

Fall 2017 Departmental Profile Report

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This report presents a profile of mathematical sciences (MS) departments at four-year colleges and universities in the United States, as of fall 2017. The information presented includes the numbers of faculty in various categories, undergraduate and graduate course enrollments, numbers of bachelors and masters degrees awarded during the preceding year, and the number of graduate students. Definitions of categorized terms such as “Mathematical Sciences,” “Math,” and “Stats” along with a description of the faculty categories are provided at the end of this report.

Throughout this report the term doctoral faculty refers to faculty who hold a PhD.

Detailed information, including tables on which the graphics and commentary are based, is available on the AMS website at www.ams.org/annual-survey.

Department Chairs

The gender identity is known for all but 48 of the 1,509 departments surveyed by the Annual Survey. Figures 1 and 2 show the distribution of these department chairs. The ratio of women to men is 395:1066. Figure 2 shows the distribution of department chairs by department groupings excluding the unknowns. Seventy-six percent of all women chairs are in bachelors-granting departments.

Figure 1. Gender Identity of Department Chair

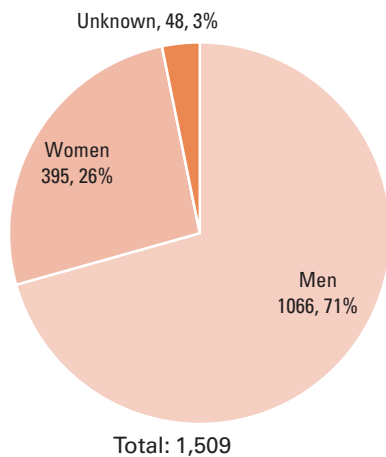
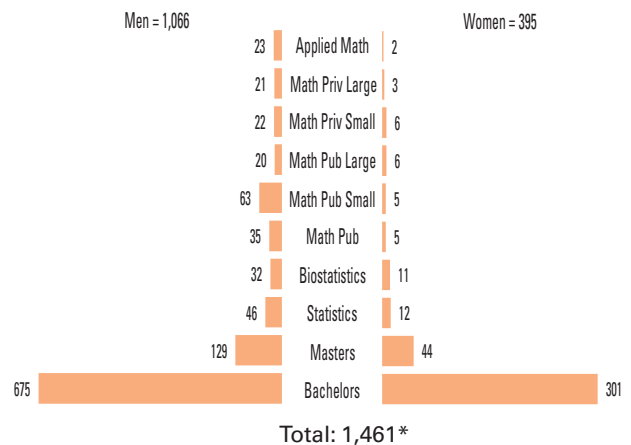


Figure 2. Gender Identity of Department Chairs by Department Grouping



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Figure F.1. Full-time Faculty by Department Grouping

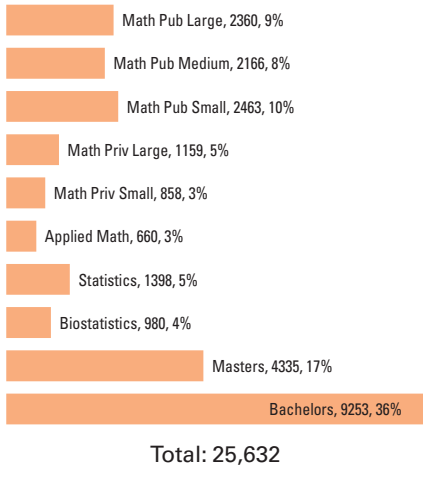


Figure F.2. Full-time Doctoral* Faculty by Department Grouping

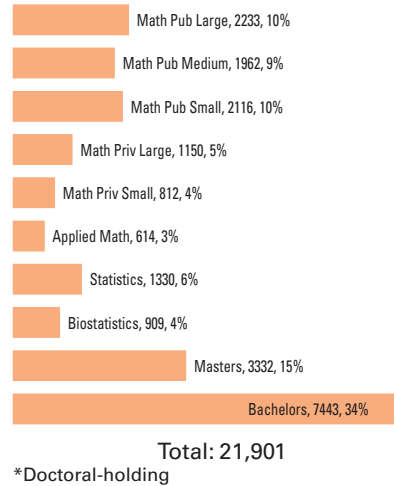
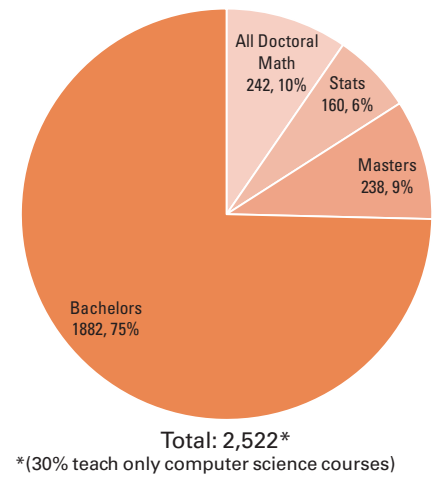


Figure F.3. Full-time Faculty Teaching Courses Outside of the Mathematical Sciences



Faculty Size

The estimated number of full-time faculty in MS for fall 2017 is 25,632 (SE = 237). Figure F.1 gives a breakdown by department grouping. Of these, 23,254 (SE = 195) were in Math and 2,378 (SE = 55) were in Stats. Approximately 85% of these full-time MS faculty hold a doctorate, a percentage that has held the past five years.

In the five years following 2012, the full-time faculty count estimate has increased slightly by an average of about 1% per year, with Math faculty growing on average at less than 1% a year and Stats faculty growing annually by about 2% on average.

The estimated number of part-time faculty in Math is 8,248, and in Stats this estimate is 255.

Doctoral Faculty

The estimated number of full-time doctoral faculty in MS is 21,901, of whom 19,662 (SE = 87) are in Math and 2,239 (SE = 46) are in Stats. These values are, respectively, up by 2% and down by 3% from the 2016 estimates. Figure F.2 gives a further breakdown by departmental groupings.

