Annual Survey Doctoral Department Groupings

Richard Cleary and James Maxwell

Introduction: What's Changing

Since their inception in the late 1950s, the results of the annual AMS surveys of mathematics and statistics departments have been reported using *groupings* of departments. Such groupings need to be constant over long periods of time in order to allow trends in the data to be detected. On the other hand, groupings must be updated periodically to reflect longer-term changes. The Joint AMS-ASA-MAA-SIAM Data Committee is charged with managing and reporting the survey data, and the Committee will update the groupings used effective with the 2012 Annual Survey.

Since the most recent change in groupings was made after the release of the 1995 National Research Council ranking of doctoral programs,[1] the update of the NRC rankings in 2010[2] has prompted the Data Committee to reevaluate the groupings used in reporting the survey data. As many in the community are aware, the methodology used for the 2010 NRC rankings was very different from what had been used in 1995 (and for the previous ranking in 1982). In particular, no single number was reported in 2010 that could be used to linearly order departments and establish groupings. After considerable study and thought, the Joint Data Committee is hereby announcing a new grouping scheme based on the size of the departments and the type of institution rather than on a reputational ranking.

Starting with reports on the 2012 AMS-ASA-IMS-MAA-SIAM Annual Survey, doctorate-granting mathematics departments will first be grouped into those at public institutions and those at private institutions, constituting 130 and 51 departments, respectively, for the 2012 Annual Survey. These groups will then be further subdivided based on the average annual number of Ph.D.'s reported to the Annual Survey by the department between 2000 and 2010.[3] Departments which self-classify their Ph.D. program as being in applied mathematics will form their own group, as will departments in statistics and departments in biostatistics. The rest of this article describes the rationale behind the Data Committee's decision to adopt the new grouping scheme and the new groupings themselves in more detail, including a chart comparing old and new groupings.

The Rationale for Grouping Data by Institution Type and Size

Our professional societies formed the Data Committee to help members with questions about the state of the profession. The description of

Richard Cleary is a professor in the Department of Mathematical Sciences at Bentley University. His email address is rcleary@bentley.edu.

James W. Maxwell is AMS associate executive director for special projects. His email address is jwm@ams.org.

[1] *The 1995 report, "Research-Doctorate Programs in the United States: Continuity and Change", is available for purchase through the National Academies website* http://sites.nationalacademies.org/PGA/Resdoc/index.htm.

[2] *The 2010 report, "A Data-Based Assessment of Research-Doctorate Programs in the United States", is available through the National Academies website* http://sites.nationalacademies.org/PGA/Resdoc/index.htm.

An extract of the NRC data on Ph.D. programs in mathematics, applied mathematics and statistics, as revised in April 2011, has been posted to the AMS website and is accessible from http://www.ams.org/profession/data/annual-survey/groups_des.

[3] *Individual departments will not be moved among size classifications until the next major revision of the groupings. Any new doctorate-granting departments that are added to the survey prior to that revision will be placed in the grouping which seems most likely to reflect their annual Ph.D. production.*

the Committee's responsibilities begins with this sentence: "The Committee is charged with gathering and disseminating data on matters of concern to the mathematical sciences community." Because any scheme for grouping departments is likely to be somewhat controversial, an important first question is to ask, "Why should we group institutions at all?" The answer is that without grouping, the variability in the size and nature of our various departments would typically overwhelm important information in the data.

Members of our societies use the reports on the Annual Survey in many ways. Members of the Data Committee often hear from colleagues who are using the data we provide to prepare reports or presentations for the administration of their college or university, for accrediting agencies, for funding agencies, and for other stakeholders. To be effective and useful benchmarking tools, this sort of data should allow a department to compare itself to others that are similar in size and mission.

In addition to use by individuals and departments, our data are frequently cited by other committees of the sponsoring societies. The "matters of concern" in our professional community would be much harder to study if our data were aggregated across all Ph.D.-granting departments. By providing information about the career trajectories of recent Ph.D.'s from groups of departments, we have been able to study trends about which groups have had the most success in the job market, which groups are granting Ph.D.'s to women at the highest rates, and the percentage of United States citizens receiving doctorates in various areas. The division of doctoral departments into groups also adds considerable value to the reports on faculty salaries. All of this information is potentially valuable to students as they choose careers, to departments as they advise students, and to the community as a whole as we make strategic decisions about managing our resources.

In moving to groups of doctoral departments formed by institutional control (public versus private) and size of doctoral program, we are explicitly making it clear that it is the business of the Data Committee to provide information about programs that are similar. We are not in the business of ranking programs, and indeed we never have been. The previous groups, formed as a reflection of the NRC rankings, implied such a ranking even if it was not the committee's intent. We hope that the new structure will make it clear that we are not claiming that departments in one group are in any way "better" than those in another group, but that they are indeed similar in ways that are self-reported and easily verifiable. The move to describing groups by their descriptive terms (e.g., Public Large) rather than by numerical titles (Group I, Group II, Group III), which suggested an order of quality, is meant to reinforce the notion that the groups no longer reflect subjective measures of quality.

A Brief History on Groupings of Ph.D.-Granting Mathematics Departments

The Conference Board of Associated Research Councils, a coalition with representatives from the American Council on Education, the American Council of Learned Societies, the National Research Council, and the Social Science Research Council, published an assessment of mathematical and physical sciences doctoral programs in 1982.[4] Soon after this, the AMS Data Committee replaced the groupings of doctoral mathematics departments in use at that time with new groupings based on the rating of "quality of graduate faculty" assigned each department in the new study. The committee used a rating of 3.0 or above to define Group I. This produced a Group I with 39 departments. Group II was defined as those departments whose doctoral program had an NRC rating below 3.0 but greater than or equal to 2.0. This produced a Group II with 43 departments. Group III was defined as the remaining mathematics departments whose doctoral program was rated below 1.0, together with those departments whose doctoral program was not rated in the assessment. (A doctoral program had to satisfy certain criteria before it was included in the study.) Rating information in the report was not used to further subdivide the much smaller groups in use for applied mathematics departments, Group V, nor for departments in statistics and biostatistics, Group IV.

Since 1996, Ph.D.-granting departments of mathematics have been grouped according to their rating of "scholarly quality of program faculty", as reported in the 1995 NRC assessment of doctoral programs mentioned earlier. This new assessment resulted in a revised Group I consisting of 48 departments: the 39 departments already in Group I plus the nine additional departments whose 1995 rating was greater than or equal to 3.0. In addition, Group I was subdivided into the 25 departments at public institutions, Group I Public, and the 23 departments at private institutions, Group I Private. The revised Group II contained 56 departments, and the revised Group III contained the remaining 65 doctoral departments in existence in 1996.

Description of the New Groupings

The new groupings of doctorate-granting departments of mathematics are based on the size of the Ph.D. program as reflected in the number of Ph.D.'s awarded during the ten years from

---

[4]*For further details on this assessment and a listing of related earlier assessments, see the April 1983 issue of* Notices of the American Mathematical Society*, pages 257–267. This article has been posted to the AMS's website and can be accessed from* `http://www.ams.org/profession/data/annual-survey/groups_des`.

July 1, 2000, through June 30, 2010. Since there are some departments that have not reported their Ph.D.'s for every Annual Survey during this time, the average annual number of Ph.D.'s awarded was used to compare the departments. In addition, the Data Committee feels that groupings that reflect the type of institution, public or private, will be most useful to the mathematical community. In the past we have done this only for Group I.

The Data Committee reviewed the list of 130 Ph.D.-granting mathematics departments at public institutions in 2010, sorted from highest to lowest based on their average annual number of Ph.D.'s awarded. The 20 percent at the top of this list forms the group labeled Public Large. This group contains 26 departments and accounts for 49 percent of the 6,148 Ph.D.'s produced by these 130 departments. The next 30 percent of the departments forms the group labeled Public Medium. This group consists of 40 departments and accounts for 32 percent of the Ph.D.'s produced by these 130 departments. The remaining 64 departments form the group labeled Public Small and account for the remaining 19 percent of the Ph.D.'s produced. The three groupings Public Large, Public Medium, and Public Small also account for 37 percent, 24 percent and 13 percent, respectively, of the 8,293 Ph.D.'s produced by all 180 departments over the ten years July 1, 2000, through June 30, 2010.

For the 50 Ph.D.-granting mathematics departments located at private institutions in 2010, the 24 departments with the highest annual number of Ph.D.'s awarded form the group labeled Private Large. This group accounts for 80 percent of the 2,145 Ph.D.'s awarded by these 50 departments during the ten years 2000–2010 and 21 percent of the Ph.D's awarded by all 180 departments. The remaining 26 departments form the group labeled Private Small.

Table A shows the mathematics departments currently in Groups I, II, and III (in 2010) cross-tabulated by their new grouping for 2012. Five of these mathematics departments are moving to applied mathematics. The 2010 NRC report, as revised in April of 2011, evaluated eleven Ph.D. programs from AMS's Groups I, II, and III mathematics departments solely within the NRC report's applied mathematics Ph.D. programs. The department chairs at these institutions were contacted and asked to decide if they wanted to be grouped with the other applied mathematics departments in the new Annual Survey groupings or remain grouped with the other mathematics departments. Four of these departments responded that they preferred to be grouped with applied mathematics departments. The new groupings reflect that preference. One program not reviewed by the NRC has also decided to move to the applied mathematics group with the 2012 survey cycle.

For the upcoming 2012 cycle of department surveys, there are 130 Ph.D.-granting mathematics departments at public institutions and 51 doctorate-granting mathematics departments at private institutions. There are also 30 Ph.D.-granting departments of applied mathematics, 58 Ph.D.-granting departments of statistics, and 34 Ph.D.-granting departments of biostatistics. Details on the new Annual Survey groupings, including listings of the departments in each group, are available on the AMS website `http://www.ams.org/profession/data/annual-survey/groups_des`.

The Data Committee recognizes that some of the most useful information in the Annual Survey reports comes from being able to identify trends within particular segments over time. Therefore we anticipate that the new groupings will be used for approximately ten years, at which time the sizes of departments can be reviewed to see if there would be substantial benefit in introducing revised groupings. The committee believes this long-term approach will not provide any incentive for departments to try to grow their doctoral program simply in order to move to a different group.

Table A: Realignment of Ph.D.-Granting Mathematics Departments [a]

	Current Group →				
New Group ↓	Group I Public	Group I Private	Group II	Group III	Row Total
Public Large	20	0	6	0	26
Public Medium	5	0	25	10	40
Public Small	0	0	13	50	63
Private Large	0	22	1	1	24
Private Small	0	0	11	15	26
Applied Math	0	1	0	4	5
Column Total	25	23	56	80	184

[a] Based on Groups I, II, and III during the 2010 Annual Survey.