

Conference Board of the Mathematical Sciences

832 Joseph Henry Building, 2100 Pennsylvania Ave., N.W., Washington, D. C. 20037

Telephone: (202) 295-1170

1 February 1976

To: The Chairman of a Mathematical Science Department

The development of sound policies and wise programs in the mathematical sciences, whether by department chairmen, administrators or national organizations, depends on having a base of accurate information on current trends in course offerings, curricula, enrollment, and faculty characteristics, as well as other data. The Survey Committee of the Conference Board of the Mathematical Sciences, whose present members are named below, has as its charge the task of making appropriate surveys of the current state of the mathematical sciences. To date, these surveys have resulted in the publication by CBMS of four reports dealing with undergraduate, graduate, or professional work in the mathematical sciences. We are now seeking your assistance in the task of bringing up to date information on the status of undergraduate programs in the various mathematical sciences.

A pioneer survey of undergraduate programs in mathematics was made by Clarence B. Lindquist of the U.S. Office of Education for academic year 1960-61. Our Survey Committee extended this work with undergraduate surveys for academic years 1965-66 and 1970-71 that are reported in the first and fourth volumes of our series. The present study will give a timely reassessment of undergraduate curricula in the mathematical sciences reflecting and highlighting the many changes that we all believe have taken place over the past five years. The current situation in employment in the mathematical sciences adds urgency to the present study.

The Committee has made every effort to limit this questionnaire to those questions which are of the greatest significance to the mathematical community and whose answers are not easily available from other sources. Your institution has been selected as one of approximately 260 which form a scientifically designed sample of the set of universities and colleges which grant bachelor's degrees and offer a substantial program in the mathematical sciences.

Your assistance in this important work will be greatly appreciated. Please return the filled out questionnaire by 1 March 1976. We shall be pleased, in return, to send you a copy of the resulting printed report.

Sincerely yours,



John W. Jewett
Chairman, CBMS Survey Committee

Survey Committee Members

Donald J. Albers
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Contributing Organizations
Mathematical Association of America
American Research Society of America

American Mathematical Society
National Council of Teachers of Mathematics
American Statistical Association
Society of Actuaries

Institute of Mathematical Statistics
Society for Industrial and Applied Mathematics
Association for Computing Machinery
The Institute of Management Sciences

SURVEY OF UNDERGRADUATE PROGRAMS IN THE MATHEMATICAL SCIENCES

1975-76

General Instructions

You are asked to report on programs in the mathematical sciences under the cognizance of your department. If your college or university has on its campus separate departments of mathematics, statistics, applied mathematics, computer science, etc. (as listed in the 1975 Mathematical Sciences Administrative Directory published by the American Mathematical Society), we are sending this same questionnaire to each such department, which is being requested to fill out the entire questionnaire insofar as it is applicable to that department. Do not include data for branches or campuses of your institution that are administratively separate.

Please return completed questionnaire by 1 March 1976 to:

Conference Board of the Mathematical Sciences
2100 Pennsylvania Avenue, N.W., Suite 832
Washington, D. C. 20037

IV. Regular Undergraduate Program Courses

Instructions for preparing of table on pp. 3-7:

- a. The courses in column (1) in the following table are listed with typical course titles (which may not necessarily coincide with the titles you use). They are listed in approximate "catalogue order", beginning with remedial and freshman courses and proceeding through to those typically given to upperclassmen, which are grouped by major subject areas for your convenience in locating a listing which is a reasonable approximation for your offering. Additional blank spaces are provided to permit you to write in names of courses which do not fit reasonably under some listed title.

For the purpose of this survey, consider as a single course, instruction in a particular area of mathematics which you offer as a sequence of two or more parts (e.g., calculus). There is a column for indicating the number of sections of a course.

- b. For each course in column (1) that is offered, write in column (2) the title(s) of the text(s) used and the name(s) of its author(s). In column (3) write the total number of students who enrolled in (any part of) the course in the fall term of 1975. In column (4) write the total number of sections of the course in the fall term of 1975. For a course not offered in fall 1975 but offered some-time, write "0".

1. Name of your institution: _____

Name of your department: _____

Plan under which your institution operates:

1. _____ semester 3. _____ trimester

2. _____ quarter 4. _____ four-one-four

5. _____ other (specify) _____

II. Approximate enrollment of your branch or campus:

	Undergraduate	Total
Full-time Students		
Part-time Students		

III. Student training and ability

A. We are trying to find out changes in mathematical ability of undergraduates in various categories of institutions. Do you feel that such changes have occurred in your students? Yes _____ No _____

B. If "Yes", has the change been upwards or downwards?

	training	ability
up		
down		

C. Such changes can be caused by a change in admissions standards or by a change in secondary school preparation or by other factors. In your judgment, what are the causes of the changes in your students?