Figures D.1, D.2, and D.3 give breakdowns by departmental grouping of the numbers of doctoral faculty in MS by employment status, and Figure D.4 provides perspective on the distribution of full-time tenured doctoral faculty within the rank of full professor.

Figure D.1. Full-time Tenured Doctoral Faculty by Department Grouping

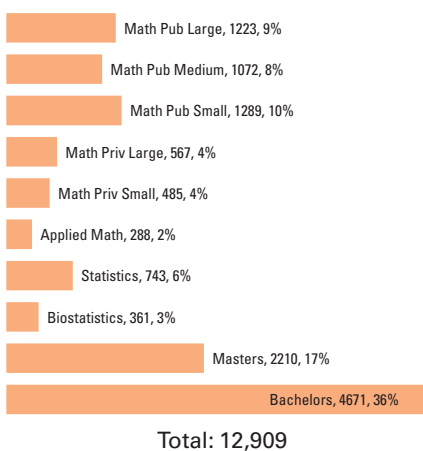


Figure D.2. Full-time Tenure-eligible Doctoral Faculty by Department Grouping

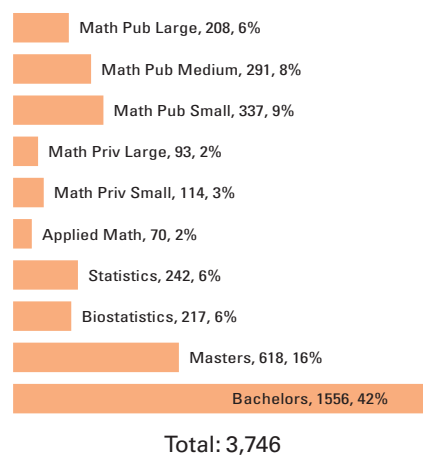


Figure D.3. Full-time Non-tenure-track Doctoral Faculty by Department Grouping

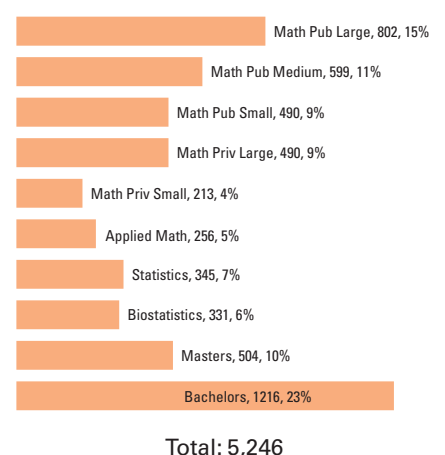
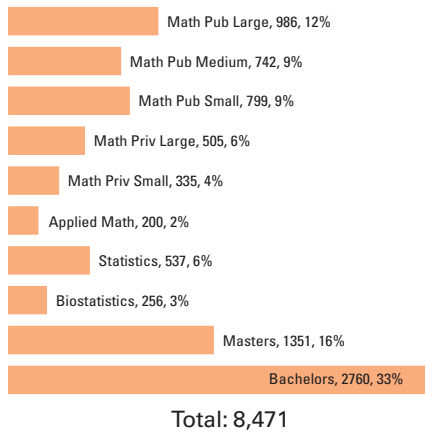


Figure D.4. Full-time Tenured Doctoral Full Professor Faculty by Department Grouping



Here are a few other features of full-time doctoral faculty data:

- Of those tenured, 11,805 are in Math, and 1,104 are in Stats.
- Among tenured faculty, 65% of those in Math and 72% of those in Stats hold the rank of full professor, and 23% are women.
- In the Doctoral Math Group, 2,850 (32%) are in non-tenure-track positions. The breakdown is 1,328 post-docs, 1,274 renewable, 220 fixed-term, and 28 other.
- In the Stats Group, 676 faculty (30%) are in non-tenure-track positions, which breaks down into 173 postdocs, 464 renewable, 21 fixed-term, and 18 other.

The estimated count of 2,274 part-time doctoral faculty increased by 15% from 2016. Of these, 2,091 are in Math and 183 in Stats. Sixty-five percent of this total are in Masters and Bachelors departments, and 31% are women.

