A complete list of these groups is available on the AMS website at `www.ams.org/employment/Thesis_groupings.pdf`.

The fall 2009 employment status of 1,411 of the 1,605 new doctoral recipients was known; the

Table 7: Field of Thesis of 2008–09 New Doctoral Recipients by Type of Degree-Granting Department

TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT	FIELD OF THESIS												TOTAL
	Algebra/ Number Theory	Real, Comp., Funct., & Harmonic Analysis	Geometry/ Topology	Discr. Math./ Combin./ Logic/ Comp. Sci.	Probability	Statistics/ Biostat.	Applied Math.	Numerical Analysis/ Approxi-mations	Linear Nonlinear Optim./ Control	Differential, Integral, & Difference Equations	Math. Educ.	Other/ Unknown	
Group I (Public)[1]	82	30	51	44	25	11	35	24	2	39	1	2	**346**
Group I (Private)	57	9	55	26	20	3	25	6	2	19	0	3	**225**
Group II	63	32	24	36	19	17	43	33	9	32	1	3	**312**
Group III	19	26	9	21	4	34	20	15	4	21	12	0	**185**
Group IV	0	0	0	1	5	411	9	0	0	0	0	8	**434**
Group Va	2	1	0	13	9	7	37	15	7	6	0	6	**103**
TOTAL	**223**	**98**	**139**	**141**	**82**	**483**	**169**	**93**	**24**	**117**	**14**	**22**	**1605**
Column Subtotals Male	169	71	103	104	60	262	111	74	21	82	5	11	**1073**
Column Subtotals Female	54	27	36	37	22	221	58	19	3	35	9	11	**532**

[1] For definitions of groups see page 882.

Table 8: Percentage of Employed New Doctoral Recipients by Type of Employer

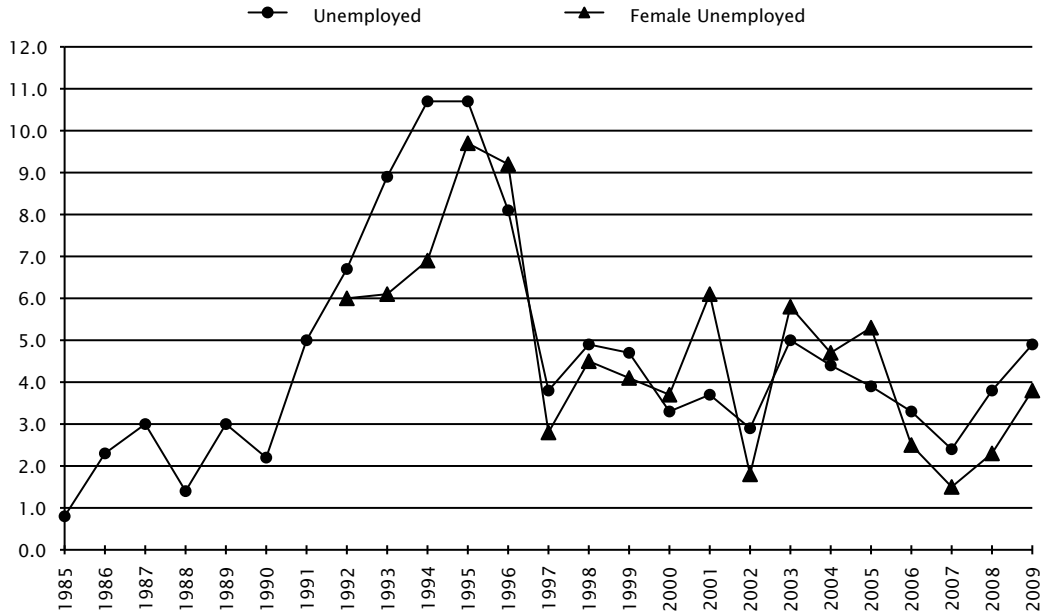
	Employed in U.S.		Employed outside. U.S.		NUMBER EMPLOYED
	Academic[1]	Nonacademic	Academic	Nonacademic	
Fall 2005	69%	17%	12%	2%	**1018**
Fall 2006	65%	22%	11%	2%	**1099**
Fall 2007	66%	22%	11%	1%	**1151**
Fall 2008	65%	23%	10%	2%	**1166**
Fall 2009	65%	23%	12%	1%	**1334**

[1] Includes research institutes and other non-profits.

unemployment rate was 4.9%. Figure 1 presents the fall 1985 through fall 2009 trend in the unemployment rate of new doctoral recipients. The unemployment rates shown in Figure 1 differ from those given in previous Annual Survey reports. The rates shown are now based on only those individuals in the U.S. labor market. For further details, see the explanatory note on unemployment rates at the end of the report. The unemployment rates, calculated by type of doctoral degree-granting department using Table 6, vary from group to group, with a high of 7.2% for Group I Pu and a low of 1.3% for Group Va.

Of the 1,411 new doctoral recipients whose employment is known, 1,166 were employed in the U.S., 168 were employed outside the U.S., 60

Figure 1: Percentage of New Doctoral Recipients Unemployed[1]



[1] As reported in the respective Annual Survey Second Reports.

Table 9: New Doctoral Recipients Employed in the U.S.

	Degree-Granting Department Group[1]													
	I (Pu)		I (Pr)		II		III		IV		Va		TOTAL	
	Academic[2]	Business/ Industry & Government	Academic	Business/ Industry & Government	Academic	Business/ Industry & Government	Academic	Business/ Industry & Government	Academic	Business/ Industry & Government	Academic	Business/ Industry & Government	Academic	Business/ Industry & Government
Fall 2005	152	21	104	17	152	23	97	18	149	79	45	18	**699**	**176**
Fall 2006	171	41	109	21	128	32	93	15	155	104	59	30	**715**	**243**
Fall 2007	191	50	91	12	181	20	95	27	151	123	47	24	**756**	**256**
Fall 2008	180	44	97	24	192	40	92	24	145	109	50	29	**756**	**270**
Fall 2009	201	44	119	21	192	42	108	31	189	143	52	24	**861**	**305**

[1] For definitions of groups see page 882.
[2] Includes research institutes and other non-profits.

were still seeking employment, and 17 were not seeking employment.

Table 8 presents the trend in the percentage of employed new doctoral recipients by type of employer for the last five years. Academic employment includes those employed by research institutes and other nonprofits. Among new doctoral recipients who are employed in the U.S., the percentage taking nonacademic employment varied significantly by field of thesis. For those whose field of thesis is in the first three columns in Table 7, the percentage is 12% (the same as last year), while the percentage for those with theses in probability or statistics is the highest at 40% (down from 45% last year).

Table 9 shows that the fall 2009 number of doctoral recipients taking positions in the United States in business/industry and government is 305. This number reflects an increase of 13% over last year. Group IV showed the largest increase up 31% from last year from 109 to 143. Table 10 shows that the number of new doctoral recipients taking U.S. academic positions increased 105 (14%) from last year after remaining flat in 2008. Doctoral hires into U.S. academic positions increased in all groups except Groups Va which remained constant at 14. The biggest percentage increase is in Group IV (53%).

Table 11 gives information about the production of female new doctoral recipients in the doctoral-granting departments and the hiring of females by all department groups. From Table 11 we see that the percentage of females hired ranges from a high of 42% in Group M&B, followed by Group IV at 39%, which also produced the highest percentage of women (47%), to 7% in Group Va.

Demographic Information about 2008–2009 Doctoral Recipients

Tables 12, 13, and 14 show the gender, race/ethnicity and citizenship of the 1,605 new doctoral recipients and the fact that 1,166 new doctoral recipients found jobs in the U.S. this year. This is 83% of the 1,411 new doctoral recipients whose employment status was known and 93% of the 1,257 known to have jobs in fall 2009. Last year these percentages were 84% and 88%, respectively.

Gender, race/ethnicity and citizenship are known for all of the 1,605 new doctoral recipients. The final count of new doctoral recipients who are U.S. citizens is 742 (46%) (up from 45% last year). Additional information on gender, race/ethnicity, and citizenship are available on the Web at `www.ams.org/employment/annual-survey.html`.

Of the 742 U.S. citizen new doctoral recipients reported for 2008–2009, 227 are female and 515 are male. Females accounted for 31% of the U.S. citizen total (the same as last year). The number of female U.S. citizens has increased by 36 from last year's count of 191, and the number of male

Table 10: New Doctoral Recipients Employed in U.S. Academic Positions

	Hiring Department Group[1]					
	I–III	IV	Va	M&B	Other[2]	**TOTAL**
Fall 2005	249	53	12	212	173	**699**
Fall 2006	263	73	14	198	167	**715**
Fall 2007	286	44	15	229	182	**756**
Fall 2008	294	43	14	220	185	**756**
Fall 2009	303	66	14	231	247	**861**

[1] For definitions of groups see page 882.
[2] Includes two-year colleges, other academic departments, and research institutes/other nonprofits.

Table 11: Females as a Percentage of 2008–2009 New Doctoral Recipients

	Department Group[1]							
	I (Pu)	I(Pr)	II	III	IV	Va	M&B	**TOTAL**
% Female								
Produced	21%	23%	32%	43%	47%	28%	-	**33%**
Hired	17%	24%	33%	31%	39%	7%	42%	**33%**

[1] For definitions of groups see page 882.

Table 12: Employment Status of 2008–09 New Doctoral Recipients by Citizenship Status

TYPE OF EMPLOYER	CITIZENSHIP				TOTAL
	U.S. CITIZENS	NON-U.S. CITIZENS			
		Permanent Visa	Temporary Visa	Unknown Visa	
U.S. Employer	594	78	475	19	1166
U.S. Academic	474	54	323	10	861
Groups I, II, III, and Va	158	17	141	1	317
Group IV	24	6	34	2	66
Non-Ph.D. Department	271	24	122	7	424
Research Institute/Other Nonprofit	21	7	26	0	54
U.S. Nonacademic	120	24	152	9	305
Non-U.S. Employer	40	4	120	4	168
Non-U.S. Academic	39	4	108	4	155
Non-U.S. Nonacademic	1	0	12	0	13
Not Seeking Employment	9	0	8	0	17
Still Seeking Employment	30	8	22	0	60
SUBTOTAL	673	90	625	23	1411
Unknown (U.S.)	66	6	27	0	99
Unknown (non-U.S.)*	3	1	74	17	95
TOTAL	**742**	**97**	**726**	**40**	**1605**

*Includes those who left the U.S. and whose employment status is reported as "unknown" or "still seeking employment".

