

Metrics Report: MATHEMATICS & COMPUTER SCIENCE (rev. 3/29/05)

I. Program Overview

A. Department Profile (faculty, students, curriculum)

The Department of Mathematics & Computer Science is an established department; according to the Department's own website, its "faculty, support staff, and graduate programs are of moderate size—large enough to support a substantial variety of research interests and degree programs, yet small enough to allow individual advising and instruction". The Department has 27 regular faculty members and 5 visiting faculty. Currently, there are 34 doctoral students in Mathematics and 14 master's-level graduate students in Mathematics/Computer Science, an increase from the numbers of Ph.D. and M.S. students last year. The most recent data collected by the Department indicates that there were 125 undergraduate majors in the department (however, it should be noted that this count is fluid).

The twenty-seven regular professors in the department number 7 full professors, 14 associate professors, 4 assistant professors, and 2 senior lecturers. Visiting faculty include two visiting professors, one visiting assistant professor, and two visiting lecturers. The Mathematics faculty's research interests fall mostly into the following (broad) areas: Algebra (QA164-255), Analysis (QA299.6-433), Numerical and Applied Mathematics (QA246; QA297-299.4; QA 355; TA329-348), Discrete Mathematics (QA76.9.M35), and Topology (QA611-614.97). Research interests of the Computer Science faculty may be broadly categorized as Theory, including Complexity (QA267.7), Optimization (QA76.6-76.66), and Algorithms (QA76.9.A43); and Systems, including Networks (TK5105-5105.9), Distributed Computing (QA76.9.D5), and Databases (QA76.9.D32). Last year, the Department hired a topologist (who is currently on leave in advance of beginning his appointment); they have also just completed hiring of a senior algebraist, who will arrive this Fall as Asa Candler Griggs Professor of Mathematics.

The faculty of Mathematics and Computer Science hold colloquia on an almost-weekly basis, as well as various graduate- and faculty-level seminars. Recently, these included "Expositions in Algebra", a series of seminars aimed at beginning graduate students; the intention was to publicize the algebra research going on at Emory. Last year, the Department held a "Math Day", a recruitment event for undergraduates and others who are interested in pursuing a Ph.D. in Mathematics at Emory. The Emory Math/CS department also hosted the December 2003 meeting of the Southeast Geometry Seminar, a day-long, semiannual conference sponsored by Emory, Georgia Tech, and the University of Alabama at Birmingham. SGS V (Feb. '04) was at Tech and SGS VI (Dec. '04) was at UAB; Emory will again be the host for SGS VII in March '05.

Undergraduate curriculum

The department offers the following programs of study for undergraduates:

- Minor in Mathematics, Applied Mathematics, or Computer Science
- B.A. in Mathematics or Computer Science

- B.A. in Mathematics/Economics (*in conjunction with the Department of Economics*)
- B.S. in Mathematics, Computer Science, or Mathematics/Computer Science
- B.S./M.S. in Mathematics, Computer Science, or Mathematics/Computer Science (4-yr. program)
- B.A./M.S.P.H. (*5-yr. program, in conjunction with the Department of Biostatistics at the Rollins School of Public Health*)

The Department has also submitted a proposal to launch a joint undergraduate major in Mathematics & Political Science.

Graduate curriculum

The department offers the following graduate degrees:

- M.S. in Mathematics
- M.S. in Mathematics/Computer Science
- Ph.D. in Mathematics (*Students may choose Pure Math or Computational Math tracks*)
- Ph.D. in Physics/M.S. in Computational Science (*in conjunction with the Department of Physics*)

A proposal for a Ph.D. in Computer Science has also recently been submitted.

Possible research concentrations in mathematics include Algebra, Analysis, Combinatorics, Computational Mathematics, Differential Equations, and Topology. M.S. students in pure mathematics must complete the course sequences in at least two of these areas, along with some electives; students in the Ph. D. program must complete the Algebra and Analysis sequences, as well as one additional sequence of their choice. For computational mathematics, the Numerical Analysis sequence replaces the Algebra sequence.

B. Coordination / Cooperation / Collaborative Library Relationships

1. Internal - Library

As noted in Section A, the Department of Mathematics and Computer Science offers joint degrees in conjunction with the Department of Physics, the Department of Economics, and the Rollins School of Public Health's Department of Biostatistics, and another joint major in conjunction with the Department of Political Science has been proposed. Though no formal liaison collaborations are in place, I do communicate regularly with other liaison librarians in the General Libraries, to make sure that the needs of interdisciplinary students are covered.

Furthermore, as Carl Friedrich Gauss said, "Mathematics is the Queen of Science"; the other natural sciences and engineering all depend on mathematics, as do the social sciences (to varying degrees). Thus, while explicit cooperative efforts with other liaisons may not be in place, it is always important to remember that a mathematics department also serves a wide population of nonmajors. For example, while Statistics is essentially a branch of mathematics, it is widely used and applied by students and researchers in the

natural, life, and social sciences. Moreover, Statistics is a split subject in LC classification: some works are classified as QA273-QA280 (Mathematical Statistics, within the larger class Mathematics), while others fall into the HA call number range (Statistics, within Social Sciences). For these two reasons, it is beneficial to discuss this portion of the collection with liaisons for the other subjects it serves.