Figure D.5. Gender of Full-time Doctoral Faculty

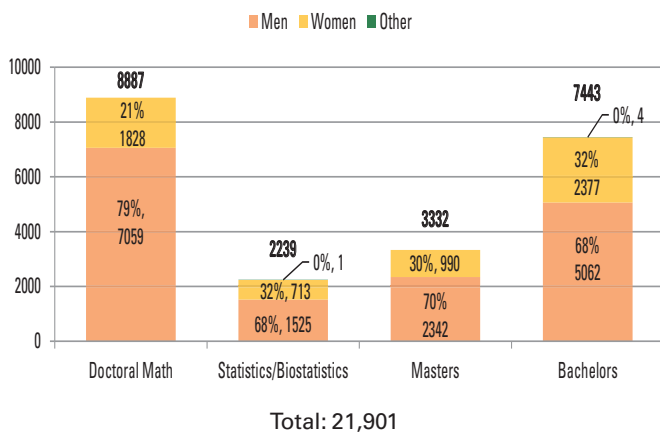


Figure ND.1. Full-time Nondoctoral Faculty by Department Grouping

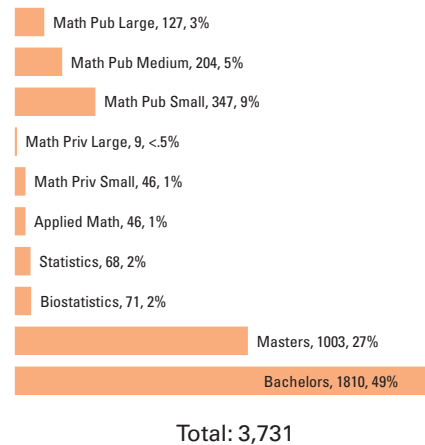
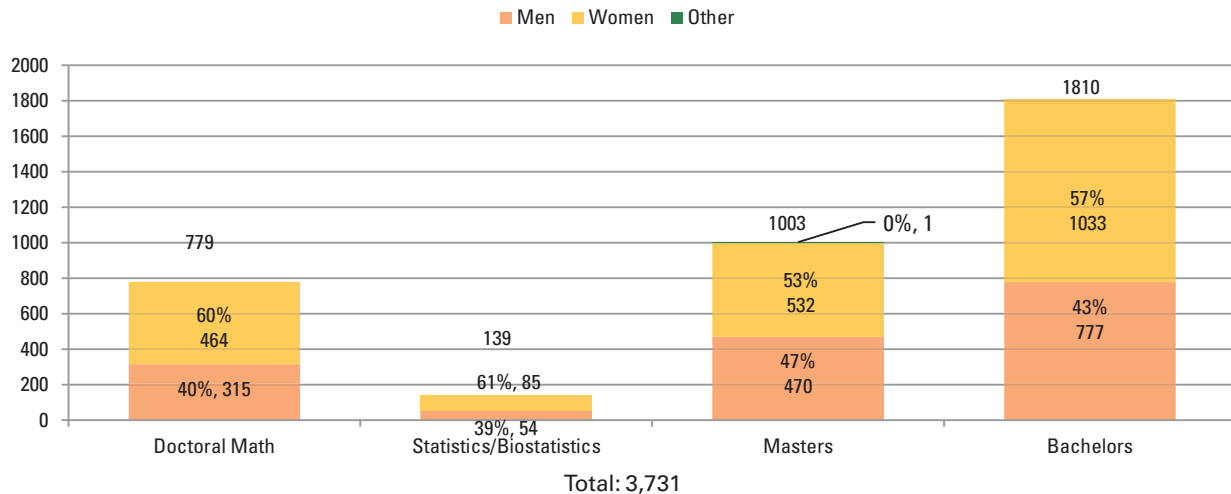


Figure ND.2. Gender of Full-time Nondoctoral Faculty



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Figure FF.1. Full-time Tenured Women Doctoral Faculty by Department Grouping

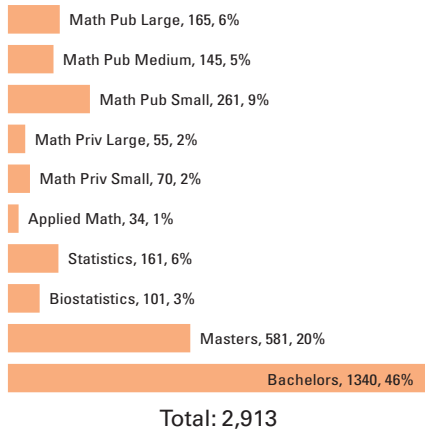


Figure FF.2. Full-time Tenure-eligible Women Doctoral Faculty by Department Grouping

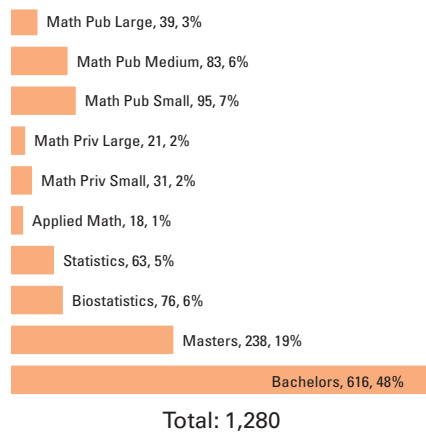
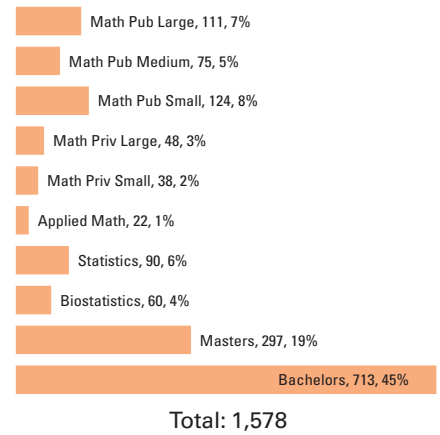


Figure FF.3. Full-time Full Professor Women Doctoral Faculty by Department Grouping



Nondoctoral Faculty

The estimated number of full-time nondoctoral faculty in MS is 3,731, of which an estimated 3,592 are in Math and 139 are in Stats. Figure ND.1 gives a more detailed breakdown. This count increased by about 2% over 2016, and it represents 15% of full-time faculty, a fraction that has held steady for the most recent five years. Approximately 90% are non-tenure-track faculty, 75% are in Masters or Bachelors departments, and 57% are women.

Approximately 276 faculty in this category are tenured (down from 309 in 2016), and fewer than 100 hold the rank of full professor. Essentially all are in the Bachelors Group. Of the non-tenure-track faculty in this category, 85% are in renewable appointments, and the rest are in fixed-term or other appointments.

Across the mathematical sciences, for the period in this report, there were approximately 6,229 part-time nondoctoral faculty, a 5% increase over 2016. Overwhelmingly, these faculty are in Math departments (6,157 or 99% in

Math, and 72 or 1% in Stats). Twenty-six percent of these individuals received benefits, and 46% are women.

Women Faculty

Women account for 31% (8,022) of all full-time faculty in MS. In Math, women made up 31% (7,224, SE = 83) of the full-time faculty; in Stats, women made up 34% (798, SE = 28) of full-time faculty. Figures FF.1, FF.2, FF.3, and FF.4, respectively, give detailed breakdowns of counts and percentages of full-time women faculty in the department groupings by employment status: tenured, tenure-eligible, rank of full professor, and non-tenure-eligible.

