

Task Force on Core Mathematics

Briefing Paper

Department of Mathematics
The University of Arizona

3 November 2005

The Department of Mathematics welcomes this opportunity for a comprehensive articulation of its relations with the rest of the university, and thanks the members of the Task Force for their willingness to contribute their time, energy and wisdom to this task.

Principles

The Department asked the Provost to initiate this effort with certain fundamental principles in mind:

- Mathematics is central to the intellectual endeavor of the university in both its research and teaching dimension.
- A coherent curriculum takes account both of where students are coming from and the mathematical terrain of their intended disciplines.
- Collaboration and consultation with departments whose faculty and students use mathematics is essential.

Scope of the Task

In accordance with these principles, the Department is taking the unusual step of putting guidance for the outward aspect of its mission in the hands of a university-wide Task Force. It asks the Task Force to consider that part of its work in which the Department provides intellectual support for other disciplines. Although the bulk of this work concerns undergraduate teaching at the lower division level, it also includes service teaching at any level and interdisciplinary connections not limited to teaching.¹

The Task Force will determine the precise scope of its activities. Possible matters for consideration are

¹However, the Program in Applied Mathematics, although closely connected to the Department, is a separate entity and does not fall under the purview of this Task Force.

1. entrance requirements
2. entry-level courses
3. general education requirements
4. academic standards
5. advising and prerequisite enforcement
6. class size and staffing
7. technology
8. alternative learning strategies and curriculum renewal
9. courses that serve other majors, including new course proposals
10. school teacher preparation

The Task Force is expected to issue a final report in early Spring 2006. In return for the confidence that it places in the Task Force, the Department asks that the final report

- proceed from a global view of all the Department's operations
- be based on evidence, including evidence provided by the Department and evidence solicited by the Task Force
- distinguish clearly between those recommendations that can be accomplished with current resources and those that require extra resources, and provide recommendations on how extra resources are to be obtained.

Information from the Department

The Department will provide information in two ways. First, four internal working groups, each comprised of three or more regular faculty members, have prepared reports on external relations, based on preliminary discussions with people outside the department. Each working group has a representative on the Task Force, indicated in parentheses. One working group focused on the transition from high school (Elias Toubassi), and three others on the physical sciences and engineering (David Lomen), on the biological sciences (Joceline Lega), and on business and the social and behavioral sciences (David Glickenstein). The reports are available at <http://www.math.arizona.edu/~wmc/taskforce>.

Second, the department representatives on the Task Force will provide information on the culture and operations of the department, and help the Task Force gather whatever further information it needs. The Task Force co-chair representing the Department is William McCallum. Also serving on the Task Force, in addition to the four working group representatives, are two representatives of the departmental administration: Daniel Madden, Associate Head for Instruction and William Y. Velez, Associate Head for Undergraduate Affairs.

Key Points from the Working Groups

Here are some key points extracted from the working group reports which might serve to start the discussion. This list is not intended to be a comprehensive description of what is in the reports, and the reports themselves are not a comprehensive description of all the issues the Task Force might consider.

- In the last 6 years, the percentage increase in freshman enrollment in mathematics courses has far outstripped the increase in university admissions (34% as compared with 8.8%). In Fall 2004, approximately 5000 out of the 6000 entering freshmen enrolled in mathematics courses
- A smaller percentage of the freshman class than 5 years ago fails to place into a course offered by the Department. However, the percentage remains large (28%).
- There are conflicting concerns and opinions about the University general education requirement, and in particular about the appropriateness of Collegiate Algebra as a course to satisfy that requirement.
- Social scientists use basic mathematical models and statistical methods, and their students need familiarity with these and would benefit in some cases from exposure to more advanced techniques.
- Biological and behavioral scientists use much more mathematics than ten years ago, and their students have a corresponding need for greater mathematical preparation, particularly in probability and statistics.
- Engineers use complex mathematical models and approximation methods, and their students need highly-developed problem solving skills and familiarity with graphical and numerical techniques.
- There are conflicting concerns and opinions about the proper apportionment of graduate teaching assistants, adjunct faculty, and regular faculty, and about articulation with community colleges.

Timeliness and National Impact of the Initiative

The Committee on the Undergraduate Program in Mathematics of the Mathematical Association of America recently concluded a major study of the undergraduate curriculum, which was informed by numerous workshops conducted with representatives of other disciplines (one of which, on Business, was held at the University of Arizona and supported by the Eller School). Furthermore, the Mathematical Sciences Education Board of the National Academy of Sciences has recently initiated a major effort to look at the freshman experience in Mathematics (links to these and other resources are available at <http://www.math.arizona.edu/~wmc/taskforce>). Thus the work of this Task Force has the potential to influence a national discussion about the changing role of mathematics and mathematics education in colleges and universities.