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23rd ANNUAL AMS SURVEY 1979

Second Report

A first report of the 1979 Survey appeared in the October 1979 Notices, pp. 382-392. It included a report of the salary survey and a first report of the survey of new 1978-1979 doctorates. This second report includes an update of the fall 1979 employment status of new doctorates, an analysis of faculty mobility, and a report on fall 1979 enrollments, class sizes, and teaching loads, as well as a report on the 1979 two-year college survey.

The 23rd Annual AMS Survey was made under the direction of the Society's Committee on Employment and Educational Policy (CEEP), whose members in 1979 were Lida K. Barrett (chairman), Alan J. Goldman, Arthur P. Mattuck, Donald C. Rung, Robert J. Thompson and William P. Ziemer. A Data Subcommittee of CEEP, consisting of Lida K. Barrett, Lincoln K. Durst, Wendell H. Fleming (chairman), Arthur P. Mattuck, Donald C. Rung, and Donald J. Albers as a consultant for two-year colleges, designed the questionnaires with which the data were collected. The committee is grateful to members of the AMS staff, especially Marcia C. Almeida, for the diligence and efficiency with which the data were collected and compiled. Comments or suggestions regarding this program may be directed to the subcommittee.

Employment of Mathematical Sciences Doctorates, Faculty Mobility, Nonacademic Employment, Fall 1979

by Wendell H. Fleming

This is one of a series of annual reports on trends in the job market for Ph.D.'s in the mathematical sciences. The report begins with an update of the fall 1979 employment status of new 1978-1979 doctorates. This is followed by a discussion of trends in the academic job market in four-year colleges and universities, based on 1979 AMS Survey data on faculty mobility. The article concludes with trends in nonacademic employment since 1975.

The past year 1979, like the year 1978 preceding it, was relatively good for the employment of recent recipients of Ph.D.'s in the mathematical sciences. Survey data indicate that nearly all new 1978-1979 Ph.D.'s, and also most untenured faculty members terminated after academic year 1978-1979, found either another teaching position for fall 1979 or mathematics-related nonacademic employment. There was some increase in the number of teaching positions, around 2% on a full-time equivalent basis. However, in some groups of departments (specifically Groups M and B in the classification below) a substantial part of the increase was through part-time positions. Again in 1979 the modest increase in teaching staff was much less than the increase of over 6% in mathematics course enrollments. The negative effects of this situation, which has continued over the last five years, are discussed in an accompanying article by Donald C. Rung. The proportion of new mathematical sciences Ph.D.'s taking nonacademic jobs has risen to nearly 30%. If one counts, in addition, those who move to such positions after a few years as junior members of the faculty, the proportion is approaching half the recent mathematical sciences Ph.D.'s employed in the U.S. This represents a substantial change, since traditionally nearly 80% of Ph.D. mathematicians have held academic positions. Reasons for this trend seem to include insecurity of nontenured faculty members and a strong demand in high-technology industry and consulting firms, accompanied by good starting salaries.

In this article departments in mathematical sciences in U.S. and Canadian universities and four-year colleges are classified as below. The first six groups consist of departments that have doctoral programs, of which Groups I-V are U.S. departments. (The numbers indicate how many departments were queried in the 1979 Survey.)

Group I:	the top 27 ACE ranked mathematics departments.
Group II:	the other 38 ACE rated mathematics departments.
Group III:	86 mathematics departments not included in the ACE study.
Group IV:	67 statistics, biostatistics and biometry departments.
Group V:	116 other mathematical science departments (includes 74 in computer science).
Group VI:	35 Canadian departments in the mathematical sciences.
Group M:	371 departments with masters' programs (of which 18 are Canadian departments).
Group B:	1,053 departments which offer at most bachelors' degrees (of which 32 are Canadian departments).

Notes: Group B includes about 100 departments with no degree programs. Both M and B include some departments in universities which have doctoral programs in other areas, in some cases in other areas of the mathematical sciences.

Response rates varied from one group to another, with the largest response rate from Groups I, II, and III. Of an estimated total of about 18,100 full-time U.S. mathematical sciences faculty members, over 10,000 are members of departments which responded to the survey.