For the Doctoral Math departments, women composed 17% of the combined doctoral tenured and tenure-eligible faculty and 28% of the doctoral non-tenure-track (including postdocs) faculty in fall 2017. In the other groups these respective percentages are: 23% and 41% in Statistics, 31% and 51% in Biostatistics, 29% and 34% in Masters, and for Bachelors faculty they are 31% and 35%. Among the full-time nondoctoral faculty in Math, women compose 57%. Women account for 42% of all part-time faculty in Math.

Features of full-time women faculty data:

- Women hold 15% of full-time tenured and 26% of full-time tenure-eligible positions in Doctoral Math departments.
- 43% of all full-time women faculty are in the Bachelors departments.
- Biostatistics departments reported the highest percentage of full-time women faculty (40%), followed by the Bachelors departments (37%), and Masters (35%). The Math Private Large Group reported the lowest (15%).
- The percentages of women holding postdocs in various department groupings ranged from a high of 41% in Bachelors to a low of 9% in Masters.
- 85% of all women nondoctoral non-tenure-track faculty appointments (1,660) are renewable; 11% are fixed-term, and 3% are other types of appointments.

Figure FF.4. Full-time Non-tenure-track Women Doctoral Faculty by Department Grouping

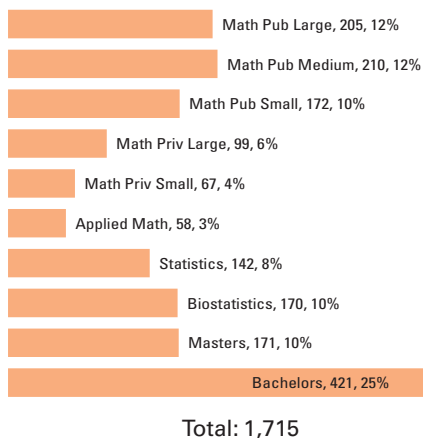
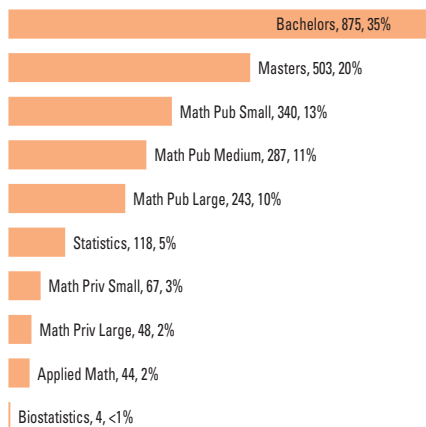


Figure UE.1. Undergraduate Course Enrollments (thousands) by Department Grouping, Fall 2017



Total Undergraduate Enrollments (thousands): 2,529

Features of part-time women faculty data:

- 61% of all part-time women faculty in Math are in Bachelors departments.
- 80% of all part-time women faculty hold nondoctoral positions. Of these faculty, 24% receive benefits and less than 1% are phased retirements.

Undergraduate Course Enrollment

The 2017 estimate of total undergraduate enrollments in MS courses is 2,529,000 (SE = 29,000). Figure UE.1 gives a sorted breakdown of this number by department grouping. A 95% confidence interval based on this data is [2,472,160, 2,585,840]. For 2016, the estimate was 2,487,000 but its SE was also large. At this confidence level, there is insufficient evidence in these data to conclude the enrollments have actually increased.

Figure UE.2. Undergraduate Course Enrollment per Full-time Faculty Member, by Department Grouping, Fall 2017

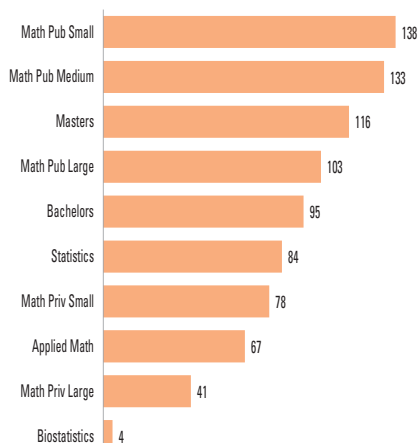
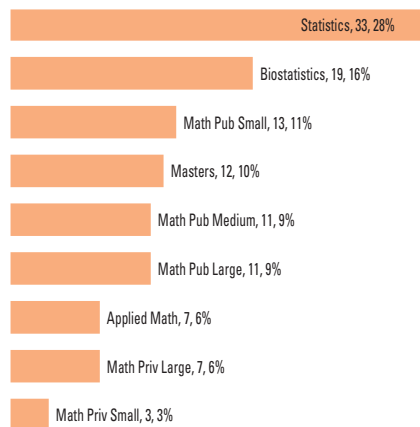


Figure GE.1. Graduate Course Enrollments (thousands) by Department Grouping, Fall 2017



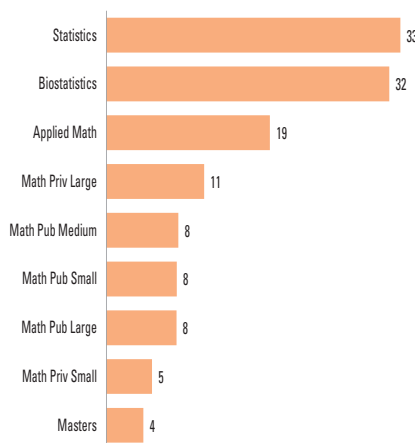
Total Graduate Enrollments (thousands): 117

Figure UE.2 shows undergraduate enrollments per full-time faculty by grouping, sorted in descending order.

Graduate Course Enrollment

The estimated total number of graduate course enrollments for 2017 is 117,000 (SE = 5,000). In 2012, these enrollments were 106,000 (SE = 3,000), and in the intervening years the estimates have trended upward, suggesting overall average annual growth of about 2%. Figure GE.1 gives a breakdown for this total among the departments with graduate programs, and Figure GE.2 shows estimates for graduate enrollments per full-time tenured and tenure-eligible faculty.