*For purposes of identification with published curricula, certain courses are labelled as follows (but it is not necessary to refer to these sources):

ACH: courses suggested by the Association for Computing Machinery, Curriculum Committee on Computer Science, as listed in Communications of the ACM, March 1968, pp. 151-197.

IV. Undergraduate Courses in Mathematics

Name of Course (or equivalent) (1)	Title and Author(s) of Text (2)	Total No. of Students Enrolled Fall 1975 (3)	Total No. of Sections (4)
1. Arithmetic for College Students			
2. General Math (basic skills, operations)			
3. High School Geometry			
4. Elementary Algebra (H.S.)			
5. Intermediate Algebra (H.S.)			
6. College Algebra			
7. Trigonometry			
8. College Algebra and Trigonometry, combined			
9. Elementary Functions			
10. Mathematics for Liberal Arts			
11. Finite Mathematics			
12. Math of Finance			
13. Business Math			
14. Math for Elementary School Teachers			
15. Analytic Geometry			
16. Other pre-calculus: specify			

IV. Undergraduate Courses in Mathematics

Name of Course (or equivalent) (1)	Title and Author(s) of Text (2)	Total No. of Students Enrolled Fall 1975 (3)	Total No. of Sections (4)
17. Calculus (math., phys., & eng. sciences)			
18. Calculus (bio., soc., & mgmt. sciences)			
19. Numerical Analysis			
20. Differential Equations			
21. Linear Algebra			
22. Differential Equations and Linear Algebra			
23. Advanced Calculus			
24. Advanced Differential Equations			
25. Partial Differential Equations			
26. Real Analysis			
27. Complex Variables			
28. Vector Analysis			
29. Advanced Math for Engineers & Physicists			
30. Geometry Survey			
31. Projective Geometry			
32. Topology			

IV. Undergraduate Courses in Mathematics

Name of Course (or equivalent) (1)	Title and Author(s) of Text (2)	Total No. of Students Enrolled Fall 1975 (3)	Total No. of Sections (4)
33. Modern Algebra			
34. Matrix Theory			
35. Combinatorics			
36. Foundations of Mathematics			
37. Theory of Numbers			
38. Set Theory			
39. History of Mathematics			
40. Mathematical Logic			
41. Math for Sec. School Teachers (methods, etc.)			
42. Applied Math. (models)			
43. Biomathematics			
44. Elementary Statistics (no calculus prereq.)			
45. Probability (& Stat.) (no calculus prereq.)			
46. Mathematical Statistics (Calculus)			
47. Probability (Calculus)			
48. Applied Statistical Analysis			

IV. Undergraduate Courses in Mathematics

Name of Course (or equivalent) (1)	Title and Author(s) of Text (2)	Total No. of Students Enrolled Fall 1975 (3)	Total No. of Sections (4)
49. Design & Analysis of Experiments			
50. Statistics, Other (specify)			
51. Intro. to Computing ACM: B-1			
52. Intro. to Computing, II			
53. Computers and Programming ACM: B-2			
54. Intro. to Discrete Structures ACM: B-3			
55. Numerical Calculus ACM: B-4			
56. Intro. to File Processing			
57. Data Structures ACM: 1-1			
58. Programming Languages ACM: 1-2			
59. Computer Organization ACM: 1-3			
60. Systems Programming ACM: 1-4			
61. Compiler Construction ACM: 1-5			
62. Design & Anal. of Computer Algorithms			
63. Artificial Intell. & Heuristic Programming			
64. Automata Theory			

IV. Undergraduate Courses in Mathematics

Name of Course (or equivalent) (1)	Title and Author(s) of Text (2)	Total No. of Students Enrolled Fall 1975 (3)	Total No. of Sections (4)
65. Information Storage and Retrieval			
66. Numerical Analysis (Computer) ACM: 1-8&9			
67. Combinatorics & Graph Theory			
68. Senior Seminar (Mathematics)			
69. Senior Seminar (Statistics)			
70. Senior Seminar (Computer Science)			
71. Indep. Study or Honors (Mathematics)			
72. Indep. Study or Honors (Statistics)			
73. Indep. Study or Honors (Computer Science)			
74. Other: Specify			

V. To what extent are courses in the mathematical sciences (comparable to those listed in Question IV) taught in divisions and departments other than one of the departments in the mathematical sciences. Enter in the relevant boxes an estimate of the total enrollments for the year of either graduates or undergraduate-level courses:

	Enrollment in courses given by division specializing in:						
	Biol. Science	Physical Sciences	Engi- neering	Agri- culture	Educa- tion Admin.	Business Social Sciences	Other: specify
1. Probability							
2. Statistics							
3. Calculus or Diff. Equations							
4. Advanced Math for Engineers/Physics							
5. Computer Science & Programming							
6. Numerical Analysis							
7. Optimization & Linear Programming							
8. Biomathematics							
9. Mathematics of Finance, etc.							
10. Other: specify							