For an account of the ACE ratings referred to above see *A Rating of Graduate Programs* by Kenneth D. Roose and Charles J. Andersen, American Council on Education, Washington, D.C., 1970, 115 pp. The information on mathematics was reprinted by the Society and may be found on pages 338-340 of the February 1971 issue of the Notices.

FALL 1979 EMPLOYMENT STATUS OF 1978-1979 NEW DOCTORATES

Table 1 contains the fall 1979 employment status by type of employer and field of degree for 889 new mathematical sciences doctorates who received the degree between July 1, 1978 and June 30, 1979. The names of these 889 people, and the titles of their doctoral theses, were published in the November 1979 Notices, pp. 470-482. Table 1 updates the corresponding table on p. 388 of the October 1979 Notices, using more recent information provided by departments and the recipients of the degrees. The total of 889 degrees included in Table 1 is one less than reported in the October 1979 Notices; in that table one individual was erroneously counted twice. Also, this total does not include a few more recipients of doctorates who were reported too late to gather employment information for these reports. (A supplementary list of recipients will appear in the April 1980 Notices.)

The first five rows in Table 1 refer to those 1978-1979 new doctorates employed by doctorate-granting departments in the U.S. The next two rows refer to those employed by U.S. mathematical sciences departments which grant masters and bachelors degrees only.

As reported elsewhere in this series of reports, the proportion of new doctorates employed in colleges which do not have Ph.D. programs has been steadily declining (see the October 1978 Notices, p. 399). Table 1 shows only 155 new 1978-1979 mathematical sciences doctorates employed in colleges. This includes a substantial number already employed in the same department before completing the Ph.D. On the other hand, the percentage of new doctorates taking nonacademic positions has gradually risen. This trend is discussed later in this article.

Table 1 shows only 13 of 889 new 1978-1979 doctorates as not yet employed by fall 1979, indicating a good job market for new mathematical sciences doctorates last year. Judging by the rather large number of advertisements in *Employment Information in the Mathematical Sciences*, January 1980 issue, the academic job market at the assistant professor level will probably be strong again this year. In particular demand, by both academic departments and industry, are new (or recent) Ph.D.'s with competence in applied areas.

FACULTY MOBILITY

This part of the AMS Survey is concerned with the number of faculty members newly hired from various sources, as well as with individuals leaving faculty positions and their subsequent employment status. The Survey also monitors trends in the proportions of tenured vs. nontenured faculty, and of doctorate-holding vs. nondoctorate faculty. The numbers of departments in the various Groups I, II,...,B responding to the 1979 Survey of faculty mobility are similar to those of previous years. The data obtained from those departments responding represent over half of all mathematical science faculty members. Over two-thirds of the faculty members in doctorate-granting mathematics departments (Groups I-III) are included among responding departments.

TABLE 1

1979-1980 Employment Status of New Doctorates in the Mathematical Sciences

Type of Employer	PURE MATHEMATICS: Algebra and Number Theory	Analysis and Functional Analysis	Geometry and Topology	Logic	Probability	Statistics	Computer Science	Operations Research	Applied Mathematics	Mathematics Education	Other	Total
Group I	9	15	17	4	3	3	1	0	6	0	4	62
Group II	9	18	10	5	2	2	0	0	3	0	0	49
Group III	16	25	8	4	2	10	1	0	13	0	1	80
Group IV	1	0	1	0	2	31	0	0	0	0	1	36
Group V	0	1	0	0	1	1	28	1	7	0	1	40
Masters	12	11	5	1	3	14	15	0	5	4	3	73
Bachelors	24	17	15	1	1	7	3	1	8	2	3	82
Two-year College or High School	3	8	1	0	0	0	1	0	5	4	0	22
Other Academic Depts.	1	3	0	0	1	17	10	5	10	1	4	52
Research Institutes	0	3	3	0	0	2	1	0	2	0	1	12
Government	2	1	1	0	2	11	6	1	6	0	4	34
Business and Industry	19	12	10	2	4	36	31	20	21	1	12	168
Canada, Academic	5	9	4	0	1	8	2	0	4	0	4	37
Canada, Nonacademic	2	1	2	1	0	2	1	0	0	0	1	10
Foreign, Academic	7	16	9	1	3	8	4	3	9	1	4	65
Foreign, Nonacademic	1	7	3	0	2	8	4	3	4	1	0	33
Not seeking employ.	3	1	2	1	0	0	0	0	0	0	3	10
Not yet employed	1	2	2	2	0	2	1	0	2	0	1	13
Unknown	1	0	0	1	0	1	2	2	2	1	1	11
Total	116	150	93	23	27	163	111	36	107	15	48	889

