

We have received your CPR Report for: Bachelor of Arts in Mathematics.

Submitted: 06/30/2003-11:04:37 am
Institution: Columbus State University
Status: Triggered Review
Level: Bachelors
Acronym: BA
Deg. & Major: Bachelor of Arts in Mathematics
CIP: 27010100
College/Div.: College of Science
Dept: Department of Mathematics
BOR process: Yes
Future Plans: Maintain at present level
Resource Plans: add
Supplemental file: Findings&Plans_Math.doc (MSW)

If you have questions or concerns regarding this report, contact Dr. Bettie Horne, Office of Academic Affairs, Board of Regents. email: bettie.horne@usg.edu ph:404-651-8391

We have received your CPR Report for: Bachelor of Science in Mathematics.

Submitted: 06/30/2003-11:10:35 am
Institution: Columbus State University
Status: Triggered Review
Level: Bachelors
Acronym: BS
Deg. & Major: Bachelor of Science in Mathematics
CIP: 27010100
College/Div.: College of Science
Dept: Department of Mathematics
BOR process: Yes
Future Plans: Maintain at present level
Resource Plans: add
Supplemental file: Findings&Plans_Math.doc (MSW)

If you have questions or concerns regarding this report, contact Dr. Bettie Horne, Office of Academic Affairs, Board of Regents. email: bettie.horne@usg.edu ph:404-651-8391

CPR Findings and Plans for the Mathematics Programs at Columbus State University

June 27, 2003

The Mathematics Department at CSU offers three baccalaureate programs: a B.A. in Mathematics; a B.S. in Mathematics; and a B.S. in Mathematics, Applied Math Concentration. Since there is little variation among the sets of required math courses for these degree programs, we reviewed the three separate programs as one collective whole.

Currently, the B.A. in Mathematics and the B.S. in Mathematics carry the same math course requirements (the B.A. also requires two foreign language courses). All three programs share a common set of 12 required math courses (37 credit hours) at the calculus level or higher. Of these courses, 7 are also required for the B.S. in secondary mathematics education. Besides these shared courses, the programs require the following numbers of additional math credit hours:

B.A., B.S. in Mathematics: 14-15

Applied Math Concentration: 11-12

B.S. Secondary Math Education: 18

1. Summary of Findings

1.1. Program quality

The external review team found that the mathematics programs maintain a high degree of quality, noting “The rigorous curriculum and the commitment of the faculty to quality instruction results in high performance of the students on the Major Fields Assessment Test.” Eight of eleven students graduating since 1999 earned scores on the Major Fields Assessment Test that exceeded the national median and mean scores. At least three of those graduates have been accepted for graduate study in mathematics.

1.2. Productivity

The low number of mathematics majors at Columbus State University reflects a nation-wide problem. According to the National Science Foundation’s *Science and Engineering Indicators 2002*, (see Table 2-16 at http://www.nsf.gov/sbe/srs/seind02/pdf_v2.htm), mathematics majors received 1% of all baccalaureate degrees awarded in 1998; these include students majoring in secondary mathematics education. In Fall 2002, approximately 1.2% of all undergraduates at Columbus State University had declared a major in mathematics or secondary mathematics education. Thus, we join the national effort to find ways of attracting more students to mathematics.

1.3. Viability

We expect our plans for improvement (see Section 2) will increase enrollment in mathematics programs. Moreover, the mathematics programs are vital to the mission of the university and to the community.

CSU has identified mathematics education as one of its select mission areas. Courses taken by math majors also serve the needs of students in the B.S.Ed. in Secondary Mathematics Education, the M.Ed. in Secondary Mathematics Education, and the Ed.S. in Secondary Mathematics Education programs. The mathematics faculty also teaches math courses taken by students majoring in Early Childhood Education and Middle Grades Education – Math/Science.

The Mathematics Department is working with the College of Education to develop a support network for new high school math teachers. The program will provide mentoring by veteran high school math teachers, development opportunities, and a chance to share experiences with other new teachers. Development opportunities will build on the foundation laid in the math courses taken as part of the degree programs in mathematics and mathematics education. This program is designed to help high schools in the region retain and polish talented math teachers.

We also work closely with the Columbus Regional Mathematics Collaborative. CRMC provides valuable resources and expertise to teachers in participating K-12 schools. Our faculty has observed math courses taught at area schools, conducted workshops, and taught courses in conjunction with CRMC.

All of these activities – teaching university mathematics courses, supporting math teachers in grades K-12, collaborating with area schools – enhance the quality of mathematics education at the university and in the region, in support of the select mission for promoting excellence in mathematics education. Maintaining the mathematics programs enables CSU to attract faculty with the expertise vital in these efforts. Moreover, the incremental cost of maintaining the degree programs in mathematics is minimal given that almost all of the mathematics courses are essential to the secondary math education programs.

2. Plans for Improvement

Plans for improvement include the four key components described in the following sections.

2.1. Reduce the Number of Required Courses

In its comprehensive program review, the CSU Mathematics Department learned that we require more math courses of mathematics majors than any other state university in the University System of Georgia and more than 10 other colleges and universities that responded to our nation-wide inquiry. Reducing the number of required courses will increase the accessibility of our programs to nontraditional students and students who might not be ready to take calculus upon admission to CSU. It also creates more flexibility for students who change their major to math or earn a double major.