Table 13: Gender, Race/Ethnicity, and Citizenship of 2008–09 New Doctoral Recipients

RACIAL/ETHNIC GROUP	MALE					FEMALE					TOTAL
	U.S. CITIZENS	NON-U.S. CITIZENS			Total Male	U.S. CITIZENS	NON-U.S. CITIZENS			Total Female	
		Permanent Visa	Temporary Visa	Unknown Visa			Permanent Visa	Temporary Visa	Unknown Visa		
American Indian or Alaska Native	1	0	1	0	2	4	0	0	0	4	**6**
Asian	30	14	291	16	351	16	34	185	8	243	**594**
Black or African American	9	4	11	1	25	12	1	2	0	15	**40**
Hispanic or Latino	11	5	34	1	51	9	1	10	0	20	**71**
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	1	0	0	0	1	**1**
White	454	25	140	2	621	179	12	46	3	240	**861**
Unknown	10	0	6	7	23	6	1	0	2	9	**32**
TOTAL	**515**	**48**	**483**	**27**	**1073**	**227**	**49**	**243**	**13**	**532**	**1605**

Table 14: 2008–09 New Doctoral Recipients Having Employment in the U.S. by Type of Employer and Citizenship

U.S. EMPLOYER	CITIZENSHIP		TOTAL
	U.S.	Non-U.S.	
Academic	474	387	861
Groups I–Va	182	201	383
M, B, & 2-Year	187	71	258
Other Acad. & Research Inst.	105	115	220
Government, Business & Industry	120	185	305
TOTAL	**594**	**572**	**1166**

U.S. citizens increased by 84 from last year's count of 431.

Table 14 shows that U.S. citizens accounted for 51% of those employed in the U.S. (up from 50 % last year). Groups I through Va hired 48% U.S. citizens, while groups M, B, and all other academic departments hired 61% U.S. citizens (last year these percentages were 49% and 59%, respectively). U.S. citizens represented 39% of those hired into nonacademic positions (up from 37% last year). Among all the 1,166 new doctoral recipients employed in the U.S., 26% took nonacademic employment (government or business and industry) the same as last year.

2008–09 New Doctoral Recipients with Dissertations in Statistics/Biostatistics and Probability

Group IV has 92 departments for 2008–09, 11 more than the next largest doctoral group. It contains 31% of all doctoral departments surveyed, and the 89 Group IV departments responding to the Annual Survey reported 434 new doctoral recipients, 27% of all new doctoral recipients in

Table 15: New Doctoral Recipients with Dissertations in Statistics/Biostatistics and Probability

Year	Group IV Depts Surveyed	Group IV Depts Responding (percent)	New Doctoral Recipients in Group IV only				New Doctoral Recipients in Statistics/Biostatistics and Probability, Group IV and Other Groups				New Doctoral Recipients Hired by Group IV	
			Total	Female (percent)	Jobs in Bus & Ind	Percentage Unemployed	Total	Group IV	Other Groups	Percentage Unemployed	Male	Female
1999–00	86	74 (86%)	290	112 (39%)	83	2.6%	353	281	72	2.8%	23	28
2000–01	86	70 (81%)	272	112 (41%)	75	4.7%	338	258	80	1.0%	32	12
2001–02	86	72 (84%)	224	94 (42%)	65	3.9%	291	222	69	3.0%	29	16
2002–03	86	75 (87%)	241	100 (41%)	46	2.3%	304	236	68	3.6%	20	19
2003–04	87	78 (90%)	265	107 (40%)	50	3.2%	346	262	84	3.9%	48	18
2004–05	88	67 (76%)	301	133 (44%)	67	2.6%	395	295	100	2.9%	30	23
2005–06	87	73 (84%)	327	154 (47%)	92	1.1%	442	314	128	1.4%	42	31
2006–07	88	70 (80%)	357	175 (49%)	115	2.1%	456	335	121	3.0%	24	20
2007–08	89	65 (73%)	317	166 (52%)	90	1.2%	434	311	123	3.2%	24	19
2008–09	92	89 (97%)	434	202 (47%)	107	1.8%	565	416*	149**	3.1%	40	26
Statistics	57	55 (96%)	296	124 (42%)	89	3.1%					25	15
Biostatistics	35	34 (97%)	138	78 (57%)	11	1.0%					15	11

*Of 416, there were 411 in statistics/biostatistics and 5 in probability. For complete details, see Table 7.
** Of 149, there were 72 in statistics/biostatistics and 77 in probability. For complete details, see Table 7.

2008–09. Because of its size, the data from Group IV have a large effect on the results when all doctoral groups are combined. Furthermore, Group IV results are often quite different from those for Groups I (Pu), I (Pr), II, III, and Va. In the following paragraphs some of these differences are discussed in detail.

Table 15 contains information about new doctoral recipients in Group IV as well as those with dissertations in statistics/biostatistics and probability in other groups. In addition, the last two rows of Table 15 give a split of the 2008–09 results between the 57 statistics departments and the 35 biostatistics and biometrics departments in Group IV. This year 565 new doctorates had a dissertation in statistics/biostatistics (483) or probability (82), a 30% increase from last year's number. Those with dissertations in statistics/biostatistics and probability accounted for 35% of new doctorates in 2008–09. Quite a bit of the year-to-year variation in these numbers is due to the changes made in the departments included in Group IV over the ten years and to the response rate variation in this group.

Group IV is producing a larger percentage of female doctorates than the other doctoral groups. Females accounted for 47% of the new doctoral recipients in Group IV, while 28% are female in the other doctoral groups.

Group IV is producing a smaller percentage of U.S. citizen new doctorates than the other doctoral groups. In Group IV, 35% of the new doctoral recipients are U.S. citizens, while in other groups 51% are U.S. citizens.

Group IV doctorates are more likely to take jobs in business and industry than those in other doctoral groups. Of the 332 new doctoral recipients from Group IV who found employment in the U.S., 107 (32%) took jobs in business or industry. From the other groups, 894 new doctoral recipients found employment in the U.S., of which 119 (13%) took jobs in business or industry.

Group IV doctorates have a lower unemployment rate than the other doctoral groups. The employment status for 368 Group IV new doctoral recipients is known, and 6 (1.8%) are unemployed. For the other groups, the employment status of 1,171 is known, and 54 (6.1%) are unemployed. Group IV is hiring a bigger percentage of females than the other doctoral groups. Twenty-six of 66 (39%) new doctoral recipients hired by Group IV departments were female, up from last year's 38%. The other doctoral groups reported that 78 of 318 (25%) new doctoral recipients hired were female, up from last year's 23%.

The number of new doctoral recipients with theses in statistics/biostatistics and probability (565) is substantially larger than any other field, with algebra and number theory next with 223.

New Information from the EENDR Survey

The 1,430 new doctoral recipients reported in the First Report were sent the "Employment Experiences of New Doctoral Recipients" (EENDR) survey in October 2009, and 755 (53%) responded. The response rates varied slightly among the various subgroups of new doctoral recipients defined by their employment status as reported by departments. Among those who were employed the highest response rate, 59%, was from those employed in the U.S. academic, while the lowest, 50%, was from those in non-U.S. academic.

The EENDR gathered details on employment experiences not available through departments. The remainder of this section presents additional information available on this subset of the 2008–2009 doctoral recipients.

Table 16 gives the numbers and percentages of EENDR respondents taking permanent and temporary positions in the U.S for fall 2005 through fall 2009.

This year we see that among the 644 employed in the U.S., 318 reported obtaining a permanent position and 326 a temporary position. The percentage of individuals taking permanent positions has increased to 49% from 42%, and the percentage of those taking temporary positions has increased to 51% from 48%. Of the 326 in temporary positions, 146 (45%) reported taking temporary employment because a suitable permanent position was not available, up from 33% in 2008. Most respondents classified their temporary position as postdoctoral (72%). Of the 234 respondents taking postdoctal positions, 68 (29%) reported that a suitable permanent position was not available, up from 27% in 2008.

Table 16: Number (and Percentage) of Annual EENDR Respondents Employed in the U.S. by Job Status

	Employed in U.S.					
			Temporary			Unknown
	Permanent Total	Temporary Total	Permanent not available	Postdoctoral		
				Total	Permanent not available	
Fall 2005	291(56%)	232(44%)	92(40%)	172(74%)	55(32%)	--
Fall 2006	289(51%)	274(49%)	98(36%)	209(76%)	57(27%)	--
Fall 2007	259(53%)	227(47%)	88(39%)	172(76%)	57(33%)	--
Fall 2008	245(42%)	222(48%)	74(33%)	172(77%)	47(27%)	--
Fall 2009	318(49%)	326(51%)	146(45%)	234(72%)	68(29%)	--

Table 17: Percentage of Annual EENDR Respondents Employed in the U.S. by Employment Sector within Job Status

	Employed in U.S.					
	Permanent			Temporary		
	Academic[1]	Government	Business/ Industry	Academic	Government	Business/ Industry
Fall 2005	68%	5%	27%	96%	4%	0%
Fall 2006	66%	4%	30%	93%	5%	2%
Fall 2007	68%	3%	29%	93%	4%	3%
Fall 2008	63%	6%	31%	95%	4%	1%
Fall 2009	64%	6%	29%	91%	5%	4%