Table 2 shows estimated faculty flow between 1978-1979 and 1979-1980 for U.S. departments. Further analyses for various groups of departments are given separately below. The left-hand side of Table 2 shows the estimated numbers of new full-time faculty members hired from various sources between fall 1978 and fall 1979. The right-hand side of Table 2 shows the fall 1979 employment status of those full-time faculty members as of fall 1978 who permanently left their departments by fall 1979. Under "graduate school" on the left-hand side are included a number coming from departments outside the mathematical sciences, or from mathematics education. Similarly, the second row in Table 2 includes some moving to or from departments in other fields or other positions in academe (e.g., in a university computer or statistical laboratory). The number (+115) in parentheses represents a flow from nondoctorate to doctorate status of individuals who remained as full-time faculty members in the same department.

The numbers in Table 2 are estimates obtained by extrapolating from AMS Survey data, not actual counts. These estimates are subject to various uncertainties. Nevertheless, Table 2 is believed to give a fairly reliable overall picture of current faculty mobility.

Table 2 shows an estimated increase of 275 doctorate faculty members and a decrease of 25 nondoctorate faculty members between fall 1978 and fall 1979. This is an overall increase of 250. While these are only estimates, the data clearly indicate a modest increase in the total number of mathematics faculty members. However, the increase did not keep pace with rising elementary course enrollments. If part-time faculty positions are converted into full-time equivalents, there was about a 2% increase nationally in the number of mathematical sciences faculty members between fall 1978 and fall 1979. The total number of teaching assistants reported for fall 1979 showed almost no change from fall 1978. On the other hand, undergraduate course enrollments rose again in 1979 by 6% or more in all categories of mathematical sciences departments. As discussed elsewhere (see pp. 176–177 of this issue), this added to the difficulties many departments face in accommodating substantially more students with scarcely any additional resources.

The pattern of faculty mobility shown by comparing the two sides of Table 2 is generally similar to that observed for the previous three years. However, the number of those newly hired from graduate school has declined along with declining Ph.D. production. More full-time faculty members are being hired before receiving the doctorate. The estimate 550 shown in Table 2 compares with a corresponding estimate of 435 two years ago (February 1978 Notices, p. 101). Most of the new nondoctorate faculty members were hired by departments in Groups M and B, a trend mentioned again later in this article.

TABLE 2 – FACULTY FLOW 1978-1979 TO 1979-1980

Full-Time Mathematical Sciences Faculty in Four-Year Colleges and Universities in the U.S.

	Sources of New Faculty	
FROM	Doctorate-Holding	Non-doctorate
Graduate school	380	250
Another college or university position	550	90
Nonacademic employment	60	70
Outside U.S.	75	20
Other sources(1)	70	130
Total	1135	550
Received doctorate and not moving(2)	(+115)	
	1250	

	Fall 1979 Employment Status, Faculty Leaving	
TO	Doctorate-Holding	Non-doctorate
Two-year college or high school	15	25
Another college or university position	470	125
Nonacademic employment	225	130
Deaths and retirements	120	65
Left U.S.	35	(<5)
Graduate or professional school	20	55
Seeking employment	30	10
Other(3)	60	50
Total	975	460
Received doctorate and not moving		(+115)
		575

Estimated size of full-time U. S. mathematical sciences faculty, Fall 1979

Doctorate-holding	14,325 (+275 from Fall 1978)
Nondoctorate	3,775 (-25 from Fall 1978)

(1) Part-time to full-time in same department, from postdoctoral or two-year college position, etc.
(2) Mostly in Group M and B departments. Probably includes a fair number in mathematics education and other fields.
(3) No longer full-time in department, unknown employment status, etc.