VI. Does your institution require an admissions examination for freshmen which includes mathematics as a part of it? Yes ___ No ___

- If applicable, check type of test(s) required, or optionally required:
- (1) ___ College Entrance Examination Board Aptitude Examination
 - (2) ___ College Entrance Examination Board Achievement Examination
 - (3) ___ American College Testing examination
 - (4) ___ State examination (e.g., New York State Regents examination)
 - (5) ___ Your own institutional examination
 - (6) ___ Other: specify

VII. Does your department or college use or administer a placement examination in mathematics? Yes ___ No ___

- If Yes, check appropriate items:
- A. Placement examination is taken by:
- 1. ___ All entering freshmen
 - 2. ___ Students taking mathematics in college for the first time
 - 3. ___ Students in special curricula only (e.g., engineering, etc.)
 - 4. ___ Students desiring advanced placement (See question VIII also)
 - 5. ___ Other: specify:

B. This placement examination tests for a knowledge of:

- 1. Algebra
- 2. Geometry
- 3. Trigonometry
- 4. Analytic geometry & Calculus
- 5. Other: specify: _____

C. The objectives or purposes of this placement examination are:

- 1. To determine which students have the necessary mathematical knowledge to undertake regular college courses
- 2. To determine the mathematical aptitude of the student
- 3. To section students by ability level
- 4. To determine which course the student may enroll in
- 5. Other: specify: _____

D. Are standardized or nationally distributed exams used? Yes No

III. Does your institution have a program of advanced standing (advanced placement) in mathematics, in which an entering student, on the basis of high school record or examination, may enroll in a course more advanced than usual for an entering freshman? Yes No

If so, for which courses may college credit be entered on the student's record?

- 1. College Algebra and/or Trigonometry
- 2. Analytic Geometry (as a separate course)
- 3. Calculus (possibly including Analytic Geometry)
- 4. Courses more advanced than Calculus
- 5. Other: specify: _____

IX. Computers and Pocket Calculators

A. Does your department have access to a computer or to computer terminal facilities? Yes No

If so,

- 1. In departmental space _____
- 2. In your building _____
- 3. Free of charge _____
- 4. From departmental budget _____
- 5. Project-by-project _____
- 6. Other _____

B. What percentage of your departmental full-time faculty make substantial use of computer facilities? 1. In research? 2. In teaching?

C. Are there courses taught by your department, other than those in computer science, in which the use of a computer is specified? Yes No

If so, list here the relevant courses, using the course numbers from Question IV: _____

D. Are there courses taught by your department in which the use of a pocket calculator is recommended for

- 1. Homework? Yes No
- 2. Taking exams? Yes No

E. If your answer to either part of D is Yes, list the relevant courses by their course numbers from Question IV: _____

X. Check any techniques of instruction, other than the standard or traditional lecture-recitation system, used to a substantial degree by your department:

- 1. Large lecture classes with small quiz sections
- 2. Large lecture classes with help sessions
- 3. Organized program of independent study
- 4. Television (closed-circuit or broadcast)
- 5. Audio-tutorial
- 6. Programmed instruction
- 7. Computer-assisted instruction (CAI)
- 8. Computer-managed instruction (SMI)
- 9. Self-paced instruction
- 10. Other: specify: _____

XI. Check in the appropriate column any innovations in undergraduate programs and requirements in the mathematical sciences introduced since 1965:

	A	B
	Introduced 1966-1970	Introduced 1971-1975
1. Have introduced new degree programs	<input type="checkbox"/>	<input type="checkbox"/>
2. Have provided new courses appropriate for the biological and medical sciences	<input type="checkbox"/>	<input type="checkbox"/>
3. Have provided new courses appropriate for the social and management sciences	<input type="checkbox"/>	<input type="checkbox"/>
4. Have provided new courses appropriate for the physical sciences and engineering	<input type="checkbox"/>	<input type="checkbox"/>
5. Have provided new courses appropriate for computing and data processing	<input type="checkbox"/>	<input type="checkbox"/>
6. Have provided new courses or tutorial work to meet broadened admissions policies	<input type="checkbox"/>	<input type="checkbox"/>
7. Have significantly altered the program for freshman year	<input type="checkbox"/>	<input type="checkbox"/>
8. Have introduced or substantially altered a program for the undergraduate preparation of secondary school teachers of mathematics	<input type="checkbox"/>	<input type="checkbox"/>
9. Have introduced or substantially altered a program for the mathematics preparation of elementary school teachers	<input type="checkbox"/>	<input type="checkbox"/>
10. Have introduced other innovations	<input type="checkbox"/>	<input type="checkbox"/>

If parts 6, 7, 8, 9, or 10 are checked, please indicate briefly, in the space below or at the top of the next page, what these changes were.

