2009 Annual Survey of the Mathematical Sciences in the United States

(Second Report)


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.


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 Doctoral 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

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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 were 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%).

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 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.

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Preliminary</th>
<th>Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>1,119</td>
<td>1,127</td>
</tr>
<tr>
<td>2000-2001</td>
<td>1,008</td>
<td>1,065</td>
</tr>
<tr>
<td>2001-2002</td>
<td>948</td>
<td>960</td>
</tr>
<tr>
<td>2002-2003</td>
<td>1,017</td>
<td>1,037</td>
</tr>
<tr>
<td>2003-2004</td>
<td>1,041</td>
<td>1,081</td>
</tr>
<tr>
<td>2004-2005</td>
<td>1,116</td>
<td>1,222</td>
</tr>
<tr>
<td>2005-2006</td>
<td>1,245</td>
<td>1,311</td>
</tr>
<tr>
<td>2006-2007</td>
<td>1,157</td>
<td>1,333</td>
</tr>
<tr>
<td>2007-2008</td>
<td>1,235</td>
<td>1,378</td>
</tr>
<tr>
<td>2008-2009</td>
<td>1,430</td>
<td>1,605</td>
</tr>
</tbody>
</table>

### Table 3: Doctoral Recipients: Citizenship

<table>
<thead>
<tr>
<th>Year</th>
<th>U.S.</th>
<th>Non-U.S.</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-2005</td>
<td>496</td>
<td>726</td>
<td>1,222</td>
</tr>
<tr>
<td>2005-2006</td>
<td>552</td>
<td>759</td>
<td>1,311</td>
</tr>
<tr>
<td>2006-2007</td>
<td>576</td>
<td>757</td>
<td>1,333</td>
</tr>
<tr>
<td>2007-2008</td>
<td>622</td>
<td>756</td>
<td>1,378</td>
</tr>
<tr>
<td>2008-2009</td>
<td>742</td>
<td>863</td>
<td>1,605</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Department Group</th>
<th>I (Pu)</th>
<th>I (Pr)</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>Va</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>346</td>
<td>225</td>
<td>312</td>
<td>185</td>
<td>434</td>
<td>103</td>
</tr>
<tr>
<td>Percent</td>
<td>22%</td>
<td>14%</td>
<td>19%</td>
<td>12%</td>
<td>27%</td>
<td>6%</td>
</tr>
</tbody>
</table>

1 For definitions of groups see page 882.

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

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

*Percentage of underrepresented minorities calculated using Gender, Race/Ethnicity and Citizenship data gathered from granting departments.
the various groups surveyed in the Annual Survey can be found on page 882 of this report.


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](http://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](http://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>
<thead>
<tr>
<th>TYPE OF EMPLOYER</th>
<th>TYPE OF DOCTORAL DEGREE-GRANTING DEPARTMENT</th>
<th>Row Subtotals</th>
<th>( \text{Total} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group I (Public)1</td>
<td>Group I (Private)</td>
<td>Group II Math.</td>
</tr>
<tr>
<td>Group I (Public)</td>
<td>47</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Group I (Private)</td>
<td>26</td>
<td>47</td>
<td>7</td>
</tr>
<tr>
<td>Group II</td>
<td>29</td>
<td>10</td>
<td>32</td>
</tr>
<tr>
<td>Group III</td>
<td>9</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Group IV</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Group Va</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Master’s</td>
<td>11</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>38</td>
<td>18</td>
<td>64</td>
</tr>
<tr>
<td>Two-Year College</td>
<td>3</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Other Academic Dept.2</td>
<td>21</td>
<td>10</td>
<td>22</td>
</tr>
<tr>
<td>Research Institute/Other Nonprofit</td>
<td>13</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Government</td>
<td>8</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Business and Industry</td>
<td>36</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>Non-U.S. Academic</td>
<td>44</td>
<td>42</td>
<td>26</td>
</tr>
<tr>
<td>Non-U.S. Nonacademic</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Not Seeking Employment</td>
<td>4</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Still Seeking Employment</td>
<td>19</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Unknown (U.S.)</td>
<td>16</td>
<td>8</td>
<td>21</td>
</tr>
<tr>
<td>Unknown (non-U.S.)3</td>
<td>15</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>TOTAL</td>
<td>346</td>
<td>225</td>
<td>312</td>
</tr>
<tr>
<td>Column Subtotals</td>
<td>71</td>
<td>51</td>
<td>100</td>
</tr>
</tbody>
</table>

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.”
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
2009 Annual Survey of the Mathematical Sciences in the United States

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

<table>
<thead>
<tr>
<th>Degree-Granting Department Group</th>
<th>I (Pu)</th>
<th>I (Pr)</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>Va</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic 2 Business/Industry &amp; Government</td>
<td>152 21</td>
<td>104 17</td>
<td>152 23</td>
<td>97 18</td>
<td>149 79</td>
<td>45 18</td>
<td>699 176</td>
</tr>
<tr>
<td>Business/Industry &amp; Government</td>
<td>171 41</td>
<td>109 21</td>
<td>128 32</td>
<td>93 15</td>
<td>155 104</td>
<td>59 30</td>
<td>715 243</td>
</tr>
<tr>
<td>Business/Industry &amp; Government</td>
<td>191 50</td>
<td>91 12</td>
<td>181 20</td>
<td>95 27</td>
<td>151 123</td>
<td>47 24</td>
<td>756 256</td>
</tr>
<tr>
<td>Business/Industry &amp; Government</td>
<td>180 44</td>
<td>97 24</td>
<td>192 40</td>
<td>92 24</td>
<td>145 109</td>
<td>50 29</td>
<td>756 270</td>
</tr>
<tr>
<td>Business/Industry &amp; Government</td>
<td>201 44</td>
<td>119 21</td>
<td>192 42</td>
<td>108 31</td>
<td>189 143</td>
<td>52 24</td>
<td>861 305</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Hiring Department Group</th>
<th>I–III</th>
<th>IV</th>
<th>Va</th>
<th>M&amp;B</th>
<th>Other 2</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall 2005</td>
<td>249 53</td>
<td>12</td>
<td>212 173</td>
<td>699</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2006</td>
<td>263 73</td>
<td>14</td>
<td>198 167</td>
<td>715</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2007</td>
<td>286 44</td>
<td>15</td>
<td>229 182</td>
<td>756</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2008</td>
<td>294 43</td>
<td>14</td>
<td>220 185</td>
<td>756</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall 2009</td>
<td>303 66</td>
<td>14</td>
<td>231 247</td>
<td>861</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Department Group</th>
<th>I (Pu)</th>
<th>I (Pr)</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>Va</th>
<th>M&amp;B</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Female Produced</td>
<td>21%</td>
<td>23%</td>
<td>32%</td>
<td>43%</td>
<td>47%</td>
<td>28%</td>
<td>-</td>
<td>33%</td>
</tr>
<tr>
<td>% Hired</td>
<td>17%</td>
<td>24%</td>
<td>33%</td>
<td>31%</td>
<td>39%</td>
<td>7%</td>
<td>42%</td>
<td>33%</td>
</tr>
</tbody>
</table>

1 For definitions of groups see page 882.

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%) from 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 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

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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
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
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 (4.6%) 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.

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

<table>
<thead>
<tr>
<th>Year</th>
<th>Group IV Depts Responding (%)</th>
<th>New Doctoral Recipients in Group IV only</th>
<th>New Doctoral Recipients in Statistics/Biostatistics and Probability, Group IV and Other Groups</th>
<th>New Doctoral Recipients Hired by Group IV</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (percent)</td>
<td>Female (percent)</td>
<td>Jobs in Bus &amp; Ind</td>
<td>Percentage Unemployed</td>
</tr>
<tr>
<td>1999-00</td>
<td>86 (86%)</td>
<td>290 (32%)</td>
<td>83 (2.6%)</td>
<td></td>
</tr>
<tr>
<td>2000-01</td>
<td>86 (71%)</td>
<td>272 (41%)</td>
<td>75 (4.2%)</td>
<td></td>
</tr>
<tr>
<td>2001-02</td>
<td>86 (72%)</td>
<td>224 (42%)</td>
<td>65 (3.9%)</td>
<td></td>
</tr>
<tr>
<td>2002-03</td>
<td>86 (75%)</td>
<td>241 (41%)</td>
<td>46 (2.3%)</td>
<td></td>
</tr>
<tr>
<td>2003-04</td>
<td>87 (78%)</td>
<td>265 (40%)</td>
<td>50 (3.2%)</td>
<td></td>
</tr>
<tr>
<td>2004-05</td>
<td>88 (67%)</td>
<td>301 (44%)</td>
<td>67 (2.6%)</td>
<td></td>
</tr>
<tr>
<td>2005-06</td>
<td>87 (73%)</td>
<td>327 (47%)</td>
<td>92 (1.1%)</td>
<td></td>
</tr>
<tr>
<td>2006-07</td>
<td>88 (70%)</td>
<td>357 (49%)</td>
<td>115 (2.1%)</td>
<td></td>
</tr>
<tr>
<td>2007-08</td>
<td>89 (65%)</td>
<td>317 (52%)</td>
<td>90 (1.2%)</td>
<td></td>
</tr>
<tr>
<td>2008-09</td>
<td>92 (89%)</td>
<td>434 (47%)</td>
<td>107 (1.8%)</td>
<td></td>
</tr>
<tr>
<td>Statistics</td>
<td>57 (55%)</td>
<td>296 (42%)</td>
<td>89 (3.1%)</td>
<td></td>
</tr>
<tr>
<td>Biostatistics</td>
<td>35 (34%)</td>
<td>138 (57%)</td>
<td>11 (1.0%)</td>
<td></td>
</tr>
</tbody>
</table>

*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.
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 percent-

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

<table>
<thead>
<tr>
<th></th>
<th>Employed in U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permanent Total</td>
</tr>
<tr>
<td></td>
<td>Permanent not available</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>291 (56%)</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>289 (51%)</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>259 (53%)</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>245 (42%)</td>
</tr>
<tr>
<td>Fall 2009</td>
<td>318 (49%)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>Employed in U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Permanent Academic¹</td>
</tr>
<tr>
<td>Fall 2005</td>
<td>68%</td>
</tr>
<tr>
<td>Fall 2006</td>
<td>66%</td>
</tr>
<tr>
<td>Fall 2007</td>
<td>68%</td>
</tr>
<tr>
<td>Fall 2008</td>
<td>63%</td>
</tr>
<tr>
<td>Fall 2009</td>
<td>64%</td>
</tr>
</tbody>
</table>

¹ Includes research institutes and other non-profits.

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 percent-

age 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 postdoctoral positions, 68 (29%) reported that a suitable permanent position was not available, up from 27% in 2008.

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.

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**

<table>
<thead>
<tr>
<th>Ph.D. Year</th>
<th>Min</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (168 male/102 female)</td>
<td>320</td>
<td>460</td>
<td>510</td>
<td>571</td>
<td>994</td>
</tr>
<tr>
<td>2009 M</td>
<td>320</td>
<td>471</td>
<td>521</td>
<td>573</td>
<td>1000</td>
</tr>
<tr>
<td>2009 F</td>
<td>320</td>
<td>460</td>
<td>510</td>
<td>573</td>
<td>820</td>
</tr>
<tr>
<td>One year or less experience (155 male/95 female)</td>
<td>320</td>
<td>470</td>
<td>520</td>
<td>594</td>
<td>1000</td>
</tr>
</tbody>
</table>

**Academic Postdoctorates Only**

<table>
<thead>
<tr>
<th>Ph.D. Year</th>
<th>Min</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (69 male/23 female)</td>
<td>360</td>
<td>460</td>
<td>515</td>
<td>558</td>
<td>680</td>
</tr>
<tr>
<td>2009 M</td>
<td>400</td>
<td>493</td>
<td>520</td>
<td>603</td>
<td>630</td>
</tr>
<tr>
<td>2009 F</td>
<td>370</td>
<td>480</td>
<td>518</td>
<td>559</td>
<td>680</td>
</tr>
</tbody>
</table>

* Includes postdoctoral salaries.

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

---

**2009 Annual Survey of the Mathematical Sciences in the United States**
2009 Annual Survey of the Mathematical Sciences in the United States

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

<table>
<thead>
<tr>
<th>Ph.D. Year</th>
<th>Min</th>
<th>Q₁</th>
<th>Median</th>
<th>Q₃</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (52 male/22 female)</td>
<td>350</td>
<td>580</td>
<td>850</td>
<td>850</td>
<td>1100</td>
</tr>
<tr>
<td>2009 F</td>
<td>350</td>
<td>580</td>
<td>715</td>
<td>710</td>
<td>859</td>
</tr>
<tr>
<td>One year or less experience (46 male/23 female)</td>
<td>250</td>
<td>420</td>
<td>495</td>
<td>495</td>
<td>595</td>
</tr>
<tr>
<td>2009 M</td>
<td>250</td>
<td>420</td>
<td>715</td>
<td>690</td>
<td>859</td>
</tr>
</tbody>
</table>

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

Ph.D.
Year Min Q₁ Median Q₃ Max
Total (44 male/24 female) | 350 | 580 | 850 | 850 | 1172 |
2009 F | 360 | 529 | 600 | 911 |
One year or less experience (42 male/23 female) | 250 | 420 | 495 | 495 | 595 |
2009 M | 250 | 420 | 715 | 690 | 859 | 1130 |

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

<table>
<thead>
<tr>
<th>Ph.D. Year</th>
<th>Min</th>
<th>Q₁</th>
<th>Median</th>
<th>Q₃</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (59 male/24 female)</td>
<td>350</td>
<td>580</td>
<td>850</td>
<td>850</td>
<td>1172</td>
</tr>
<tr>
<td>2009 F</td>
<td>360</td>
<td>529</td>
<td>600</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td>One year or less experience (49 male/23 female)</td>
<td>250</td>
<td>420</td>
<td>495</td>
<td>495</td>
<td>595</td>
</tr>
<tr>
<td>2009 M</td>
<td>250</td>
<td>420</td>
<td>715</td>
<td>690</td>
<td>859</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Ph.D. Year</th>
<th>Min</th>
<th>Q₁</th>
<th>Median</th>
<th>Q₃</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (23 male/9 female)</td>
<td>350</td>
<td>580</td>
<td>850</td>
<td>850</td>
<td>1172</td>
</tr>
<tr>
<td>2009 F</td>
<td>400</td>
<td>670</td>
<td>710</td>
<td>859</td>
<td>1130</td>
</tr>
<tr>
<td>One year or less experience (16 male/7 female)</td>
<td>250</td>
<td>420</td>
<td>495</td>
<td>495</td>
<td>595</td>
</tr>
<tr>
<td>2009 M</td>
<td>250</td>
<td>420</td>
<td>715</td>
<td>690</td>
<td>859</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Ph.D. Year</th>
<th>Min</th>
<th>Q₁</th>
<th>Median</th>
<th>Q₃</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (59 male/24 female)</td>
<td>350</td>
<td>580</td>
<td>850</td>
<td>850</td>
<td>1172</td>
</tr>
<tr>
<td>2009 F</td>
<td>400</td>
<td>670</td>
<td>710</td>
<td>859</td>
<td>1130</td>
</tr>
<tr>
<td>One year or less experience (49 male/23 female)</td>
<td>250</td>
<td>420</td>
<td>495</td>
<td>495</td>
<td>595</td>
</tr>
<tr>
<td>2009 M</td>
<td>250</td>
<td>420</td>
<td>715</td>
<td>690</td>
<td>859</td>
</tr>
</tbody>
</table>

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

Includes postdoctoral salaries.
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.

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.
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 comprised of 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.

Doctoral Degrees Conferred 2008–2009

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 numerical 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 vector-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 volatility estimations.
Matteson, David, Statistical inference for multivariate nonlinear time series.
Roesenthal, 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 semiparametric 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, Yuemiao, 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, Yonjoo, Two part longitudinal models of zero heavy data.

MASSACHUSETTS
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.
Zhao, 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 prospecting.
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, Thotsaporn, 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.

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.
Tunno, Ferebee, Time series analysis: a new look at some old problems.
Zhu, Mingfu, Modeling HIV drug resistance.

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
Heindl, Raymond, New directions in multivariate public-key cryptography.
Kandasamy, Hariharan, Portfolio selection under various risk measures.
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

**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.
- **Ouyang, Bichun**, Modeling and Bayesian analysis of recurrent events and longitudinal data with dependent termination.
- **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 anodic 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.
- **Savelev, Eugene**, 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.

**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, Steady 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, Yi, Understanding complex systems using random graph models.
Olveras, Katie, Stability of periodic traveling surface water waves.
Velicka, 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, Jongyoun, 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.