Attrition due to deaths and retirements continues at the rate of about 1% per year. In addition, some leave tenured faculty positions to take nonacademic positions or for other reasons. The total number of faculty members who received tenure in their institutions is estimated at about 425. About 250 of these 425 can be regarded as replacements; the other 175 represent growth in the number of tenured positions. Since the total number of full-time positions also increased slightly (Table 2 gives 250 for the estimated increase), there was little change nationally in the percentage of faculty members with tenure.

Doctorate-granting Mathematics Departments (Groups I, II, III). Table 3 gives a somewhat different perspective of faculty mobility into and out of the 151 U.S. mathematics departments with doctoral programs. In Table 3 the sources of new tenured and nontenured doctorate-holding faculty members are shown, as well as the employment status of those leaving between academic years 1978-1979 and 1979-1980.

As the left-hand side of Table 3 shows, most of those newly hired for fall 1979 are not tenured. Nevertheless, departments appear to have had somewhat more tenured openings. The estimate of 40 new tenured faculty members hired by Groups I-III departments compares, for instance, with only 25 two years earlier. Slightly fewer than half of the estimated 130 promotions to tenure shown in Table 3 were in Group I and Group II departments, the rest being in Group III. The figures on the right side of Table 3 indicate that an estimated 20 individuals with doctorates moved from one tenured position in one Group I-III department to a tenured position in another. In addition, 60 with tenure are estimated to have left such departments entirely. There was an overall increase of 90 tenured positions in Groups I, II, III.

Groups M and B. Nearly 60% of all full-time members of the U.S. mathematical sciences faculty are in departments without Ph.D. programs (Groups M and B). Of the total of about 1700 full-time members newly hired for fall 1979, about 1000 were in Groups M and B departments and the other 700 in Groups I-V departments. Of these 1000 newly hired in Groups M and B, only about 550 had a doctoral degree. (This includes, of course, many moving from other positions as well as new doctorates coming directly from graduate school.) An undetermined (but nontrivial) number of these 550 have doctorates in mathematics education or a field other than one of the mathematical sciences. The number of nondoctorate faculty members hired by Groups M and B departments has been steadily increasing, from about 350 newly hired for fall 1977 to 400 for fall 1978 and 450 for fall 1979.

The M and B departments are very diverse, ranging from medium-to-large departments in public

TABLE 3 – FACULTY FLOW 1978-1979 TO 1979-1980

Full-time, Doctorate-holding Faculty in 151 Doctorate-Granting Mathematics Departments in the U.S. (Groups I, II, III)

	Sources of New Faculty			Fall 1979 Employment Status, Faculty Leaving		
FROM	Non-tenured	Tenured		TO	Non-tenured	Tenured
Graduate school	170			Another Group I-III department	120	20
Another Group I-III department	115	25		Another college or university position (not Groups I-III)	65	10
Another college or university position (not Groups I-III)	45	5		Nonacademic employment	50	10
Nonacademic employment	15			Deaths and retirements	10	30
Outside U.S.	25	{10}		Left U.S.	15	
Other sources	10			Seeking employment	10	{10}
				Other	30	
Total	380	40		Total	300	80
Received doctorate and not moving	(+10)					
Received tenure and not moving		(+130)		Received tenure and not moving	(+130)	
	390	170			430	80

Estimated size of full-time faculty, Fall 1979, Groups I-III

Doctorate, Nontenured	1250 (-40 from Fall 1978)
Doctorate, Tenured	3800 (+90 from Fall 1978)
Nondoctorate faculty	350 (+30 from Fall 1978)
Total full-time faculty	5400 (+80 from Fall 1978)

TABLE 4

NEW MATHEMATICAL SCIENCES DOCTORATES TAKING NONACADEMIC POSITIONS IN U.S.

	1975-1976	1976-1977	1977-1978	1978-1979
In Government	74	62	44	34
In Business/Industry	112	136	166	168
Total	186	198	210	202
Total no. new doctorates employed in U.S.	787	776	734	690
% in Govt./Bus./Ind.	24%	26%	29%	29%

institutions, to quite small departments in private colleges of varying degrees of selectivity. Besides mathematics instruction, mathematics departments in Groups M and B often have responsibilities in applied areas which in larger universities are taken by separate departments of statistics, operations research, or computer science. Currently these mathematics departments face keen competition in recruiting in such applied fields, from industry which pays higher salaries and from university departments offering a more research-oriented environment. There are opportunities for young mathematicians with a strong commitment to teaching, who can fit the needs of Groups M or B departments.

There are in Groups M and B departments about 2600 part-time faculty members, representing about 1040 full-time equivalent positions. This compares with about 10,600 full-time members in Groups M and B. The number with part-time appointments in these groups has been increasing rather rapidly, with a 16% increase from fall 1978 to fall 1979. During the same one-year period the number of full-time faculty members in Groups M and B increased by only slightly more than 1%. Although part-time mathematics faculty members still represent only a small fraction of the total, this trend surely bears watching. (In contrast, part-time appointments in two-year colleges represent an important part of the total; see p. 178.)

Graduate Student Enrollments. Doctorate-granting mathematics departments in the U.S. (Groups I-III) reported only a 1% drop in the number of full-time graduate students from fall 1978 to fall 1979. This is a smaller decline than for the last few years. However, the number of entering full-time first-year graduate students in Groups I-III declined by nearly 7%. In Group I there was a more severe decline of nearly 10% in the number of first-year graduate students. This agrees with the comments made early in 1979 by several individuals from strong departments who observed that numbers of applicants for graduate study were down substantially.

Other groups of departments reported increases in full-time graduate student enrollments, up 3% in Group IV, 13% in Group V, 3% in Group VI and 1.5% in Group M.

Nonacademic employment of doctorates in the mathematical sciences. Traditionally, most mathematics Ph.D.'s have held faculty positions in colleges and universities, with only about 20% of mathematics Ph.D.'s employed by business, industry, and government. However, the pattern has changed substantially for recent Ph.D.'s. Table 4 is a summary of AMS Survey data on the employment of new doctorates during the last four years 1975-1976 to 1978-1979.

Table 4 shows a steady growth in hiring of new doctorates by business and industry. Many of these jobs are in companies in high technology, computer-information processing, and communications areas. A significant number are with organizations which do consulting work in operations research, statistics or applied physics, or which provide computer software or data management services; other jobs are energy or automotive related, or health-care related. Table 4 shows that the number of new doctorates per year employed in government, business, or industry grew slightly from 1975 to 1979, while the total number per year with positions in the U.S. declined by about 100. Not included in Table 4 are a few new doctorates, a half dozen or so per year, employed in research institutes (for example, the Sloan-Kettering Institute). The March 1980 issue of *Employment Information in the Mathematical Sciences* will contain lists of the names and addresses of nonacademic employers of individuals included in Table 4, with an indication of the thesis field of the employee.

Table 5 shows that relatively few individuals included in Table 4 received the Ph.D. in pure mathematics. (The somewhat arbitrary classification "pure" mathematics is the same as in Table 1. "Other" mathematical sciences refers to the right-hand columns: Statistics, . . . , Other in Table 1.)

TABLE 5

THESIS SUBJECTS OF THE NEW DOCTORATES

	1975-1976	1976-1977	1977-1978	1978-1979
Pure	46	38	41	53
Other	140	160	169	149
	186	198	210	202

There is some inherent ambiguity in the count of "Other mathematical sciences" doctorates, since the boundary between the applied mathematical sciences and other fields in science and engineering is not sharp. In addition, responses to the AMS Survey of new doctorates from departments in Group V (especially from those in computer science) are less complete than from Groups I-IV. Nevertheless, the AMS data have generally fitted rather well with NRC data obtained from the doctorate recipients themselves (February 1978 **Notices**, p. 108).

In addition to new Ph.D.'s shown in Table 5, whose job after receiving the doctorate was nonacademic, a significant number of others moved to

positions in government, business or industry after a few years in faculty positions. Table 6 shows the estimated annual net outflow of doctorate-holding faculty members to nonacademic positions since 1975. For instance, the number 165 for 1979 is the difference of 225 doctorates shown in Table 2 leaving academia and 60 hired in academia from nonacademic positions.

Unlike the data from the Survey of new doctorates, AMS faculty mobility data do not give the field of degree. However, from various other indications it seems likely that the proportion of those in Table 6 with Ph.D.'s in pure mathematics is significantly higher than shown in Table 5 for new doctorates. Included in Table 6 are "nonretained" junior faculty members who did not find another satisfactory academic position, as well as others moving to nonacademic jobs because of salary or for other reasons. Among the latter are included some with tenure. The faculty mobility data indicate that most (some 85% to 90%) of the individuals shown in Table 6 took nonacademic jobs which are in applied mathematics, science, or engineering. If we make allowances for individuals whose current job is unrelated to mathematics (e.g., the proverbial Ph.D. taxi driver), and for a few in Table 6 with doctorates in a field not in the mathematical sciences, we still have a net annual outflow of some 150 faculty members with mathematical sciences Ph.D.'s to nonacademic mathematics-related employment. When the 200 new doctorates per year shown in Table 4 are added to these, one gets a net flow of about 350 per year to mathematics-related nonacademic positions. This compares with around 700 new mathematical sciences doctorates employed in the U.S. for fall 1979, down from over 800 per year a few years earlier. Thus, we seem to be approaching a situation in which at least half of recent mathematical sciences Ph.D.'s will hold mathematics-related jobs outside academia.

TABLE 6

ESTIMATED NET OUTFLOW OF DOCTORATE-HOLDING FACULTY MEMBERS TO NONACADEMIC EMPLOYMENT

	1976	1977	1978	1979
Net Outflow	155	190	190	165

The January 1979 issue of *Employment Information in the Mathematical Sciences* shows nonacademic employment of new doctorates since 1972, by employer and field of degree. (A new list will appear in the March 1980 issue.) There is an uneven geographic distribution, with over half taking positions in the Northeast or Mid-Atlantic states and another 30% on the West Coast or the Southwest. In addition to the annual salary survey of new doctorates (October 1979 **Notices**, p. 387), the AMS surveyed individual Ph.D. mathematicians in nonacademic jobs during 1977. This survey gave information about salaries and other demographic data not available from other sources. The results were summarized in the August 1978 **Notices**, pp. 307-314. This nonacademic survey will be repeated in the spring of 1980. (Cf. page 184.)

Present indications are that the nonacademic job market for Ph.D.'s qualified and willing to work in applied mathematical sciences will remain strong. A positive underlying factor is the rapid growth of high-level mathematics-related opportunities generated in one way or another by the revolution in computer technology. A negative factor would be a severe downturn in the U.S. economy, causing a general contraction of hiring in scientific and technical fields. If academic salaries continue to fall behind in real terms (cf. October 1979 **Notices**, pp. 391-392), more members of the faculty will probably leave for economic reasons, as happened in the years just after World War II. A strong contraction in the number of academic openings during the 1980s has been forecast and widely publicized (including previous reports in this series of articles in the **Notices**). Despite the continuing decline in numbers of new Ph.D. recipients, present indications are that a larger proportion of them will be in nonacademic jobs.

Changes in Enrollments, Class Sizes, and Size of Faculty

by Donald C. Rung

Enrollments increased from Fall 1978 to Fall 1979 in courses in nearly every category and for all groups of departments with the single exception of graduate courses in Groups I, II, and III departments. The figures reveal striking increases in (1) pre-calculus enrollments which now are greater than ever before in the undergraduate program, and (2) computer science enrollments which continue to expand. Overall graduate enrollment increased in spite of the decline in graduate enrollment in Groups I, II, III, primarily because of a 31% increase in graduate enrollments in computer science departments. In short, the service load of mathematics departments continued to rise while the graduate program is in decline.

The number of undergraduate majors reported has increased from Fall 1978 to Fall 1979 in all groups except Groups I-III, where the number of mathematics majors remained virtually unchanged during the same period. One may attribute the increase in majors in departments other than Groups I-III to the fact that curricula in these departments contain a computer science option. Most of the bachelors and masters schools do not have a separate department of computer science. Table 7 summarizes the changes in enrollments for Fall 1978 to Fall 1979.

The second part of this report deals with class sizes and teaching loads for mathematical sciences departments between Fall 1971 and Fall 1979. It is based on data collected by the Society from the Fall Enrollments and Class Size questionnaires which were distributed each spring from 1971 to 1975 and distributed in the fall for the past four years. A comparison of the class sizes in Fall 1971 and Fall 1979 is presented in Table 8. It shows that class sizes have increased in all courses in mathematical sciences departments. In particular, undergraduate class size for Group II departments has had the largest increase among U. S. departments. Since the number of full-time faculty members has increased by less than 2% over this period, one is lead to the conclusion that increased enrollments have been met primarily by increased class sizes. (An analysis of class sizes and related parameters for Fall semesters 1976 and 1977 was presented by Lida K. Barrett in the February 1978 Notices.) Another factor contributing to the increases in class sizes is the decreasing number of teaching assistants.

Because the number of departments reporting differs for each group from year to year, it is difficult to describe a statistically average department. In order to make a comparison, the figures for the teaching staff, sections offered and students enrolled, have been divided by the number of full-time faculty members. The ratios are compared for Fall 1971 and Fall 1979 in Table 9. The parameters used are the number of sections, number of credit hours, number of teaching assistants and number of part-time faculty members per full-time faculty member for each group. The figures in Table 9 show that there is a wide disparity in these parameters both within groups and between the first reporting period and the present. In particular, we note the rather dramatic decrease in the number of teaching assistants per full-time faculty member for Group II departments; these departments seem to have, all in all, the least favorable parameters. Why this group should have statistics so much at variance with other groups is not clear.

The drop in the number of sections offered per full-time faculty member for Groups I and II may be explained in terms of the movement toward large lectures, reducing the number of sections offered.

TABLE 7 – PERCENT CHANGE IN COURSE ENROLLMENTS

By Type of Course, Fall 1978 to Fall 1979

Type of Course	Groups								All Groups
	I	II	III	IV	V	VI	M	B	
Below calculus	29%	5.4%	9.3%	*	*	38%	5%	8.3%	7.4%
First year calculus	3.3%	7.0%	6.4%	*	*	5.4%	8.5%	7.1%	6.5%
Statistics	*	*	*	10.8%	*	1.0%	3%	7.1%	4.0%
Computer Science	*	*	*	*	15.4%	13%	16%	26%	16.1%
Other undergraduate mathematics courses	0%	5%	3.5%	*	*	1.0%	4.9%	4.9%	3.4%
Graduate courses	3%	5%	3.5%	0%	12.5%	22%	10.3%	31.5%	3.4%
All courses	4.5%	6.3%	6.0%	4.8%	14.2%	7%	6.8%	9.5%	6.8%

*Enrollments in this type of course amount to less than 5% of total undergraduate enrollments for this group of departments.

Note that these parameters, when multiplied by the number of full-time faculty members in a department, produce average *departmental* numbers which can be used for comparative purposes. For example, the figures show that for the Fall 1979 term, a department with 30 full-time faculty members has, on the average, a total of 30 x 3.7 = 111 sections with an enrollment of 30 x 127 = 3,810 students. (We have no figures on what percentage of the 3,810 students are taught by full-time faculty members, part-time faculty members or teaching assistants.) There are 30 x 1.7 = 5.1 part-time faculty members and 30 x 0.84 = 25.2 teaching assistants. If one assumes that the Fall enrollments represent about 55% of the total academic year enrollment then the average 30 member department enrolls 3,810 x (1/0.55) = 6,927 students over the academic year.

TABLE 8 – AVERAGE CLASS SIZE IN FALL 1971 AND FALL 1979

(1971 figures in italic)

Type of Course	Groups I	II	III	IV	V	VI	M	B
Below calculus	*29*	*33*	*37*	–	–	*54*	*34*	*29*
	33	46	41	–	–	65	38	32
First year calculus	*25*	*30*	*32*	–	–	*54*	*28*	*22*
	32	44	39	–	–	74	35	28
Statistics	–	–	–	*35*	–	*45*	–	*29*
	–	–	–	37	33	49	33	28
Computer Science	–	–	–	–	*50*	*68*	*24*	*23*
	–	–	–	–	51	77	35	26
Other undergraduate mathematics courses	*28*	*23*	*22*	–	*31*	*41*	*29*	*13*
	28	34	30	–	–	34	13	15
Graduate courses	*16*	*10*	*11*	*14*	*13*	*10*	*11*	–
	11	8	8	18	16	6	10	–
All courses	*25*	*27*	*29*	*24*	*35*	*41*	*29*	*23*
	29	38	34	29	37	46	32	27

A dash indicates that these courses represent less than 5% of total undergraduate enrollment for departments in this category.

TABLE 9 – SELECTED DEPARTMENTAL PARAMETERS, FALL 1971 AND FALL 1979

(1971 figures in italic)

For each full-time faculty member	Groups I	II	III	IV	V	VI	M	B
Sections offered	*3.6*	*4.0*	*3.3*	*2.4*	*2.3*	*2.5*	*3.4*	*3.5*
	3.3	3.2	3.7	2.5	3.0	3.2	4.0	3.9
Students enrolled	*91*	*106*	*95*	*57*	*78*	*103*	*97*	*79*
	95	123	127	74	113	107	129	103
Part-time faculty	*0.12*	*0.15*	*0.08*	*0.20*	*0.58*	*0.15*	*0.23*	*0.16*
	0.05	0.10	0.17	0.35	0.32	0.09	0.33	0.38
Teaching assistants	*1.5*	*1.3*	*0.86*	*0.66*	*1.2*	*0.92*	*0.31*	*0*
	1.3	0.90	0.84	1.0	1.3	1.8	0.26	0

The report refers to the actual number of graduate teaching assistants and part-time faculty, not to any full-time-equivalent number.

Two-Year College Survey

by Wendell H. Fleming

This article is a report of results from the 1979 Survey of Two-Year Colleges. The data summarized below were provided by 248 two-year college mathematics departments (or other departments which include the mathematics faculty). The questionnaire was sent to 892 departments in the U. S. in September 1979, and requested data current for the fall term. The departments responding to the survey questionnaire were self-selected, and do not represent a scientifically chosen random sample. While the trends reported below are consistent from year to year, one should be cautious about extrapolating to all two-year colleges.

Course enrollments. About a 6% overall increase in mathematics course enrollments between fall 1978 and fall 1979 was reported. This increase was larger than for the preceding three years 1975–1978, for which the average annual increase in course enrollments was about 3% (see the February 1979 **Notices**, p. 113–114, or the March 1979 *Two-Year College Mathematics Journal*). Enrollments were up for most types of courses, except for basic concepts for general mathematics, mathematics for elementary teachers, and calculus for social/life sciences, or business. Computing course enrollments were up 35%, but still make up less than 3% of all two-year college mathematics enrollments.

Two-year college mathematics faculty. Table 1 shows numbers of full-time mathematics faculty members by sex, tenure status (doctorate-holding vs. nondoctorate) in departments providing usable responses (236 of 892 departments). It shows essentially no change from fall 1978 to fall 1979. On the other hand, a 17% increase from fall 1978 to fall 1979 in the number of part-time two-year college mathematics faculty members was reported. Nearly 30% of all sections of mathematics courses are taught by part-time faculty members. If this year's trends continue, this percentage will clearly increase.

Salary data. The Survey questionnaires asked for information on salaries including a minimum, median, and maximum salary figure both for staff members with doctorates and for those without doctorates. Annual salaries of full-time faculty members for the academic year of 9 to 10 months were sought. In Table 2 the data in the parentheses give the range of the middle fifty percent of salaries reported. The figures outside the parentheses represent the minimum and maximum salary listed by any reporting institution.

TABLE 1 – SIZE OF FACULTY

	1978–1979				1979–1980			
	FACULTY		WOMEN		FACULTY		WOMEN	
	Total	With Tenure	Total	With Tenure	Total	With Tenure	Total	With Tenure
Nondoctorate	1,244	835	293	158	1,237	818	295	164
Doctorate	208	113	32	21	211	123	32	19
Total	1,452	948	325	179	1,448	941	327	183

TABLE 2 – SALARIES (in hundreds of dollars)

	1978–1979			1979–1980		
	Minimum	Median	Maximum	Minimum	Median	Maximum
Nondoctorate	73(125-176)	(148-210)	(160-232)383	85(132-188)	(158-220)	(175-245)393
Doctorate	106(153-208)	(158-220)	(171-230)339	113(164-223)	(168-234)	(181-244)360