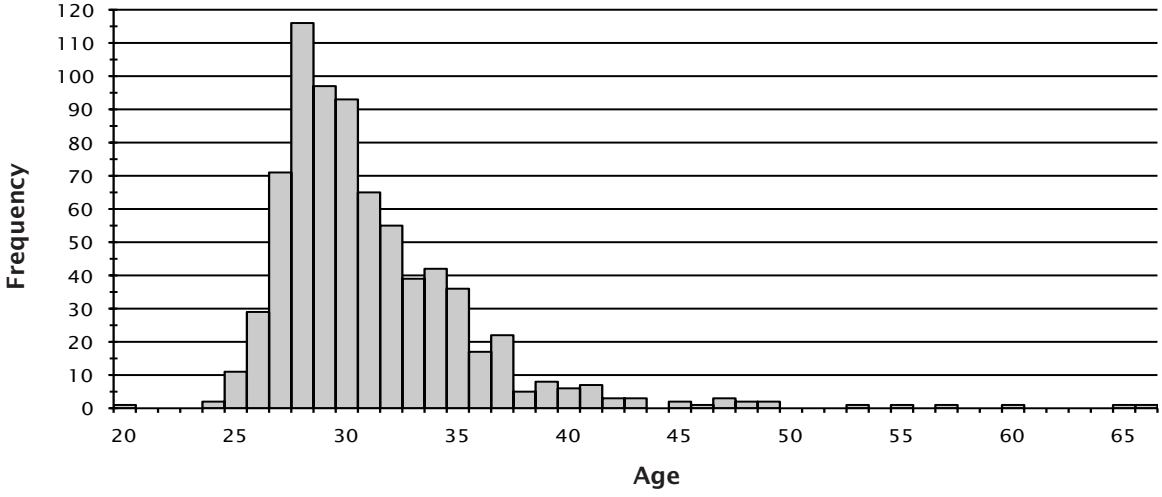
[1] Includes research institutes and other non-profits.

Table 17 shows the employment trends of permanent and temporary positions broken down by employment sector for the last five years. Among the 318 who reported obtaining a permanent position in the U.S. in fall 2009, 64% were employed in academia (including 4% in research institutes and other nonprofits), 6% in government, and 29% in business or industry. Women held 39% of the permanent positions, up from 37% in 2008.

Among the 326 individuals with temporary employment in the U.S. this year, 91% were employed in academia (including 6% in research institutes and other nonprofits), 5% in government, and 4% in business or industry.

Figure 2 gives the age distribution of the 755 new doctoral recipients who responded to this question. The median age of new doctoral recipients was 30 years, while the mean age was 31 years. The first and third quartiles were 28 and 33 years, respectively. This distribution is consistent with those of the recent past.

Figure 2: Age Distribution of 2008–2009 EENDR Respondents



Starting Salary Survey of the 2008–2009 Doctoral Recipients

The starting salary figures for 2009 were compiled from information gathered on the EENDR questionnaires sent to individuals who received doctoral degrees in the mathematical sciences during the 2008–2009 academic year from universities in the United States (see previous section for more details).

The questionnaires were distributed to 1,430 recipients of degrees using addresses provided by the departments granting the degrees; 755 individuals responded between late October and April. Responses with insufficient data or from individuals who indicated they had part-time or non-U.S. employment were excluded. Numbers of usable responses for each salary category are reported in the following tables.

Readers should be warned that the data in this report are obtained from a self-selected sample, and inferences from them may not be representative of the population.

Previous Annual Survey Reports

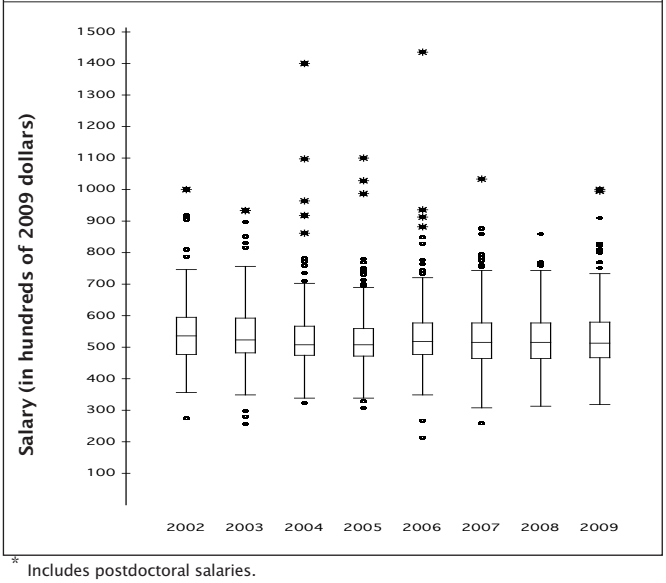
The 2009 Preliminary Report on New Doctoral Recipients (First Report, Part I) was published in the *Notices of the AMS,* February 2010 issue. The last full year of reports: the Faculty Salaries Report (First Report, Part II), the Report on New Doctoral Recipients and Starting Salaries (Second Report), and the Departmental Profile Report (Third Report) were published in the *Notices of the AMS* in the February, August, and November 2009 issues respectively. These reports and earlier reports, as well as a wealth of other information from these surveys, are available on the AMS website at `www.ams.org/employment/surveyreports.html`.

Acknowledgments

The Annual Survey attempts to provide an accurate appraisal and analysis of various aspects of the academic mathematical sciences scene for the use and benefit of the community and for filling the information needs of the professional organizations. Every year, college and university departments in the United States are invited to respond. The Annual Survey relies heavily on the conscientious efforts of the dedicated staff members of these departments for the quality of its information. On behalf of the Annual Survey Data Committee

Academic Teaching/Teaching and Research 9–10-Month Starting Salaries* (in hundreds of dollars)

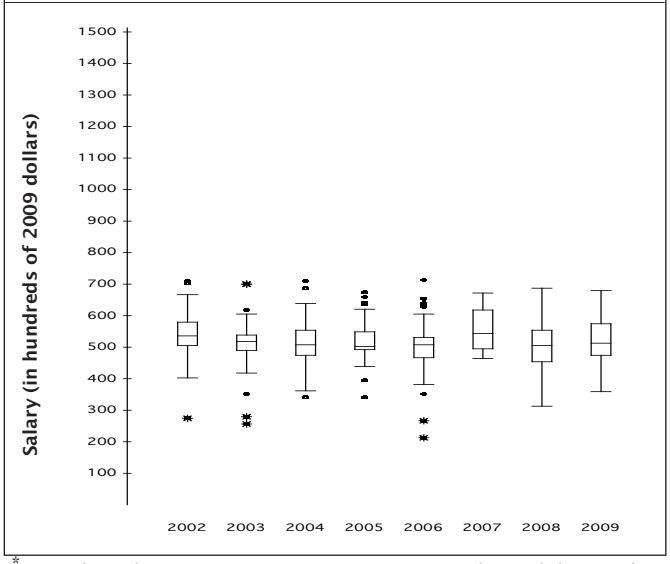
Ph.D. Year	Min	Q_1	Median	Q_3	Max
Total (168 male/102 female)					
2009 M	320	460	510	571	994
2009 F	320	471	521	600	1000
One year or less experience (155 male/95 female)					
2009 M	320	460	510	573	820
2009 F	320	470	520	594	1000



* Includes postdoctoral salaries.

Academic Postdoctorates Only* 9–10-Month Starting Salaries (in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max
Total (69 male/23 female)					
2009 M	360	460	515	558	680
2009 F	400	493	520	603	630
One year or less experience (66 male/23 female)					
2009 M	370	480	518	559	680
2009 F	400	493	520	603	630

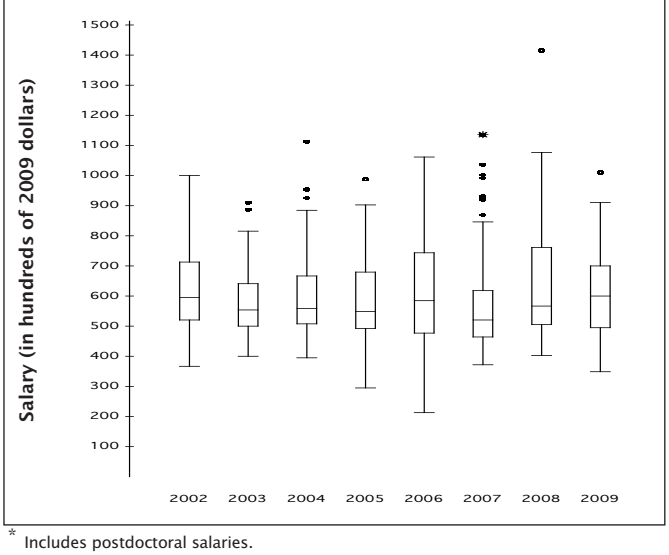


* A postdoctoral appointment is a temporary position primarily intended to provide an opportunity to extend graduate training or to further research experience.

Academic Teaching/Teaching and Research 11–12-Month Starting Salaries* (in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max
Total (44 male/24 female)					
2009 M	350	499	565	616	1772
2009 F	360	529	600	785	911
One year or less experience (42 male/23 female)					
2009 M	350	500	565	614	1772
2009 F	360	508	600	790	911

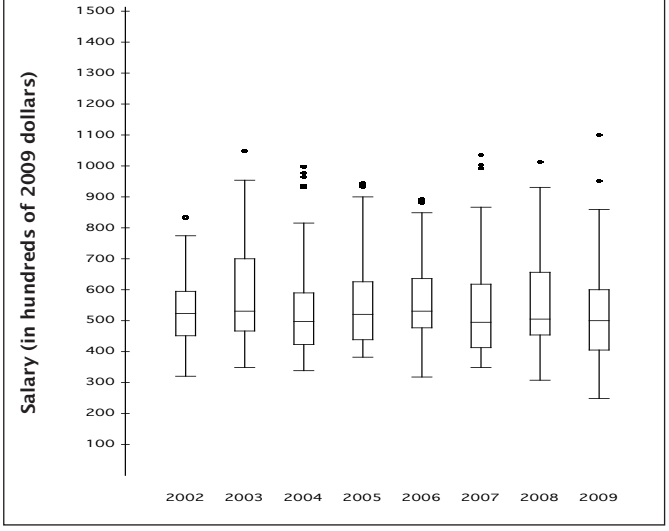
(Note: One salary above $150,000 is not shown.)