Additionally, the Goizueta Business Library (particularly in serving the Business School's department of Decision and Information Analysis) has some overlap between its collection needs and those of the General Libraries' collection in Mathematics and Computer Science. Recently, the GBL has restructured its collection management responsibilities so as to assign a particular liaison to this area; this position's duties include collaborative efforts with the General Libraries' liaison for Mathematics and Computer Science.

2. External - Library

Currently, there are no collaborative efforts between the Emory General Libraries and the libraries of other institutions in developing their Mathematics and Computer Science collections, apart from some e-resources we might have through consortial licensing. Georgia Tech appears to have a number of mathematics faculty with research interests in combinatorics; if the title-count numbers were available, it might be interesting to compare Emory's combinatorics collection to that of Georgia Tech, in order to see how the two collections overlap and complement each other.

3. Library & Department

Recently and in the past, some of Martin Halbert's work here at the library has involved M.S. students in Computer Science working on data-oriented projects (e.g. the recent Greenstone cataloging project). The Chair of the Department, Dwight Duffus, describes this as an "unusual link" and expresses a hope that it might be built into "a substantial relationship that includes student research and project funding".

II. Description of Material Collected

A. Scope of the Collection

1. Subject Areas

The bulk of the Mathematics collection is classed QA, with Computer Science lying within QA75.5-QA76.95. However, some mathematics outposts may be found in the T57-T57.97 (Applied Mathematics, within Industrial Engineering; includes Operations Research) and TA329-TA348 ranges (Engineering Mathematics; this area is not collected much, as Emory has no School of Engineering). Some computer science material is classed TK7885-TK7895 (Computer Engineering, within Electrical Engineering); some works on robotics are found in the TJ210.2-TJ211.47 range, within Mechanical Engineering.

2. Chronology

Chronology applies to mathematics in a somewhat limited way; mathematics doesn't "go bad", so to speak. Presentation styles for a freshman calculus class may come in and out

of fashion, but Newton's original writings are still true. While it is mainly new or current works that are added to the collection, it is still important to keep historic and foundational works at hand.

3. Language

Most of the collection is in English. Some works in foreign languages are present (chiefly German, French, and Russian, though not exclusively); but whenever possible, translations are acquired.

4. Date of Publication

As mentioned above, primarily new works are added to the collection. Retrospective collection is done as needed, to support areas of renewed interest or to fill holes. For example, the General Libraries do not have a full set of the mathematical texts published by "Nicolas Bourbaki" (the pseudonym of a group of mathematicians who sought to create a definitive set of pedagogical works in mathematics). As reprints of the translations of these works become available, they will be added to the collection.

5. Geographic Areas

Most of the collection is from the United States and Great Britain, with some from other parts of North America and Europe. This is due to language considerations; mathematics and computer science are not classed geographically.

B. Formats and Publication Type

1. Monographs and Texts

Most monographs and texts come in either through the YBP approval plan (books and occasionally slips) or through standing orders for monographic series such as *Contemporary Mathematics* (American Mathematical Society), *Undergraduate Texts in Mathematics* (Springer), *Cambridge Tracts in Mathematics*, etc.

2. Serials

In print and online, serials are an essential carrier of scholarly communication for Mathematics and Computer Science faculty. There is an interesting split in the resources used: while the Mathematics segment of the department uses journals heavily, on the Computer Science side there is a preference for conference proceedings. The Emory General Libraries hold print and/or online subscription to a multitude of journals (we expect to quantify and qualify this "multitude" further, when the Ulrich's serials tool becomes available to us) but, in general, collect far less in terms of conference proceedings in hard copy. Instead, we seek to obtain conference proceedings via electronic access (see below), building on the foundation of the *ACM Digital Library*.

3. Electronic Publications

E-books are not collected much; however, electronic serials are of great and increasing importance to the Department. We subscribe to many online journals, both individually and in packages; currently, we plan to add a subscription to Project Euclid's EUCLID PRIME package. For reasons similar to those mentioned in other subject reports, a wholesale conversion to e-only (though desirable from a library-policy point of view)

could be difficult to sell to the faculty; however, conversion of some EUCLID PRIME titles to e-only might be a good way to get things started.

Due to the aforementioned preference of Computer Science faculty for conference proceedings rather than journals, we have started a subscription to the *IEEE Computer Society Library Subscription Plan* (CSLSP-e), which includes several important conference proceedings. We recently also subscribed to *Reviews.com*, an ACM database which includes and expands upon content from *Computing Reviews*. Currently, the library holds subscriptions to several other databases in Mathematics and Computer Science, including *MathSciNet*, the *ACM Portal to Computing Literature*, *SIAM Journals Online*, and *ZMATH* (online edition of *Zentralblatt MATH*).

4. Microforms

Not a high priority.

5. Multimedia

Audiovisuals are seldom used in Mathematics or Computer Science classes.

6. Government Publications

These may be used in the Freshman Seminar (MATH 190) on Cryptology; other than that, government documents are mostly outside the scope of the Department.

7. Exclusions

No undergraduate textbooks. (NOTE: This does not include advanced, specialized works such as those in the Springer UTM series.) Some undergraduate textbooks are (and should be!) available in the collection; but due to the large assortment of math texts in subjects such as underclassman Calculus, as well as the frequency of their updates and reissues, undergraduate texts are not included in the approval plan.