XIII. Age, Sex and Ethnic Group of Full-time Faculty

A. Record the number of full-time faculty members in each category:

Age	Under 30	30-34	35-39	40-44	45-49	50-54	55-59	60 & Over
Tenured, PhD								
Tenured, non-PhD								
Non-tenured, PhD								
Non-tenured, non-PhD								
Men								
Women								
Caucasian								
Oriental								
Hispanic								
Black								
Amerindian								

XII. Questions on Mathematics Faculty (Graduate and Undergraduate)

A. Full-time faculty: indicate the number of full-time mathematical science faculty members in your department in the table below, according to their highest degrees and subject fields in which these were earned:

Highest degree	In Math.	In Stat.	In Computer Science	In Math. Ed.	In Another field (specify)
Doctor's degree					
Master's degree					
Bachelor's degree					

B. Part-time faculty, other than graduate students: indicate the numbers of part-time mathematical sciences faculty members in your department in the table below, by highest degrees and subject fields:

Highest degree	In Math.	In Stat.	In Computer Science	In Math. Ed.	In Another field (specify)
Doctor's degree					
Master's degree					
Bachelor's degree					

C. Teaching assistants employed in instruction (by highest degree):

No. of teaching assistants with master's degree:	1974	1975
No. of teaching assistants with bachelor's degree:"		
No. of undergraduates employed as teaching assistants:		

D. Teaching assignments: indicate in the following table your estimate of the percentage of the total freshman-sophomore teaching load in your department, distributed by type of teaching personnel:

Teaching Group	Percent of total freshman-sophomore teaching load
Full-time faculty	
Part-time faculty	
Teaching assistants	

XIV.

A. What is the expected (or typical) teaching load in credit hours for your full-time faculty (excluding thesis supervision):

	Full semester or quarter	Spring semester or quarter
(a) Professors		
(b) Associate Professors		
(c) Assistant Professors		
(d) Instructors with PhD		
(e) Instructors without PhD		
(f) Teaching Assistants		

B. If there are significant departures from these expected teaching loads for certain classes of individuals, please specify:

C. For regular faculty members above the rank of instructor, with teaching loads as indicated above, which of the following best describes your department's normal expectation (explicit or implicit) with respect to an individual's research activity?

- (a) Publication of scientific papers or articles, on a reasonably regular basis, averaging perhaps _____ publications in a five-year period.
- (b) Maintaining research activity, but with no expected rate of publication _____.
- (c) No particular expectation of research and/or publication _____.
- (d) Other: specify: _____.

XV. Does your department have a sabbatical-leave plan under which a faculty member may have leave (one semester at full pay or a year at half pay, every seven years or so, or roughly equivalent)?

Yes No

If so, is this leave granted:

- (a) automatically (without restriction)
(b) only with well-defined research plans
(c) other; specify:

If there is no regular sabbatical plan as described above, but other provision is made for paid leaves of absence, please comment:

VI. Employment and Mobility of Faculty (Graduate and Undergraduate)

Ph.D.'s Non-Ph.D.

A. Of the new full-time faculty in your department this year, how many were during the previous year 1974-1975 --

- (1) enrolled in graduate school
(2) teaching in a four-year institution
(3) teaching in a two-year institution
(4) holding postdoctoral study/research appointments
(5) employed in non-academic positions
(6) otherwise occupied; specify:

B. Of the full-time faculty last year, who are no longer part of your full-time faculty, how many --

- (1) died, or retired
(2) are teaching in a four-year institution
(3) are teaching in a two-year institution
(4) left for a non-academic position
(5) returned to graduate school
(6) are otherwise occupied; specify:

C. Give your best estimate of total faculty size in your department for 1976-77 and 1977-1978:

1976-77 1977-78

Full-time
Part-time

D. In seeking new faculty members for 1976-77, approximately how many do you seek in each of the following subfields?

- (a) Algebra & Number Theory
(b) Analysis
(c) Topology & Geometry
(d) Probability & Statistics
(e) Computer Science
(f) Applied Mathematics
(g) Biomathematics
(h) Operations Research
(i) Math. Education
(j) Math--general

E. Of your present full-time Ph.D. faculty members who were also part of your full-time staff in previous years, how many have completed the requirements for their Ph.D. while in your employ --

- (1) between July 1973 and June 1974?
(2) between July 1974 and June 1975?
(3) since July 1975?

XVII. How many bachelor's degrees with major in mathematical sciences were awarded by your department between July 1974 and June 1975? Indicate the number of these with each specialty:

- Mathematics, General
Statistics
Actuarial Science
Computer Science
Applied Mathematics
Secondary School Teaching
Other; specify

If you have found some question(s) difficult to interpret or to secure data for, please supply elucidating comments or suggestions which would be helpful to the Committee in future surveys:

Information supplied by:

Title and Department:

Institution and Campus

Date: