Iowa State University Library
Collection Development Policy
Mathematics

I. General Purpose

The collection supports the faculty and students of the Department of Mathematics in their research and curriculum needs. In addition, there are many other programs at Iowa State University whose students and faculty use this collection.

II. History

Courses in Mathematics have been taught at Iowa State since 1869, the first academic year of the school. The Department of Mathematics was established in 1870. Graduate work leading to the degree of Master of Science was offered before 1881 and doctoral work in applied mathematics was added in 1934.

Beardshear Hall is among the buildings that have housed the Mathematics Department; since 1969 the Department has been located in Carver Hall. The most recent Mathematics self-study report was completed in 1998.

III. Iowa State University Program (from the 1999-2001 Iowa State University Bulletin)

Undergraduate Study

The undergraduate program in mathematics offers training suitable for students planning to enter secondary school teaching, to work in mathematics and computation for industry or government, or to continue their studies in graduate school. The requirements for an undergraduate major in mathematics are designed so that the student may have opportunity for appropriate specialization to meet one or more of the foregoing objectives and, at the same time, obtain a thorough introduction to the mathematics underlying all of them.

Graduates understand a broad range of mathematical topics and are familiar with a broad range of mathematical models. They have skills for solving problems in diverse situations. They can construct rigorous arguments to demonstrate mathematical facts. They can communicate their mathematical methods to others and can justify their assumptions.

The department strongly recommends that each student majoring in mathematics include in the program substantial supporting work beyond the minimum general education requirement of the college in one or more areas of application of mathematics, such as other mathematical sciences, engineering, natural science, or social science.

The department offers an undergraduate minor in mathematics.

Graduate Study

The department offers work for the degrees master of science and doctor of philosophy with majors in mathematics or applied mathematics, and minor work to students taking major work in another department. The department also offers work for the degree of masters of school mathematics (M.S.M.).

The M.S. degree requires at least 30 credit hours and students must write a creative component or thesis and pass a comprehensive oral examination over their coursework and their creative component or thesis.

The Ph.D. degree requires a student to take 54 hours of coursework in addition to research hours, pass written qualifying examinations, pass an oral preliminary exam, and perform an original research project culminating in a dissertation which is defended by an oral exam. Ph.D. candidates must have at least one year of supervised teaching experience.

The M.S.M. degree is primarily for in-service secondary mathematics teachers. Candidates for the M.S.M. degree must write an approved creative component and pass a comprehensive oral examination over their course work and their creative component.

The Department of Mathematics sponsors weekly and biweekly topic seminars and frequent departmental colloquia to further research and education.

IV. Subject Boundaries

The collection includes the QA section of the Library of Congress classification schedules with the exception of the QA276-QA281 sections (mathematical statistics) and the QA75-QA76.9 sections (computer science).

Works with a focus on teaching mathematics at the primary level are referred to the education bibliographer for consideration, though works that deal with teaching mathematics at the secondary or higher level are purchased for the mathematics collection. Works on teaching secondary-school mathematics are purchased in support of the master of school mathematics program.

A work which deals primarily with the application of mathematical methods to another specific field of study will usually be more appropriate to purchase for that other part of the collection. Works on applied mathematics that are not focused on specific other fields will usually be appropriate choices for the collection in mathematics.

V. General Collection Guidelines

A. Linguistic.

English is the main language collected. Materials in foreign languages are well represented with a predominance of German, French, and Russian language. No language is excluded. Rather the level and quality of the publication is the determinant in the selection process.

B. Geographical Areas.

No geographical areas are excluded. The nature of the publication rather than its geographical origin determines its selection.

C. Types of Materials Collected.

Monographs, monographic series, journals, proceedings, society publications, some revised dissertations, and handbooks are purchased to support research, teaching and learning. Societies publications are well represented. Seminars in mathematics and lecture notes from institutions and societies are actively collected from various sources. Periodicals represent a large part of the collection. Theses and dissertations produced at Iowa State University are comprehensively collected under an arrangement between the ISU Library and the Thesis Office. Indexes, abstracts and other reference materials are collected under a separate policy for Reference.

D. Format of Materials Collected

No format is excluded except in cases when special equipment not owned by the Library would be needed to use the work in question. For example, floppy disks formatted for Commodore 64 computers would not be collected.

E. Mathematics Reading Room

The Mathematics Reading Room is located in Room 401 of Carver Hall. The room is maintained primarily for the benefit of faculty and graduate students in the Department of Mathematics, although all university students, faculty and staff are allowed access to the many resources available in the Reading Room. Organizationally, the Mathematics Reading Room is part of the ISU Library's Branch Facilities Department and Public Services and Collections Division.

The Mathematics Reading Room collection consists of over 4,700 volumes and receives current subscriptions to approximately 120 serial titles, none of which are duplicated elsewhere in the Library system. For many titles, the most recent ten years are housed in the Reading Room, with earlier volumes shelved in the General Collection of the Parks Library. Before moving any serial title from Parks Library to the Mathematics Reading Room, faculty of other departments

likely to use the title should be consulted due to the more restricted access to print materials housed in Room 401 Carver as compared to Parks Library.

VI. Specific Collection Guidelines

The mathematics journal literature has a longer span of usefulness to researchers than the journal literature of most other fields. Collection management decisions should reflect this difference. Electronic access to mathematics journals should be actively sought when this is compatible with other library policies.

VII. Detailed Subject Areas

Faculty Research Areas:

- Algebra
  - Group Theory
  - Non-Associative Rings
- Analysis
  - Almost Periodic Functions
  - Integration Theory
  - Tomography
- Applied Mathematics and Mathematical Physics
  - Free Boundary Problems
  - Inverse Scattering
  - Non-Equilibrium Statistical Mechanics
- Combinatorics and Discrete Mathematics
- Complex Analysis
- Complex Systems
- Control Theory
  - Stability and Control
  - Systems Theory
- Differential Equations and Dynamical Systems
  - Oscillation,
  - Systems Theory
  - Transform Theory
- Functional Analysis
- Linear Algebra
  - Matrix Theory
- Logic
- Manifold Theory
- Mathematical Biology
- Mathematics Education
- Numerical Analysis and Scientific Computation
  - Superconductivity
  - Parallel Algorithms and High Performance Computing
- Partial Differential Equations

Fluid Dynamics
Ill-posed Problems
Inverse Problems
Transport processes in chemical and biological systems
Probability and Stochastic Processes
Systems Theory
Special Functions
Topology
Differential Topology
Fractals

VIII. Other Resources Available

American Mathematical Society (AMS)

The American Mathematical Society was founded in 1888 to further mathematical research and scholarship. The Society currently has approximately 30,000 members throughout the United States and around the world. It fulfills its mission through programs that promote mathematical research, increase the awareness of the value of mathematics to society, and foster excellence in mathematics education.

The American Mathematical Society provides many professional services to the community and is a major publisher of mathematics. The Society has a Washington, D.C office that deals with matters of science policy and education. Since 1996, all journals of the Society have been available in electronic form over the Web. Mathematical Reviews, a major reviewing journal used by mathematicians around the world, is produced by the AMS. Mathematical Reviews is available on the Web as MathSciNet, providing access to the mathematical literature from 1940 until the present.

Institute for Mathematics and its Applications (IMA)

The IMA was established in 1982 by the National Science Foundation, as a result of a national competition. The mission of the Institute is to close the gap between theory and its applications. This is a two-fold task: (1) to identify problems and areas of mathematical research needed in other sciences; (2) to encourage the participation of mathematicians in these areas of application by providing settings conducive to the solution of such problems, and by demonstrating that first-rate mathematics can make a real impact in the sciences. The IMA scientific programs allow mathematicians and other scientists to share a stimulating research environment. Yearly programs are chosen with the purpose of encouraging interaction between mathematicians and scientists from academia, industry and government laboratories. Other programs consist of the Industrial Problems Seminar where industrial scientists are invited to present industrial problems; the IMA Participating Corporations Program, a formalized relationship between the IMA and industrial scientists; and IMA Participating Institutions (including Iowa State University), a consortium of universities who provide valuable support and guidance.

Mathematical Association of American (MAA)

The Mathematical Association of America (MAA) is the world's largest organization devoted to the interests of collegiate mathematics. Members of the MAA receive many valuable benefits for modest dues. These benefits are designed to stimulate interest in mathematics by providing expository books and articles on contemporary mathematics and on recent developments at the frontiers of mathematical research, and by exchanging information about important events in the mathematical world. A major emphasis of the MAA is the teaching of mathematics at the collegiate level, but anyone who is interested in mathematics is welcome to join.

Society for Industrial and Applied Mathematics (SIAM)

The Society for Industrial and Applied Mathematics (SIAM) was organized in 1952. The goals of SIAM are to advance the application of mathematics to science and industry, promote mathematical research that could lead to effective new methods and techniques for science and industry, and provide media for the exchange of information and ideas among mathematicians, engineers, and scientists. SIAM fosters the development of the methodologies needed in these application areas. The acronym SIAM also represents the society's slogan: Science and Industry Advance with Mathematics. SIAM sponsors peer-reviewed journals, conducts many specialized seminars and conferences, and provides a number of other services to its more than 9,000 members.

IX. Cross-references to Collection Policies

Computer Science
General Engineering
Statistics
Physics

X. Creation date

2000 (Kristine K. Stacy-Bates)

XI. Revision History

XII. LC Ranges

QA 1-74
QA 77-272.5
QA299.6-939

XIII. Bibliographer name
Kristine K. Stacy-Bates

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