* Includes postdoctoral salaries.

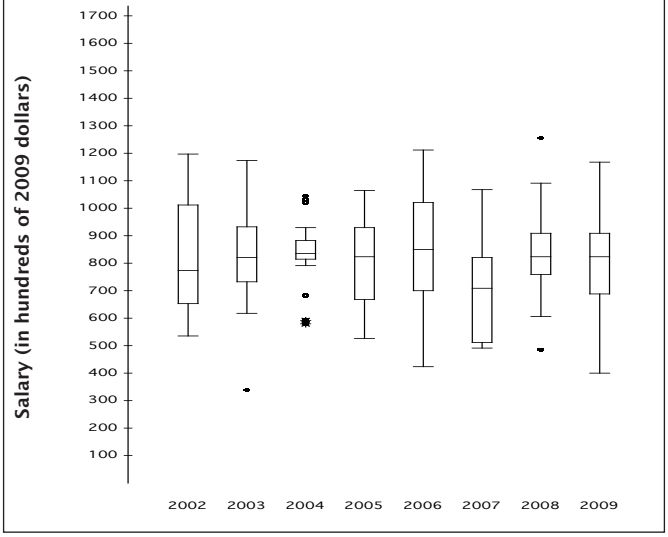
Academic Research Only 11–12-Month Starting Salaries (in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max
Total (52 male/22 female)					
2009 M	250	420	500	600	1100
2009 F	360	400	490	550	860
One year or less experience (46 male/19 female)					
2009 M	250	420	495	600	1100
2009 F	360	397	480	550	860



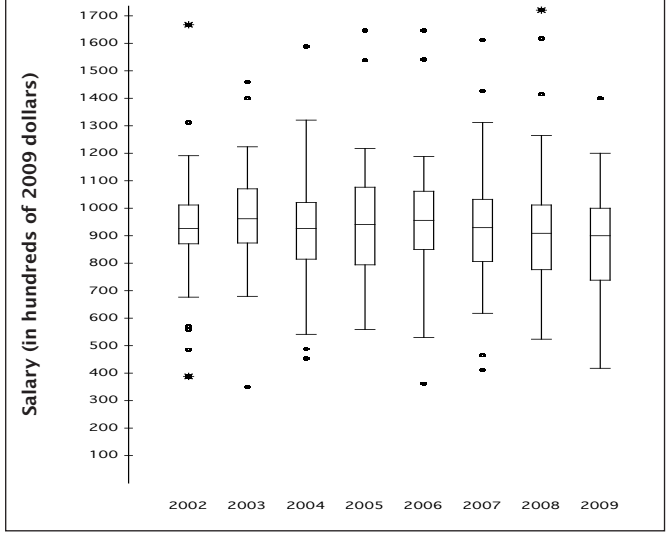
Government 11–12-Month Starting Salaries (in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max
Total (23 male/9 female)					
2009 M	580	715	850	905	1170
2009 F	400	670	710	859	1130
One year or less experience (16 male/7 female)					
2009 M	580	707	825	877	1000
2009 F	400	635	690	785	956



Business and Industry 11–12-Month Starting Salaries (in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max
Total (59 male/24 female)					
2009 M	420	740	900	1000	2350
2009 F	500	785	915	992	1070
One year or less experience (49 male/23 female)					
2009 M	470	715	850	1000	1400
2009 F	500	771	910	995	1070



and the Annual Survey Staff, we thank the many secretarial and administrative staff members in the mathematical sciences departments for their cooperation and assistance in responding to the survey questionnaires.

Other Sources of Data

Vist the AMS website at www.ams.org/employment/specialreports.html for a listing of additional sources of data on the Mathematical Sciences.

Remarks on Starting Salaries

Key to Tables and Graphs. Salaries are those reported for the fall immediately following the survey cycle. Years listed denote the survey cycle in which the doctorate was received—for example, survey cycle July 1, 2008–June 30, 2009, is designated as 2009. Salaries reported as 9–10 months exclude stipends for summer grants or summer teaching or the equivalent. M and F are male and female respectively. Male and female figures are not provided when the number of salaries available for analysis in a particular category was five or fewer. All categories of "Teaching/Teaching and Research" and "Research Only" contain those recipients employed at academic institutions only.

Graphs. The graphs show standard boxplots summarizing salary distribution information for the years 2002 through 2009. Values plotted for 2002 through 2009 are converted to 2009 dollars using the implicit price deflator prepared annually by the Bureau of Economic Analysis, U.S. Department of Commerce. These categories are based on work activities reported in EENDR. Salaries of postdoctorates are shown separately. They are also included in other academic categories with matching work activities.

For each boxplot the box shows the first quartile (Q1), the median (M), and the third quartile (Q3). The interquartile range (IQR) is defined as Q3–Q1. Think of constructing invisible fences 1.5 IQR below Q1 and 1.5 IQR above Q3. Whiskers are drawn from Q3 to the largest observation that falls below the upper invisible fence and from Q1 to the smallest observation that falls above the lower invisible fence. Think of constructing two more invisible fences, each falling 1.5 IQR above or below the existing invisible fences. Any observation that falls between the fences on each end of the boxplots is called an outlier and is plotted as ● in the boxplots. Any observation that falls outside of both fences either above or below the box in the boxplot is called an extreme outlier and is marked as ✷ in the boxplot.

Changes in Reporting of Unemployment Rate

In the unemployment calculations provided in this report the individuals employed outside the U.S. have been removed from the denominator used in the calculation of the rate, in addition to the routine removal of all individuals whose employment status is unknown. This is a change from prior Annual Survey Reports. As a consequence, the unemployment rate now being reported more accurately reflects the U.S. labor market experienced by the new doctoral recipients. This change tends to increase the rate of unemployment over that produced in prior years.

In a further small change from prior years, those individuals reported as not seeking employment have also been removed from the denominator. The number of individuals so designated is small each year, and the impact of this change is to produce a slight increase in the rate over that reported in prior years.

The unemployment rates for years prior to 2009 shown in this report have been recalculated using this new method. One can view a comparison of the unemployment rates using the traditional method and the new method by visiting the AMS website at www.ams.org/employment/surveyreports.html.

The Annual Survey series begun in 1957 by the American Mathematical Society is currently under the direction of the Data Committee, a joint committee of the American Mathematical Society, the American Statistical Association, the Mathematical Association of America, and the Society of Industrial and Applied Mathematics. The current members of this committee are Pam Arroway, Richard Cleary (chair), Steven R. Dunbar, Susan Geller, Abbe H. Herzig, Ellen Kirkman, Joanna Mitro, James W. Maxwell (ex officio), Bart S. Ng, Douglas Ravanel, and Marie Vitulli. The committee is assisted by AMS survey analyst Colleen A. Rose. In addition, the Annual Survey is sponsored by the Institute of Mathematical Statistics. Comments or suggestions regarding this Survey Report may be directed to the committee.

Definitions of the Groups

As has been the case for a number of years, much of the data in these reports is presented for departments divided into groups according to several characteristics, the principal one being the highest degree offered in the mathematical sciences. Doctoral-granting departments of mathematics are further subdivided according to their ranking of "scholarly quality of program faculty" as reported in the 1995 publication *Research-Doctorate Programs in the United States: Continuity and Change*.[1] These rankings update those reported in a previous study published in 1982.[2] Consequently, the departments which now comprise Groups I, II, and III differ significantly from those used prior to the 1996 survey.

The subdivision of the Group I institutions into Group I Public and Group I Private was new for the 1996 survey. With the increase in number of the Group I departments from 39 to 48, the Data Committee judged that a further subdivision of public and private would provide more meaningful reporting of the data for these departments.

Brief descriptions of the groupings are as follows:

Group I is composed of 48 doctoral-granting departments with scores in the 3.00–5.00 range. Group I Public and Group I Private are Group I doctoral-granting departments at public institutions and private institutions respectively.

Group II is composed of 56 doctoral-granting departments with scores in the 2.00–2.99 range.

Group III contains the remaining U.S. doctoral-granting departments, including a number of departments not included in the 1995 ranking of program faculty.

Group IV contains U.S. doctoral-granting departments (or programs) of statistics, biostatistics, and biometrics reporting a doctoral program.

Group V contains U.S. doctoral-granting departments (or programs) of applied mathematics/applied science, operations research, and management science.

Group Va is applied mathematics/applied science doctoral-granting departments; Group Vb, which is no longer surveyed as of 1998–99, was operations research and management science.

Group M or Masters contains U.S. departments granting a master's degree as the highest graduate degree.

Group B or Bachelors contains U.S. departments granting a baccalaureate degree only.

Listings of the actual departments which comprise these groups are available on the AMS website at www.ams.org/outreach.

[1]Research-Doctorate Programs in the United States: Continuity and Change, *edited by Marvin L. Goldberger, Brendan A. Maher, and Pamela Ebert Flattau, National Academy Press, Washington, DC, 1995.*

[2]*These findings were published in* An Assessment of Research-Doctorate Programs in the United States: Mathematical and Physical Sciences, *edited by Lyle V. Jones, Gardner Lindzey, and Porter E. Coggeshall, National Academy Press, Washington, DC, 1982. The information on mathematics, statistics, and computer science was presented in digest form in the April 1983 issue of the* Notices, *pages 257–67, and an analysis of the classifications was given in the June 1983* Notices, *pages 392–3.*

Doctoral Degrees Conferred 2008–20009

Supplementary List

The following list supplements the list of thesis titles published in the February 2010 *Notices*, pages 281–301.

ALABAMA

University of Alabama (4)

INFORMATION SYSTEMS, STATISTICS AND MANAGEMENT SCIENCE

Alhammadi, Yousuf, Neural network control charts for Poisson processes.

Anderson, Billie, Study of reject inference techniques.

Devasher, Michael, An evaluation of optimal experimental designs subject to parameter uncertainty for properties of compartmental models used in individual pharmacokinetic studies.

CALIFORNIA

California Institute of Technology (1)

CONTROL AND DYNAMICAL SYSTEMS

Shi, Ling, Resource optimization for networked estimator with guaranteed estimation quality.

University of California, Riverside (3

MATHEMATICS

Alvarez, Vicente, A numercial computation of eigenfunctions for the Kusuoka laplacian on the Sierpinski gasket.

Childress, Scot Paul, Quantum measures, arithmetic coils, and generalized fractal strings.

Wong, Chau Yim, On a class of commuting squares.

University of California, Santa Cruz (1)

MATHEMATICS

Marks, Christopher, Classification of vecto-valued modular forms of dimensions less than six.

COLORADO

University of Denver (1)

MATHEMATICS

Daly, Dan, Permutation patterns, reduced decompositions with few repetitions and the Bruhat order.

ILLINOIS

University of Chicago (8)

STATISTICS

Atlason, Oli, Generalized parametric models.

De la Cruz Cabrera, Omar, Geometric approaches in the analysis of genetic data.

Li, Yingying, Robustness of volalility estimations.

Matteson, David, Statistical inference for multivariate nonlinear time series.

Rosenthal, Dale, W. R., Trade classification and nearly-gamma random variables.

Song, Minsun, Restricted parameter space models for testing gene-gene interactions.

Zheng, Xinghua, Critical branching random walks and spatial epidemic.

Zibman, Chava, Adjusting for confounding in a semi-parametric Bayesian model of short term effects of air pollution on respiratory health.

IOWA

University of Iowa (4)

STATISTICS AND ACTUARIAL SCIENCE

Ahn, Kwang Woo, Topics in statistical epidemiology.

Fang, Xiangming, Generalized additive models with correlated data.

Hao, Xuemiao, Asymptotic tail probabilities in insurance and finance.

Song, Jung-Eun, Bayesian linear regression via partition.

KENTUCKY

University of Louisville (1)

BIOINFORMATICS AND BIOSTATISTICS

Lan, Ling, Inference for multistate models.

LOUISIANA

Tulane University (1)

BIOSTATISTICS

Yi, Yeonjoo, Two part longitudinal models of zero heavy data.

MASSCHUSETTS

Harvard University (8)

STATISTICS

Edlefsen, Paul, Profile HMMs for DNA sequence families: the conditional Baum-Welch and dynamical model-surgery algorithms.

Lenarcic, Alan, Bayesian two-glasso for the study of financial contagion.

Morgan, Charity, Assessing thought disordered behavior using finite mixture models and comparing approximations for logistic regression.

Olding, Benjamin, Methods of approximate inference: applications to stochastic differential equations, video microscopy, and network data.

Zhang, Jing, Bayesian inference of interactions in biological problems.

Zhang, Tingting, Nonparametric studies of doubly stochastic poisson processes, binomial data, and high dimension, low sample size data.

Zhang, Wei, Statistical methods for detecting expression quantitative trait loci (eQTL).

Yuan, Yuan, Decoding gene expression regulation through Motif discovery and classification.

MICHIGAN

Michigan Technological University (3)

MATHEMATICAL SCIENCES

Tang, Rui, Statistical methods for genome-wide association study.

Wang, Xuexia, Genetic association studies considering LD information and genome-wide application.

Ye, Zhan, Genetic association studies under the population stratification, family pedigree and application to genome-wide association studies

MINNESOTA

University of Minnesota (12)

SCHOOL OF MATHEMATICS

Bellay, Jeremy, The stability and transitions of coherent structures on excitable and oscillatory media.

Hiary, Ghaith, Fast methods to compute the Riemann Zeta function.

Korolev, Alexander, Large-distance asymptotics of steady-state incompressible fluid flows.

Letang, Delia, Subconvexity bounds for automorphic L-functions on GL2.

Li, Fang, Stability from the point of view of diffusion, relaxation and spatial inhomogeneity.

Peterson, Jonathon, Limiting distributions and large deviations for random walks in random environments.

Rhoades, Brendon, Modeling and optimization of mortgage loan portfolios.

Striker, Jessica, Poset and polytope perspectives on alternating sign matrices.

Valiquette, Francis, Applications of moving frames to Lie pseudo-groups.

Xue, Chuan, Mathematical models of taxis-driven bacterial pattern formation.

Yang, Jiaqi, Design and implementation of accurate and efficient integral equation methods with applications to ultrasound vibro-acoustography and geophysical propsection.

Zhang, Wenliang, Lyubeznik numbers.

NEW HAMPSHIRE

Dartmouth College (3)

MATHEMATICS

Brown, Jonathan, Proper actions of groupoids on C*-algebras.

Goehle, Geoff, Groupoid crossed products.

Mahoney, John, A composition formula for asymptotic morphisms.

NEW JERSEY

Rutgers The State University of New Jersey (8)

MATHEMATICS

Levitt, Ian, Some problems in extremal graph theory avoiding the use of the regularity lemma.

Mau, Sikimeti, The multiplihedra in Lagrangian Floer theory.

Neiman, Michael, Negative correlation and log-concavity.

Nguyen, Luc, Singular harmonic maps into hyperbolic spaces and applications to general relativity.

Rowland, Eric, Experimental methods applied to the computation of integer sequences.

Thanatipanonda, Thotsaporm, Symbolic-computational methods in combinatorial game theory and Ramsey theory.

Wang, Liming, Dynamics and asymptotic behaviors of biochemical networks.

Wood, Philip, On the probability that a discrete complex random matrix is singular.

Stevens Institute of Technology (3)

MATHEMATICAL SCIENCES

Bussolari, Luca, Hyperbolic planar billiards with nearly flat focusing boundaries.

Grechuk, Bogdan, Deviations measures: theory and application.

Molyboha, Anton, Optimization approaches to sensor placement for threat detection.

NEW YORK

Columbia University (3)

BIOSTATISTICS

Huang, Lin, Sequential test for right censored data with linear transformation models.

Tai, Wanling, Regularized estimation of covariance matrices for longitudinal data through smoothing and shrinkage.

Wisnivesky, Juan, Instrumental variable estimation for survival data: evaluating the effectiveness radiation therapy for the treatment of lung cancer in the elderly in the presence of allocation bias.

PENNSYLVANIA

Bryn Mawr College (1)

MATHEMATICS

Fukui, Ayako, Lp estimates for oscillatory singular integral operators and Marcinkiewicz integral operators.

Drexel University (1)

MATHEMATICS

Coletta, Meredith, Integrability in optical design.

Temple University (3)

STATISTICS

Miller, Charles William, Familywise robustness criteria revisited for newer multiple testing procedures.

Wang, Luqiang, Contributions to estimation of measures for assessing rater reliability.

Yang, Zijiang, New step down procedures for control of the familywise error rate.

NORTH CAROLINA

Duke University (8)

MATHEMATICS

Baron, Rann, Small Boolean networks.

Bendich, Paul, Analyzing stratified spaces using persistent version of intersection and local homology.

Cooke, Ben, Theory and practice in replica-exchange molecular dynamics simulation.

Dai, Shu, Bifurcations in the Echebarria-karma modulation equation for cardic alternans in one dimension.

Froehlich, Mihaela, Two coating problems: thin film rupture and spin coating.

Law, Jing, Approximately counting perfect and general matchings in bipartite and general graphs.

McCarthy, Janice, TL2 index theory and D-particle binding.

Smith, Abraham, Integrability of second-order partial differential equations and the geometry of GL(2) structures.

RHODE ISLAND

Brown University (6)

MATHEMATICS

Katz, Daniel, Sumfree subsets in cubes of arbitrary dimension.

Liaw, Constanze, Singular integrals and rank one perturbations.

Lin, Yu-Lin, Perturbation theorems for Hele-Shaw flows and their applications.

Park, Donghoon, 1-Motives with torsion and Cartier duality.

Tsikkou, Charis, Hyperbolic conservation laws with large initial data. Is the Cauchy problem well-posed? BV estimates for the P-system.

Ulfarsson, Henning, Extending Grothendieck topologies to diagram categories and Serre functors on diagram schemes.

SOUTH CAROLINA

Clemson University (10)

MATHEMATICS

Chrispell, John, Numerical analysis of a fractional step theta-method for fluid flow problems.

Heindl, Raymond, New directions in multivariate public key cryptography.

Kandasamy, Hariharan, Portfolio selection under various risk measures.

Light, John, Intersections and representations of graphs.

Lyle, Jeremy, Homomorphisms of graphs.

Mateer, Todd, Fast Fourier transform algorithms with applications.

Samson, Sundeep, Performance based decision under uncertainty and risk.

Smith, Ethan, On some problems concerning the distribution of primes.

Tunno, Ferebee, Time series analysis: a new look at some old problems.

Zhu, Mingfu, Modeling HIV drug resistance.

Medical University of South Carolina (8)

DIVISION OF BIOSTATISTICS AND EPIDEMIOLOGY

Kirbach, Stephanie, The risk and consequences of cerebrovascular events, mortality, and institutionalization among Alzheimers patients on anti-psychotic therapy.

Miller, Scott, Handling treatment by covariate interactions in interim analyses of clinical trials.

Nowacki, Amy, Response-adaptive randomization in neurological clinical trials: obstacles in application.

Ouyang, Bichun, Modeling and Bayesian analysis of recurrent events and longitudinal data with dependent termination.

Saunders, Lee, A population-based study of repetitive traumatic brain injury mortality.

Sims, Kellie, Sphingolipids are altered in aging yeast cultures under caloric restriction.

Wilson, Dulaney, Health effects of plutonium exposure.

Zhang, Boshao, Two stage clonal expansion models of carcinogenesis for acute, continuous, and multiple exposure with applications.

TEXAS

Baylor University (4)

MATHEMATICS

Bruder, Andrea, Applied left-defined theory; the Jacobi polynomials, their Sobolev orthogonality and self-adjoint operators.

Hopkins, Britney, Multiplicity of positive solutions of even-order nonhomogenous boundary value problems.

Jones, Leslie Braziel, Adding machines.

Nicely, Dywayne, Restarting the Lanczos algorithm for large eigenvalue problems and linear equations.

Southern Methodist University (4)

STATISTICAL SCIENCE

Delzell, Darcie Ann Pace, Optimal statistical design for functional magnetic resonance imaging experiments.

Kozlitina, Julia V., Tests for trend in the analysis of genetic associations studies.

Nappa, Dario, Bayesian classification using Bayesian additive and regression trees.

Wang, Yan, Dependencies in NAEP and their effects on analysis.

Texas Tech University (5)

MATHEMATICS AND STATISTICS

Charles, Janelle, Probability distribution estimation using control theoretic smoothing splines.

Ji, Xiao Yi, Frechet-Differentiation of functions of operators with application to functional data analysis.

Kennaugh, Todd, Complexity of atriodic continua.

Pang, Johnny, Some statistical methods for directly and indirectly observed functional data.

Wesley, Curtis, Discrete-time and continuous-time epidemic models with applications to the spread of Hantavirus in wild rodents and human populations.

The University of Texas at Dallas (1)

MATHEMATICAL SCIENCES

Ansari, Yassmin, Matrix theory motivated by quantum mechanics and engineering.

VERMONT

University of Vermont (1)

MATHEMATICS AND STATISTICS

Annan, Kodwo, Mathematical modeling of solute transfer during hemodialysis.

VIRGINIA

University of Virginia (2)

STATISTICS

Jeon, Youngsook, Optimal randomization and randomization test for multi-treatment clinical trials.

Wang, Xin, Derivation and implementation of the asymptotics for approximate entropy (ApEn) with application to medicine.

Virginia Commonwealth University (1)

BIOSTATISTICS

Kong, Xiangrong, Variable selection in competing risks using the L1 penalized Cox model.

Virginia Polytechnic Institute and State University (12)

MATHEMATICS

Childers, Adam, Parameter identification and the design of experiments for continuous non-linear dynamical systems.

Deng, Shengfu, A spatial dynamic approach to three-dimensional gravity-capillary water waves.

Fang, Quanlei, Multivariable interpolation problems.

Herman, Mark, Born-Oppenheimer corrections near a Renner-Teller crossing.

He, Xiaoming, Bilinear immersed finite elements for interface problems.

Savel'ev, Eugeny, Controllability of the stresses in multimode viscoelastic fluid of upper convected Maxwell type.

Stoyanov, Miroslav, Model order reduction methods for solving high rank Riccati equations.

Weinhart, Thomas, A posteriori error analysis of the discontinuous Galerkin method for linear hyperbolic systems of conservation laws.

STATISTICS

Gao, Feng, Classifying response-stressor relationship in ecological studies.

Lou, Jianying, Diagnostics after a signal from control charts in normal process.

Wang, Xiaowei, Weighted optimality of block designs.

Wilson, Sarah, Control charts with missing observations.

WASHINGTON

University of Washington (13)

APPLIED MATHEMATICS

Curtis, Christopher, Exact and approximate methods for the computation of the spectral stability of traveling-wave solutions.

Gull, Dean, Stead state analysis of chemical reaction systems.

Jean, Larry, Stochastic multi-scale modeling of carcinogenesis.

Ketcheson, David, High-order strong stability preserving time integrators and numerical wave propagation for hyperbolic PDEs.

Nivala, Michael, Nonlinear stability in integrable Hamiltonian systems.

Shi, Yiyi, Understanding complex systems using random graph models.

Oliveras, Katie, Stability of periodic traveling surface water waves.

Vellela, Melissa, Mesoscopic dynamics of biochemical kinetic equations.

BIOSTATISTICS

Burington, Bart, Flexible bootstrap monitoring of group sequential trials with longitudinal response data.

Cotton, Cecilia, Inference for treatments targeting control of an intermediate measure.

Saha, Paramita, Time-dependent predictive accuracy: extending binary classification accuracy methods for censored survival data.

Scott, JoAnna, Vaccine efficacy trials using stepped wedge design.

Rajan, Kumar Bharat, Regression methods for classification accuracy in diagnostic studies with ordinal scale outcomes.

WISCONSIN

University of Wisconsin-Madison (14)

STATISTICS

Casper, Theron, Survival and recurrent event analysis when ascertainment of events is delayed.

Chen, Chien-Wei, Enhancing the prediction accuracy of regression trees: linear splits and variable selection.

Cho, Sang-Hoon, Statistical inference under hierarchical models based on Izawa's bivariate gamma distribution with applications to gene data.

Han, Junhee, Some problems with spatial statistics.

Jiang, Yuan, Regularized regression and classification under general loss.

Kim, Joungyoun, Estimating divergence times of African gorilla populations.

Lee, Minjung, Topics in competing risks data.

Lin, Feng-Chang, Statistical inferences on modulated renewal processes.

Shi, Weiliang, LASSO-pattern search algorithm.

Stanhope, Stephen, Detecting m- and miRNA targeting relationships from observational microarray studies: systems biology and statistical modeling.

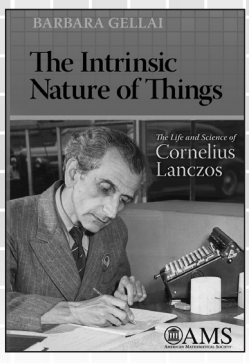
Wang, Hui, Bayesian analysis of cross-classified spatial-temporal data with autocorrelation.

Wang, Shubing, Weighted Fourier image analysis and modeling.

Xiao, Zhiguo, Topics in generalized method of moments estimation with application to find data with measurement error.

Zhang, Jun, Regression models for Spatial images.

AMERICAN MATHEMATICAL SOCIETY



The Intrinsic Nature of Things

The Life and Science of Cornelius Lanczos

Barbara Gellai, *Hungarian Academy of Sciences, Budapest, Hungary*

This book recounts the extraordinary personal journey and scientific story of Hungarian-born mathematician and physicist Cornelius Lanczos. His life and his mathematical accomplishments are inextricably linked, reflecting the social upheavals and historical events that shaped his odyssey in 20th-century Hungary, Germany, the United States, and Ireland.

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Supplemental Table 1: Fall 2009 Employment Status of 2008–2009 Doctoral Recipients by Field of Thesis

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/ Biostat.	Applied Math.	Numerical Analysis/ Approxi-mations	Linear Nonlinear Optim./ Control	Differential, Integral, & Difference Equations	Math. Educ.	Other/ Unknown	
Group I (Public)		19	7	6	9	8	1	13	7	0	13	0	1	**84**
Group I (Private)		28	7	21	4	5	2	6	2	0	9	0	1	**85**
Group II		13	15	12	5	7	3	8	11	0	6	1	2	**83**
Group III		11	9	3	9	1	3	4	4	1	4	2	0	**51**
Group IV		0	0	1	1	3	57	1	1	0	0	0	2	**66**
Group Va		1	0	0	0	2	1	3	6	1	0	0	0	**14**
Master's		9	4	3	13	2	11	4	3	0	4	2	0	**55**
Bachelor's		34	10	26	26	6	27	13	7	3	19	5	0	**176**
Two-Year College		8	4	2	4	0	2	2	5	0	0	0	0	**27**
Other Academic Dept.[1]		5	4	6	8	2	76	35	10	4	11	3	2	**166**
Research Institute/ Other Nonprofit		6	4	2	3	3	27	4	0	0	5	0	0	**54**
Government		8	2	1	7	2	44	7	5	1	2	0	0	**79**
Business and Industry		13	11	6	15	19	117	27	6	7	3	0	2	**226**
Non-U.S. Academic		36	12	25	12	4	25	12	11	2	15	0	1	**155**
Non-U.S. Nonacademic		4	0	2	0	1	2	3	0	0	1	0	0	**13**
Not Seeking Employment		2	1	2	2	2	4	2	1	1	0	0	0	**17**
Still Seeking Employment		8	3	8	8	3	11	5	5	1	8	0	0	**60**
Unknown (U.S.)		11	3	6	12	4	40	7	5	2	6	0	3	**99**
Unknown (non-U.S.)[2]		7	2	7	3	8	30	13	4	1	11	1	8	**95**
TOTAL		**223**	**98**	**139**	**141**	**82**	**483**	**169**	**93**	**24**	**117**	**14**	**22**	**1605**
Column Subtotals	Male	169	71	103	104	60	262	111	74	21	82	5	11	**1073**
	Female	54	27	36	37	22	221	58	19	3	35	9	11	**532**

[1] These are departments outside the mathematical sciences.
[2] Includes those whose status is reported as "unknown" or "still seeking employment".

Supplemental Table 2: Citizenship of 2008–2009 Male Doctoral Recipients by Fall 2009 Employment Status

TYPE OF EMPLOYER	CITIZENSHIP				TOTAL MALE DOCTORAL RECIPIENTS
	U.S. CITIZENS	NON-U.S. CITIZENS			
		Permanent Visa	Temporary Visa	Unknown Visa	
U.S. Employer	403	35	310	12	**760**
U.S. Academic	309	26	224	5	**564**
Groups[1] I, II, III, and Va	120	10	108	1	**239**
Group IV	14	3	22	1	**40**
Non-Ph.D. Department	165	11	75	3	**254**
Research Institute/Other Nonprofit	10	2	19	0	**31**
U.S. Nonacademic	94	9	86	7	**196**
Non-U.S. Employer	33	3	91	2	**129**
Non-U.S. Academic	33	3	82	2	**120**
Non-U.S. Nonacademic	0	0	9	0	**9**
Not Seeking Employment	6	0	7	0	**13**
Still Seeking Employment	26	5	13	0	**44**
Subtotal	468	43	421	14	**946**
Unknown (U.S.)	46	5	13	0	**64**
Unknown (non-U.S.)[2]	1	0	49	13	**63**
TOTAL	**515**	**48**	**483**	**27**	**1073**

[1] For definitions of groups see page 839.
[2] Includes those whose status is reported as "unknown" or "still seeking employment".

Supplemental Table 3: Citizenship of 2008–2009 Female Doctoral Recipients by Fall 2009 Employment Status

TYPE OF EMPLOYER	CITIZENSHIP				TOTAL FEMALE DOCTORAL RECIPIENTS
	U.S. CITIZENS	NON-U.S. CITIZENS			
		Permanent Visa	Temporary Visa	Unknown Visa	
U.S. Employer	191	43	165	7	**406**
U.S. Academic	165	28	99	5	**297**
Groups[1] I, II, III, and Va	38	7	33	0	**78**
Group IV	10	3	12	1	**26**
Non-Ph.D. Department	106	13	47	4	**170**
Research Institute/Other Nonprofit	11	5	7	0	**23**
U.S. Nonacademic	26	15	66	2	**109**
Non-U.S. Employer	7	1	29	2	**39**
Non-U.S. Academic	6	1	26	2	**35**
Non-U.S. Nonacademic	1	0	3	0	**4**
Not Seeking Employment	3	0	1	0	**4**
Still Seeking Employment	4	3	9	0	**16**
Subtotal	205	47	204	9	**465**
Unknown (U.S.)	20	1	14	0	**35**
Unknown (non-U.S.)[2]	2	1	25	4	**32**
TOTAL	**227**	**49**	**243**	**13**	**532**

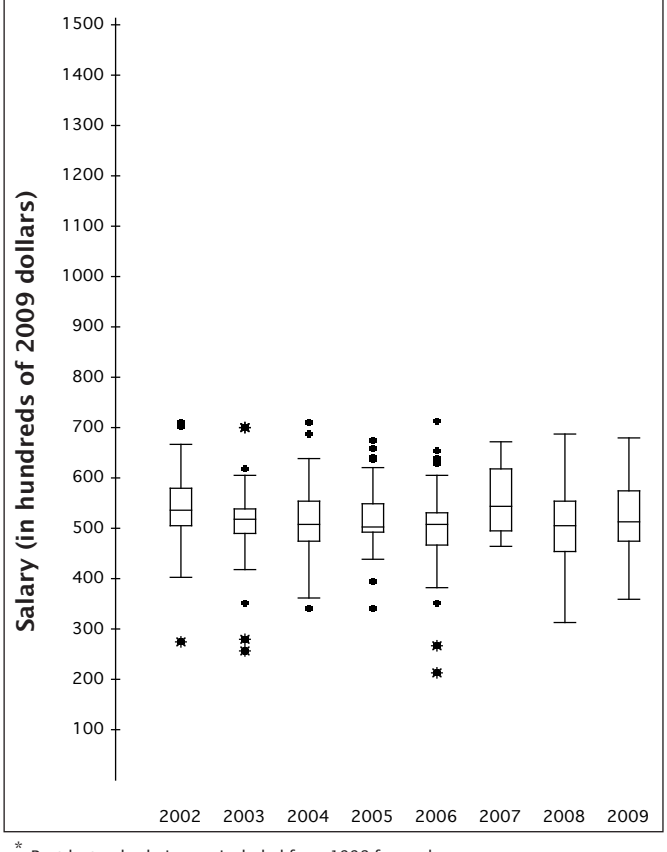
[1] For definitions of groups see page 839.
[2] Includes those whose status is reported as "unknown" or "still seeking employment".

Supplemental Table 4: Gender and Citizenship of 2008–09 New Doctoral Recipients by Type of Degree-Granting Department

	GROUP												TOTAL	
	I (Pu)		I (Pr)		II		III		IV		Va			
CITIZENSHIP	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
U.S.	138	37	90	23	115	48	50	35	82	68	40	16	515	227
Non-U.S.	137	34	84	28	97	52	56	44	150	134	34	13	558	305
TOTAL	**275**	**71**	**174**	**51**	**212**	**100**	**106**	**79**	**232**	**202**	**74**	**29**	**1073**	**532**

Academic Teaching/Teaching and Research 9–10-Month Starting Salaries* (in hundreds of dollars)

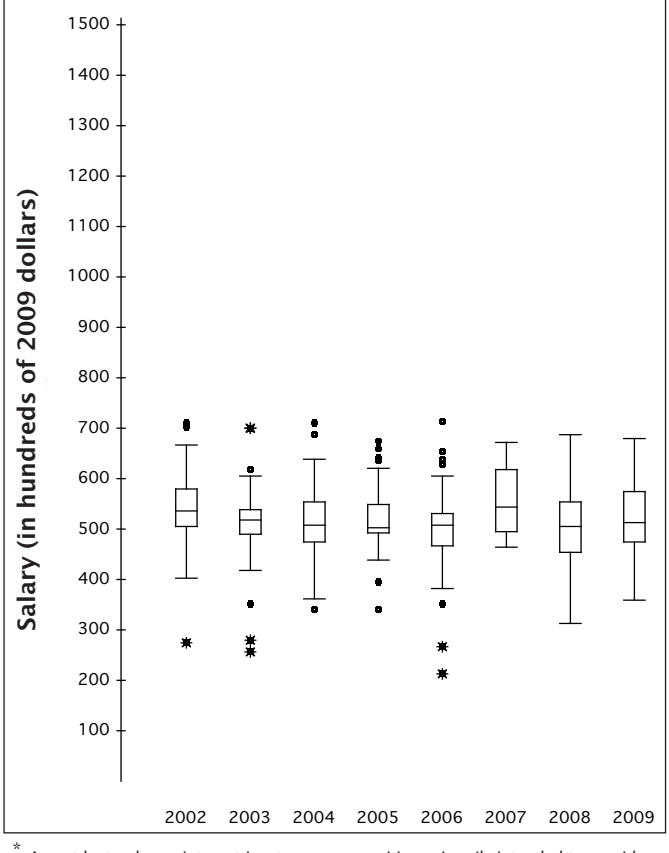
Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 2009 $
1980	105	155	171	185	250	393
1985	170	230	250	270	380	446
1990	230	305	320	350	710	486
1995	220	320	350	382	640	471
1998*	140	340	370	410	700	475
2000	250	380	415	450	650	514
2003	220	415	450	510	920	525
2004	285	420	450	500	1234	510
2005	280	430	465	506	1002	510
2006	200	450	490	550	1350	521
2007	250	450	500	560	1000	517
2008	310	460	510	569	850	516
2009	320	469	515	580	1000	515
2005 M	300	430	465	510	710	
2005 F	280	430	467	501	1002	
2006 M	200	450	499	550	880	
2006 F	270	450	480	520	1350	
2007 M	320	450	500	558	1000	
2007 F	250	438	490	560	830	
2008 M	310	460	515	573	850	
2008 F	380	455	500	550	760	
Total (168 male/102 female)						
2009 M	320	460	510	571	994	
2009 F	320	471	521	600	1000	
One year or less experience (155 male/95 female)						
2009 M	320	460	510	573	820	
2009 F	320	470	520	594	1000	



* Postdoctoral salaries are included from 1998 forward.

Academic Postdoctorates Only* 9–10-Month Starting Salaries (in hundreds of dollars)

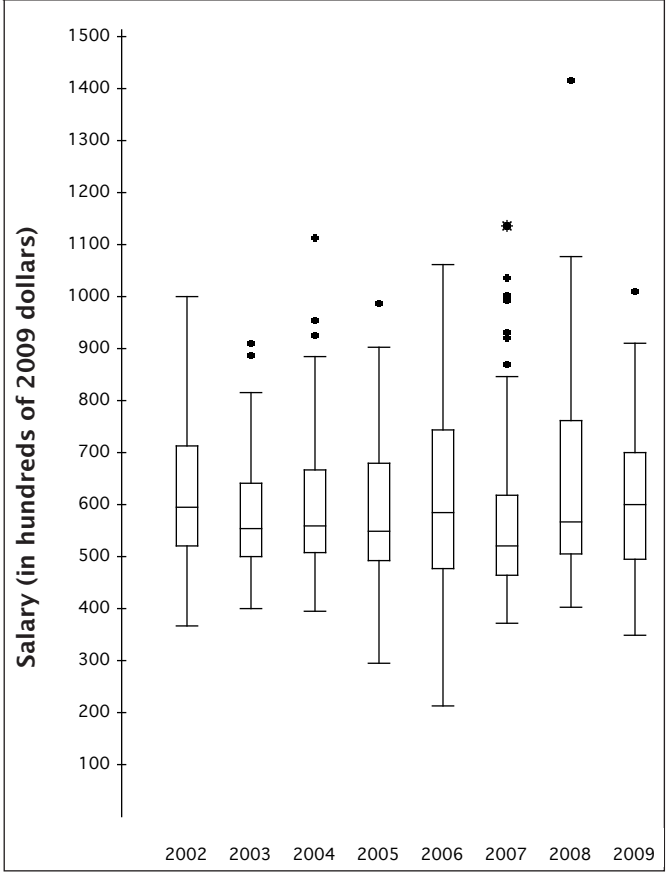
Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 2009 $
1997	180	350	385	410	450	500
1998	290	350	390	420	500	501
1999	130	365	400	418	540	506
2000	300	385	420	450	550	520
2001	250	400	425	450	566	515
2002	230	425	450	487	595	536
2003	240	420	450	480	600	525
2004	300	420	450	490	625	510
2005	310	450	460	500	615	505
2006	200	441	480	500	670	510
2007	250	450	483	550	650	499
2008	310	450	500	550	680	506
2009	360	479	515	571	680	515
2005 M	310	450	470	500	615	
2005 F	400	437	450	471	500	
2006 M	200	450	483	523	670	
2006 F	330	413	464	500	590	
2007 M	360	450	490	575	650	
2007 F	250	425	470	515	650	
2008 M	310	450	500	553	655	
2008 F	400	460	505	542	680	
Total (69 male/23 female)						
2009 M	360	460	515	558	680	
2009 F	400	493	520	603	630	
One year or less experience (66 male/23 female)						
2009 M	370	480	518	559	680	
2009 F	400	493	520	603	630	



* A postdoctoral appointment is a temporary position primarily intended to provide an opportunity to extend graduate training or to further research experience.

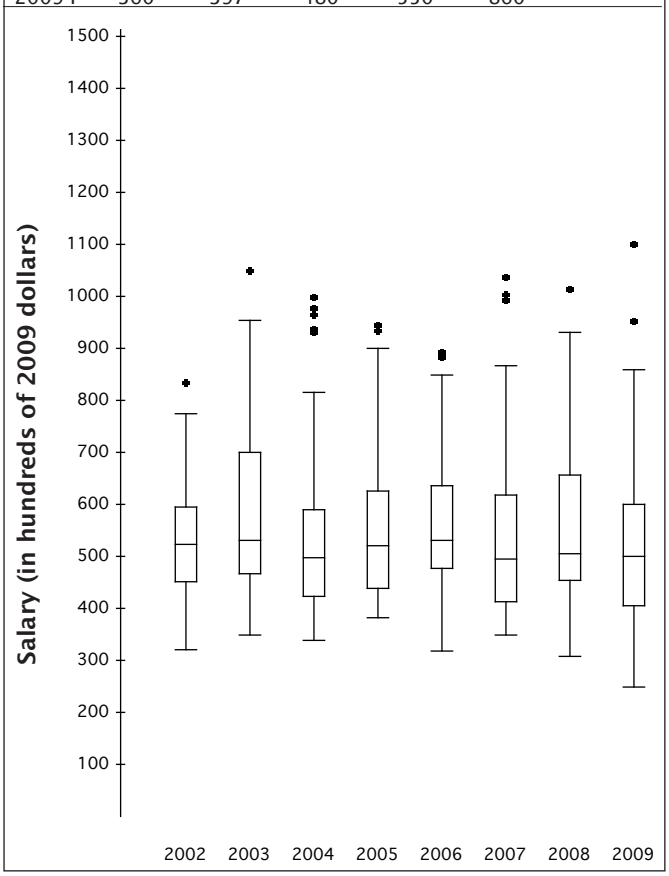
Academic Teaching/Teaching and Research 11–12-Month Starting Salaries* (in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 2009 $
1985	220	230	273	300	470	487
1990	225	318	365	404	670	555
1995	300	354	410	478	600	552
1998*	275	405	480	575	700	616
2000	300	400	485	600	1170	600
2003	345	438	475	550	780	554
2004	350	450	495	583	980	561
2005	270	450	500	615	900	549
2006	200	450	550	700	1000	585
2007	340	450	504	600	1100	521
2008	400	500	560	753	1400	567
2009	350	499	600	681	1772	600
2005 M	270	455	490	549	900	
2005 F	420	450	570	753	824	
2006 M	300	450	535	685	900	
2006 F	200	520	600	850	1000	
2007 M	360	440	500	600	1100	
2007 F	340	480	529	703	1003	
2008 M	419	530	560	750	1400	
2008 F	400	498	540	757	1067	
Total (44 male/24 female)						
2009 M	350	499	565	616	1772	
2009 F	360	529	600	785	911	
One year or less experience (42 male/23 female)						
2009 M	350	500	565	614	1772	
2009 F	360	508	600	790	911	



Academic Research Only 11–12-Month Starting Salaries (in hundreds of dollars)

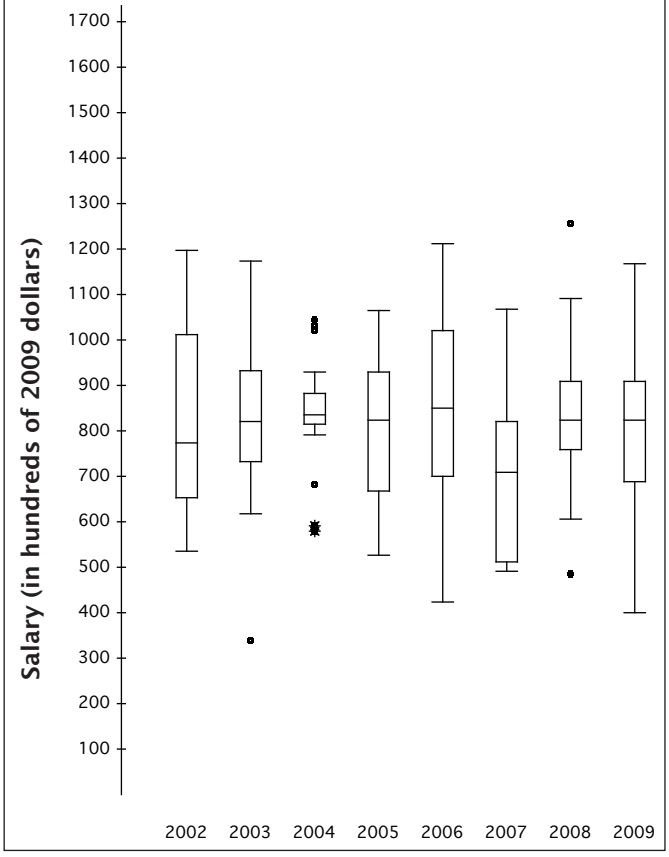
Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 2009 $
1995	196	280	340	370	587	458
1999	270	370	400	480	720	506
2000	300	365	400	529	1000	495
2001	300	350	400	575	796	484
2002	270	380	440	500	700	524
2003	300	405	455	600	900	531
2004	300	378	440	510	880	499
2005	350	400	475	570	860	521
2006	300	450	500	600	840	531
2007	340	415	480	540	1003	496
2008	305	450	500	577	1000	506
2009	250	410	500	600	1100	500
2005 M	350	420	480	580	860	
2005 F	350	400	475	529	850	
2006 M	350	450	500	600	830	
2006 F	300	455	540	680	840	
2007 M	360	400	470	600	970	
2007 F	340	465	480	504	1003	
2008 M	305	450	500	550	1000	
2008 F	370	465	500	675	920	
Total (52 male/22 female)						
2009 M	250	420	500	600	1100	
2009 F	360	400	490	550	860	
One year or less experience (46 male/19 female)						
2009 M	250	420	495	600	1100	
2009 F	360	397	480	550	860	

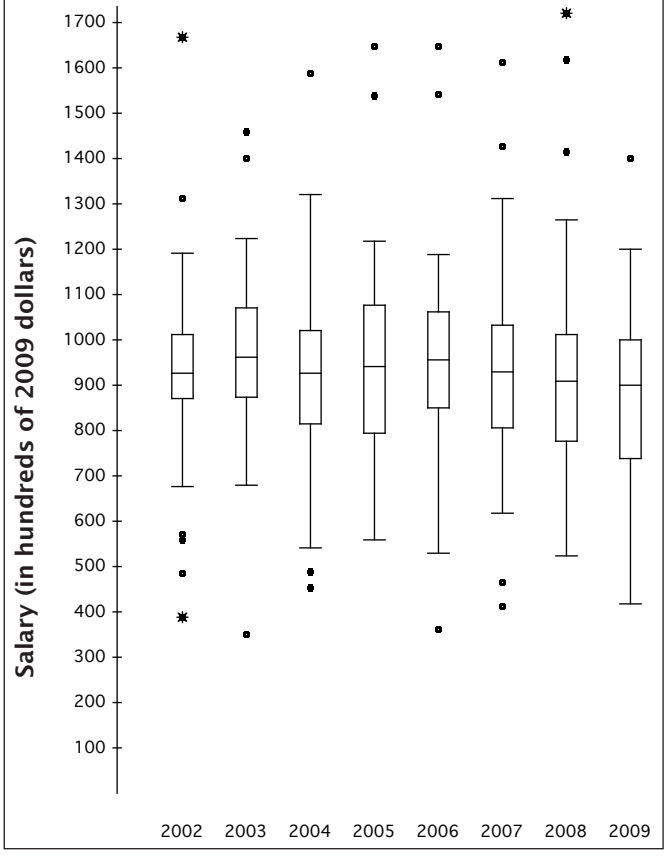


* Postdoctoral salaries are included from 1998 forward.

Government
11–12-Month Starting Salaries
(in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 2009 $
1985	263	294	325	381	440	579
1990	320	345	378	430	587	575
1995	370	440	494	507	650	665
2000	440	540	600	640	830	743
2002	450	551	650	775	1005	775
2003	290	668	705	763	1008	822
2004	510	720	738	780	920	837
2005	480	610	752	848	972	825
2006	400	678	800	961	1140	850
2007	480	500	690	800	1040	713
2008	480	750	815	900	1240	825
2009	400	696	825	903	1170	825
2005 M	500	668	790	902	955	
2005 F	480	540	750	770	972	
2006 M	500	660	800	960	1000	
2006 F	400	775	790	1043	1140	
2007 M	480	500	695	813	1040	
2007 F	To few women to report separately.					
2008 M	600	790	830	982	1240	
2008 F	480	720	810	863	930	
Total (23 male/9 female)						
2009 M	580	715	850	905	1170	
2009 F	400	670	710	859	1130	
One year or less experience (16 male/7 female)						
2009 M	580	707	825	877	1000	
2009 F	400	635	690	785	956	



Business and Industry
11–12-Month Starting Salaries
(in hundreds of dollars)

Ph.D. Year	Min	Q_1	Median	Q_3	Max	Reported Median in 2009 $
1985	260	360	400	420	493	713
1990	320	438	495	533	700	753
1995	288	480	568	690	1250	765
2000	200	640	720	800	1500	891
2002	325	734	780	850	1400	929
2003	300	700	800	900	1250	933
2004	400	728	817	900	1800	927
2005	510	755	870	978	2000	955
2006	340	800	900	1000	1550	957
2007	400	780	900	1000	2500	930
2008	518	780	900	1000	1700	911
2009	420	746	900	1000	2350	900
2005 M	510	760	930	1005	2000	
2005 F	600	745	860	890	1100	
2006 M	340	750	890	1000	1450	
2006 F	500	850	900	960	1550	
2007 M	400	760	920	1000	2500	
2007 F	710	800	855	950	1270	
2008 M	518	768	910	1013	1700	
2008 F	700	800	900	955	1250	
Total (59 male/24 female)						
2009 M	420	740	900	1000	2350	
2009 F	500	785	915	992	1070	
One year or less experience (49 male/23 female)						
2009 M	470	715	850	1000	1400	
2009 F	500	771	910	995	1070