2.2. Distinguish Between the B.A. and B.S. Programs

As they currently exist, the B.A. in Mathematics and the B.S. in Mathematics do not serve distinct purposes. The external review team has suggested redefining or eliminating one of the programs. The issue will be considered in Fall 2003.

2.3. Re-design the Applied Math Program

This program will be redesigned for students who wish to pursue careers in industry without pursuing graduate studies. We will establish an advisory council consisting of leaders from regional businesses that might employ our graduates. The advisory council will make recommendations on the curriculum and the possible establishment of student internships.

We believe there is an opportunity to establish courses in actuarial science. These courses will help students to prepare for the professional exams administered by the Society of Actuaries. The courses will also benefit students in other areas, such as business and finance.

2.4. Create a More Encouraging, More Supportive Environment for Students

Creation of a more encouraging, more supportive environment for students is vital in attracting and retaining greater numbers of math majors. This entails improving the entire mathematics pipeline, from the core through the upper division. The department was mindful of this in Spring 2003 as it searched for three new faculty members to replace its retiring faculty, seeking candidates who demonstrated energy, breadth of knowledge, and enthusiasm for teaching. Specific steps under consideration include the following:

- *Actively recruit students to study mathematics.* We will use our high school math tournament to network with high school students and math teachers, seeking out opportunities to speak at math club meetings and recruit students. One faculty member is currently working on a grant proposal to establish a scholarship program for students who do interdisciplinary study in math and computer science. Faculty who teach courses in the

core will encourage mathematically talented students to take additional math courses and pursue a minor or major in math.

- *Evaluate and improve our placement system.* We currently do not have data to determine its effectiveness. Anecdotal evidence suggests that too many students are enrolling in pre-calculus and calculus with insufficient preparation. An improved placement system can result in higher degrees of student satisfaction and success in the core and therefore lead to more pursuing a major in math or math education.
- *Carefully monitor multi-section courses covered by part time instructors.* As recommended by the external review team, the department will seek the appointment of a formal coordinator of part time faculty. The coordinator will assure that part time instructors have access to adequate resources, convey the departmental philosophy regarding its courses, evaluate teaching performance, and arrange development opportunities.
- *Improve and promote the minor in mathematics.* An academic minor often serves as a gateway to the major. Student interest in the discipline can be encouraged, leading to some students obtaining a double major or changing their major to mathematics. With our current course offerings, completion of a minor in math proves too formidable for many students to consider. To increase interest in the minor, we plan to restructure prerequisites, re-appropriate course levels, and diversify course options.
- *Maintain a faculty that is diverse in ethnicity, gender, and mathematical interests.* A diverse faculty will be more likely to provide an inviting environment for a diverse group of students. We expect to conduct a search in the 2003-2004 academic year to replace a retiring faculty member. During this search, we will be mindful of our need for diversity.
- *Add two additional tenure track faculty positions.* The department supports the mathematical needs of the general education core, early childhood education majors, middle grades education majors, science majors, math majors, and secondary math education majors while relying heavily on the services of part-time faculty. In Fall 2002, ten different part-time instructors taught 24 out of 57 sections of math in the general education core; part-time instructors taught 17 of the 22 College Algebra sections. Full-time, non-tenure track faculty taught eight more core sections. Adding two more tenure track faculty positions will allow approximately half of the college algebra sections to be taught by tenure track faculty. Other benefits suggested by the external review team include:
 - greater faculty participation in course and curriculum development,
 - a larger pool of faculty to carry out service for the department, and
 - a reduction in the number of course preparations carried by individual faculty members. This, in turn, will increase the level of scholarly activity.

3. New Resources

The plans for improvement described in Sections 2.1-2.3 do not require additional resources. However, several initiatives described in Section 2.4 will require additional resources: instituting a new placement system, appointing a coordinator for part-time faculty, and adding more tenure track faculty positions.

If our upcoming investigation warrants a change in the system used for placing students in math courses, the department is likely to recommend the use of a standardized, professionally developed instrument. The College Board produces one such tool, ACCUPLACER. Three different tests are

available: Arithmetic, Elementary Algebra, and College Level Mathematics. If every entering freshman were to take one math placement exam, the cost would be approximately **\$1500** (\$1.35 per student per test attempt, using projected enrollment figures for Fall 2003). The earliest term for which we would use this system is Fall 2004. We will be investigating this during the 2003-2004 academic year.

The coordinator of part time mathematics faculty will play a valued role in our efforts to improve instruction in the core. The position will require some faculty release time – probably two or three courses per year. The annual cost of covering these courses with part-time instructors will be **\$3,000-6,300**.

The annual cost of creating two additional tenure faculty positions will be approximately **\$80,000** plus fringe benefits. The American Mathematical Society conducts an annual survey of faculty salaries. In its 2001 survey (the latest available at this time), the AMS found that the median academic-year salary for first-year assistant professors of mathematics in bachelor's degree-granting departments of mathematics was just over \$40,000 (see <http://www.ams.org/notices/200302/02-first-report.pdf>).

4. Plans for Increasing Program Productivity

Increasing the number of students pursuing majors and minors in math will increase productivity. Reducing the frequency of some upper level course offerings can provide only very limited improvement because of the scheduling constraints of students majoring in secondary mathematics education (B.S.Ed., M.Ed., and Ed.S. degrees), who need those courses. These constraints exist because the graduate programs are one-year programs and because of student teaching requirements for the B.S.Ed. students.