Figure GE.2. Graduate Course Enrollment per Full-time Tenured & Tenure-eligible Faculty Member, by Department Grouping, Fall 2017



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Figure UD.1. Undergraduate Degrees Awarded by Major and Department Grouping (Degrees awarded between July 1, 2016 and June 30, 2017)

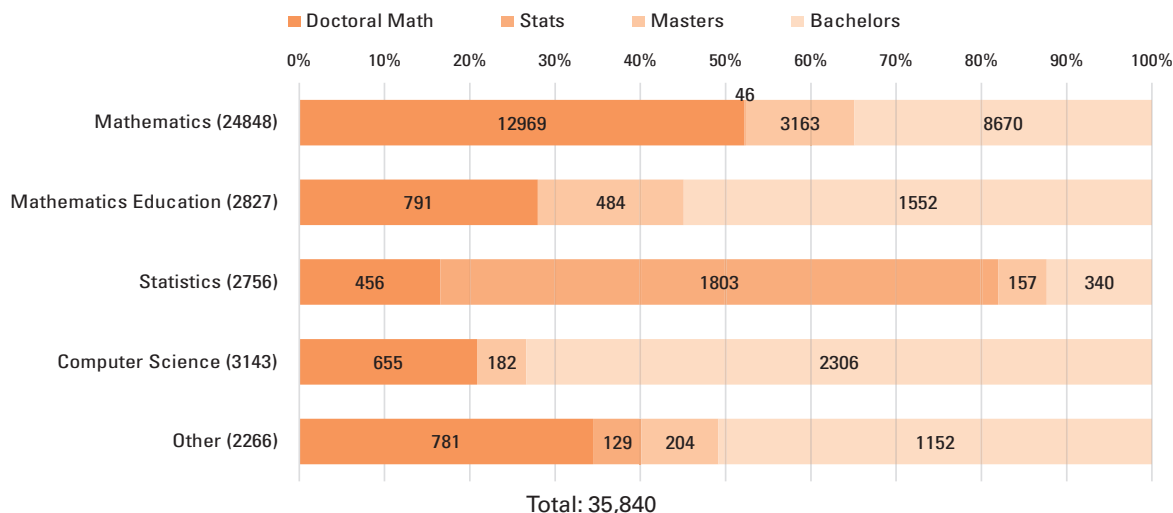


Figure UD.2. Undergraduate Degrees Awarded by Major and Gender (Degrees awarded between July 1, 2016 and June 30, 2017)

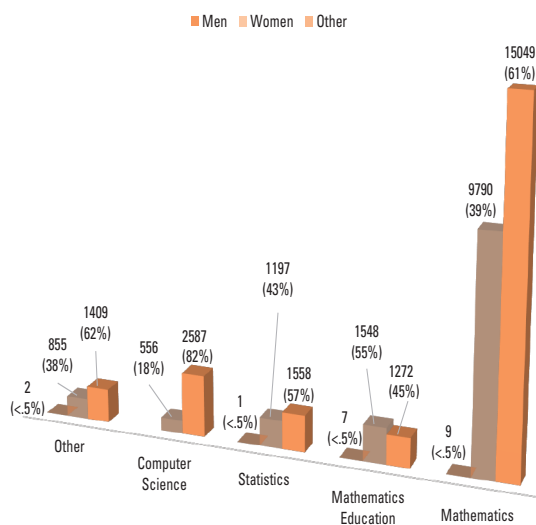
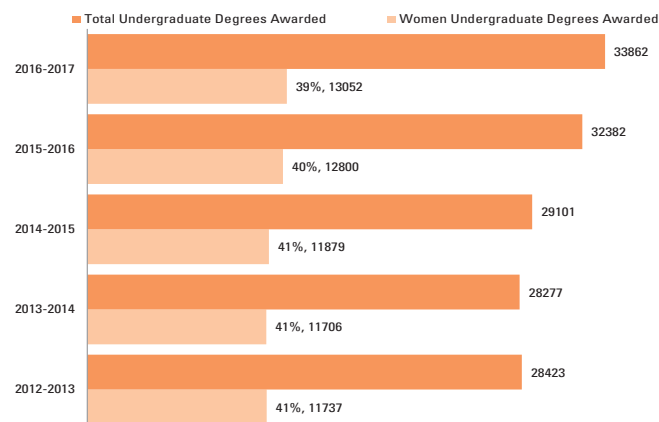


Figure UD.3. Undergraduate Degrees Awarded¹, 2012–2017, All Mathematics Departments



¹ Degrees awarded between July 1 and June 30.
² Due to the finer detail being collected on majors, it's possible departments have reported degrees not reported in the past.

Undergraduate Degrees Awarded

For the period 2016–17, the estimated number of bachelors degrees awarded in MS departments is 35,840 (SE = 759), up 5% from the 2015–16 estimate of 34,219. Of these, 13,946 were earned by women (39%), a 3% increase. In Math Departments, the 2016–17 estimated number of bachelors degrees awarded is 33,862, a count that includes 24,802 Math degrees, 2,827 Math Ed degrees, 953 Statistics-only degrees, 3,143 Computer Science-only degrees, and 2,137 other degrees. Approximately 13,052 of these degrees were earned by women. This figure represents a 6% increase from last year's estimate of 12,800 degrees awarded by Math departments to women.

Figure UD.1 shows the distributions of undergraduate degrees awarded by major and department grouping, and Figure UD.2 gives a breakdown by gender. Figure UD.3 provides a multi-year perspective.

Here are some further highlights:

- All department groupings reported increases in the number of undergraduate degrees awarded, except Math Public Medium and Masters.
- 39% (13,946) of all bachelors degrees, 55% (1,548) of mathematics education degrees, and 18% (556) of computer science degrees were earned by women.
- Of all degrees in mathematics (24,848, 69% of all bachelors degrees awarded), 52% (12,969) were awarded in the Doctoral Math group; 39% of these degrees were awarded to women.

Figure MD.1. Masters Degrees Awarded by Major and Department Grouping (Degrees awarded between July 1, 2016 and June 30, 2017)

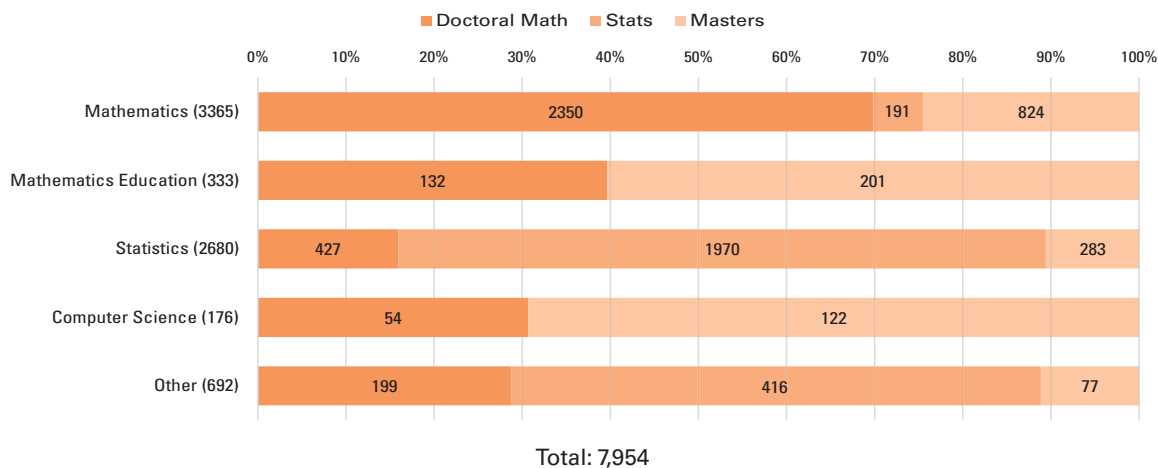


Figure MD.2. Masters Degrees Awarded by Major and Gender (Degrees awarded between July 1, 2016 and June 30, 2017)

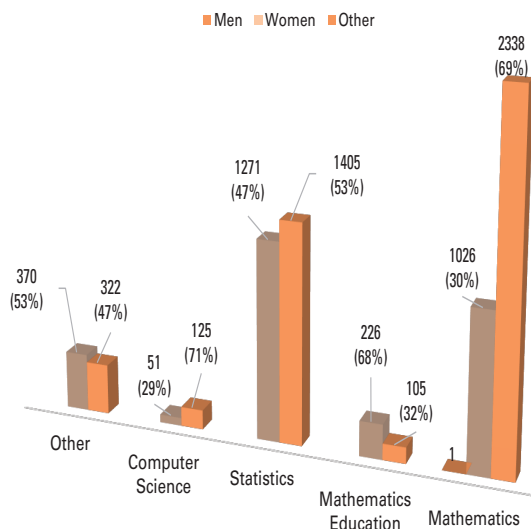
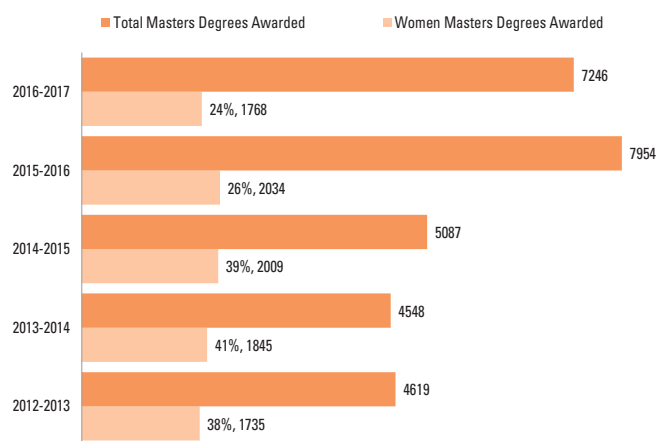


Figure MD.3. Masters Degrees Awarded¹, 2012–2017, All Mathematics Departments



¹ Degrees awarded between July 1 and June 30.

- 35% (8,670) were awarded in Bachelors departments, and 43% of these were to women.
- 13% (3,163) were awarded in Masters departments, and 38% of these were to women.
- Of all degrees in statistics (2,756, or 8% of all bachelors degrees),
 - 65% (1,803) were awarded in departments of Statistics or Biostatistics
 - 43% (1,197) were awarded to women
- Of degrees in Computer Science awarded in mathematical sciences departments (3,143, 9% of bachelors awarded), 73% (2,306) were awarded in the Bachelors Group, and 18% of these were to women.

Masters Degrees Awarded

For the period 2016–2017, the estimated number of masters degrees awarded in MS departments is 7,246 (SE = 336), a decrease of 9% from the 2015–2016 estimate of 7,954. Of these, 2,944 or 41% were earned by women, a 8% decrease from the 2015–2016 estimate consisting of 3,203. In Math departments, the estimated number of masters degrees awarded is 4,669, a count estimate consisting of 3,174 Math degrees, 333 Math Ed degrees, 710 Statistics-only degrees, 176 Computer Science-only degrees, and 276 other degrees. Approximately 1,768 of these are earned by women. This figure represents a 13% decrease from last year’s estimate of 5,360 masters degrees awarded by Math departments.

Figures MD.1 and MD.2 show distribution by major, department grouping, and gender. Figure MD.3 gives a longitudinal view of degree counts and percentages of women recipients.

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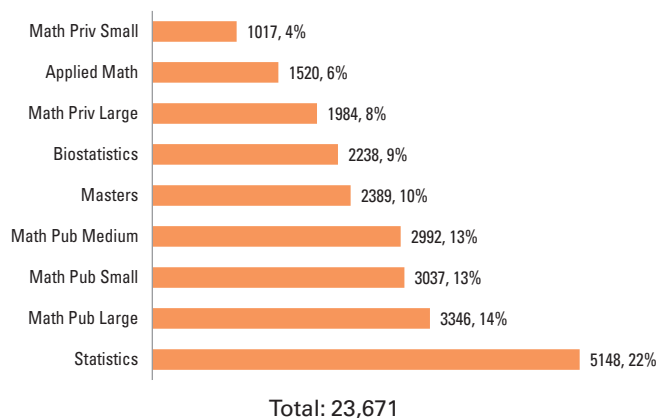
Here are a few highlights regarding the masters degrees:

- All department groupings reported decreases in the number of masters degrees awarded except Math Public Small, Applied Math, and Biostatistics which all showed increases of 18%.
- 37% (2,680) of masters degrees were in statistics.
- 21% (1,507) of masters degrees were awarded by Masters departments, 25% (1,822) by Statistics, and 12% by Math Public Small.
- 41% of all masters degrees were awarded to women, with the lowest rates of 29% (51) in computer science-only followed by 30% (1,026) among math majors and the highest rate of 68% (226) among mathematics education majors.
- 46% (3,365) of masters degrees represented were awarded in mathematics.
 - 24% (824) of these were awarded by Masters departments.
 - 29% (237) of these were awarded to women.
- 5% (333) of masters degrees were in mathematics education.
 - 60% (201) of these were awarded by Masters departments.
 - Women earned 68% of all mathematics education degrees.
- 10% (692) of masters degrees in mathematical sciences departments were in other degrees.
 - 48% (331) of Other masters were awarded by the Biostatistics Group; 64% of these went to women.

Graduate Students

In fall 2017, the total number of full-time graduate students is estimated at 23,671, with 16,285 in Math (essentially unchanged from 16,305 in fall 2016) and 7,386 in Stats. Figure GS.1 gives a breakdown by department grouping. The total number of full-time graduate students in Doctoral Math departments is 13,896 (from 13,702). Table

Figure GS.1. Graduate Students by Department Grouping, Fall 2017



GS.2 provides insight into longer-term trends in graduate student environments and gender.

Features of full-time graduate student data:

- Women account for 36% of full-time graduate students and 40% of full-time first-year graduate students.
- First-year graduate students decreased 6% to 6,982 from 7,402.
- US citizen and permanent resident graduate students decreased 2% from 11,587 to 11,383. 88% of this decrease comes from the Statistics group which dropped 14% from 1,732 to 1,497.
- Underrepresented minorities accounted for 12% of US citizen and permanent resident graduate students and 13% of first-year graduate students. Women compose 38% and 39%, respectively, of these categories.
- Underrepresented minorities decreased by 8% overall with only Math Private Large reporting an increase of 6%; all groupings reported decreases or no change.
- Non-US citizen full-time graduate students increased slightly from 12,226 to 12,288. All groups except Math Public Small, Math Public Medium, Math Public Large, and Masters reported more non-US citizen graduate

Table GS.2. Full-time Graduate Students in All Doctoral Math Groups Combined by Gender and Citizenship, Fall 2008–2017

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total full-time graduate students	10883	11286	13048	12514	12684	12961	13023	13431	13702	13896
Women	3193	3248	3839	3773	3771	3969	3925	4039	4146	4233
% Women	29%	29%	29%	30%	30%	31%	30%	30%	30%	30%
% US Citizen & Permanent Residents ¹	55%	56%	57%	56%	54%	53%	55%	53%	52%	52%
% Underrepresented minorities ²	9%	9%	11%	8%	8%	9%	11%	15%	13%	13%
Total first-year graduate students	2924	3040	3313	3288	3394	3623	3551	3646	3704	3701
Women	870	904	1019	1077	1036	1205	1193	1188	1200	1279
% Women	30%	30%	31%	33%	31%	33%	34%	33%	32%	35%
% US Citizen & Permanent Residents ¹	56%	55%	51%	50%	54%	53%	55%	53%	52%	52%
% Underrepresented minorities ²	10%	9%	9%	9%	7%	10%	13%	14%	12%	14%

¹ Starting with 2014, departments were asked to report US citizen and permanent resident counts together; previously permanent residents were included in the non-US citizen counts. All percentages prior to 2014 have been updated to allow for comparison with previous years' data.

² Prior to 2014 these counts only included US Citizens. Underrepresented minorities include any person having origins within the categories American Indian or Alaskan Native, Black or African American, Hispanic or Latino, and Native Hawaiian or Other Pacific Islander.

students than US citizens. 39% of all non-US graduate students were reported by Stats. Women account 40% (4,933) of non-US citizen graduate students.

Features of part-time graduate student data:

- The overall count held steady at 4,480. In most groups the number fell slightly, but an increase in Statistics from 352 in 2016 to 566 in 2017 helped to compensate.
- Underrepresented minorities account for 13% of these students, essentially the same percentage as in 2016.

Faculty Categories

The faculty categories used in this report are described below. Departments were asked to report any faculty member who was considered to be full-time in the institution for the academic year and at least half-time in the department. Each faculty member was reported in exactly one of these categories.

Tenure-track faculty includes full-time faculty who hold tenured/tenure-eligible positions (i.e., only those individuals who are tenured full professors, other tenured and tenure-eligible faculty).

Postdoctoral faculty includes full-time faculty who have teaching and/or research responsibilities, but for a strictly limited term of employment (i.e., those individuals who hold a temporary position primarily intended to provide an opportunity to continue training or to further research experience).

Non-tenure-track faculty includes full-time faculty eligible for benefits and with an appointment that lasts at least one academic year. These faculty hold appointments that are renewable (potentially unlimited), fixed-term but not renewable, or temporary. Typical titles for these positions are Lecturer, Senior Lecturer, Instructor, Senior Instructor, Associate/Assistant/Full Teaching Professor, Professor of the Practice, or Clinical Professor, and similar titles for research-only faculty.

Part-time faculty includes those individuals who are hired term-by-term, paid by the course, and/or those in phased retirement.

Remarks on Statistical Procedures

The questionnaire on which this report is based, “Departmental Profile,” is sent to all Doctoral, Masters, and Bachelors departments in the US.

Response rates vary substantially across the different department groups. For most of the data collected on the Departmental Profile form, the year-to-year changes in a given department’s data are small when compared to the variations among the departments within a given group. As a result of this, the most recent prior year’s response is used (imputed) if deemed suitable. After the inclusion of prior responses, standard adjustments for the remaining nonresponses are then made to arrive at the estimates reported for the entire grouping.

Standard errors were calculated for some of the key estimates for the Doctoral Math Group (Math Public, Math Private, and Applied Math), and for the Masters, Bachelors, Statistics, and Biostatistics Groups. Standard errors are calculated using the variability in the data and can be used to measure how close our estimate is to the true value for the population. As an example, the number of full-time faculty in the Masters Group is estimated at 4,343 with a standard error of 107. This means the actual number of full-time faculty in the Masters Group is most likely between 4,343 plus or minus two standard errors, or between 4,129 and 4,557. This is much more informative than simply giving the estimate of 4,343.

Estimates are also given for parameters that are totals from all groups, such as the total number of full-time faculty. For example, an estimate of the total number of full-time faculty in all groups except Statistics and Biostatistics combined is 23,254, with a standard error of 195.

The careful reader will note that a row or column total may differ slightly from the sum of the individual entries. All table entries are the rounded values of the individual projections associated with each entry, and the differences are the result of this rounding (as the sum of rounded numbers is not always the same as the rounded sum).

Department Groupings

In this report, *Mathematical and Statistical Sciences* departments are those in four-year institutions in the US that refer to themselves with a name that incorporates (with a few exceptions) “Mathematics” or “Statistics” in some form. For instance, the term includes, but is not limited to, departments of “Mathematics,” “Mathematical Sciences,” “Mathematics and Statistics,” “Mathematics and Computer

A department is in Group...	...when its subject area, highest degree offered, and PhD production rate p
Math Public Large	Math PhD, $7.0 \leq p$
Math Public Medium	Math PhD, $3.9 \leq p < 7.0$
Math Public Small	Math PhD, $p < 3.9$
Math Private Large	Math PhD, $3.9 \leq p$
Math Private Small	Math PhD, $p < 3.9$
Applied Math	Applied mathematics, PhD
Statistics	Statistics, PhD
Biostatistics	Biostatistics, PhD
Masters	Math, masters
Bachelors	Math, bachelors
Doctoral Math	Math Public, Math Private, & Applied Math
Stats or Stat/Biostat	Statistics & Biostatistics
Math	All groups except Statistics & Biostatistics

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Science," "Applied Mathematics," "Statistics," and "Biostatistics." Also, *Mathematics (Math)* refers to departments that (with exceptions) have "mathematics" in the name; *Stats* refers to departments that incorporate (again, with exceptions) "statistics" or "biostatistics" in the name but do not use "mathematics."

Listings of the actual departments that comprise these groups are available on the AMS website at www.ams.org/annual-survey/groupings.

Survey Response Rates by Grouping

Departmental Profile Department Response Rates

Group	Number	Percent	Imputed ¹
Math Public Large	26 of 26	100%	8
Math Public Medium	38 of 40	95%	5
Math Public Small	62 of 68	91%	5
Math Private Large	21 of 24	88%	3
Math Private Small	26 of 28	93%	10
Applied Math	22 of 25 ²	88%	4
Statistics	52 of 59	88%	20
Biostatistics	33 of 44 ²	75%	9
Masters	107 of 174	61%	32
Bachelors	566 of 1,021	55%	186
Total	954 of 1,509	63%	288

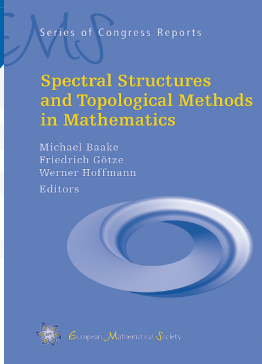
¹See paragraph two under 'Remarks on Statistical Procedures.'
²The populations for Applied Math and Biostatistics are slightly less than for the Doctorates Granted Survey because some programs do not formally "house" faculty, teach undergraduate courses, or award undergraduate degrees.

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 Data Committee 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.

FEATURED TITLE FROM THE

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Series of Congress Reports
Spectral Structures and Topological Methods in Mathematics
 Michael Baake
 Friedrich Götze
 Werner Hoffmann
 Editors

Spectral Structures and Topological Methods in Mathematics

Michael Baake, *Universität Bielefeld, Germany*, Friedrich Götze, *Universität Bielefeld, Germany*, and Werner Hoffmann, *Universität Bielefeld, Germany*, Editors

This book is a collection of survey articles about spectral structures and the application of topological methods bridging different mathematical disciplines, from pure to applied. The topics are based on work done in the Collaborative Research Centre (SFB) 701.

Notable examples are non-crossing partitions, which connect representation theory, braid groups, non-commutative probability, as well as spectral distributions of random matrices. The local distributions of such spectra are universal and also represent the local distribution of zeros of *L*-functions in number theory.


An overarching method is the use of zeta functions in the asymptotic counting of sublattices, group representations, etc. Further examples connecting probability, analysis, dynamical systems, and geometry are generating operators of deterministic or stochastic processes, stochastic differential equations, and fractals, relating them to the local geometry of such spaces and the convergence to stable and semi-stable states.

EMS Series of Congress Reports, Volume 15; 2019; 433 pages; Hardcover; ISBN: 978-3-03719-197-2; List US\$108; AMS members US\$86.40; Order code EMSSCR/15

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