

To: Christopher Markwood, Provost/Vice Chancellor/Dean of Faculty
Martha Einerson, Chair of the Faculty

From: Program Review and Planning Council
Chair, Deb Nordgren

Cc: Chad Scott, Chair, Mathematics and Computer Science Department
Pamela Bustos, PRPC
George Wright, PRPC
Mary Pulford, PRPC
Maureen Salzer, PRPC
Laura Jacobs, University Archivist

Date: May 9, 2007

Re: Report on the Review of the Mathematics and Computer Science Program

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Introduction

In spring of 2007, the members of the PRPC began their examination of the self-study submitted by the faculty of the Computer Science program. Members of the Council, which is chaired by Deb Nordgren, volunteered to write a review of particular sections of the materials.

Review sections were written by the following members of the Council:

- Mary Pulford reviewed Question One, on purposes of the program
- George Wright review Question Two, on the means it employs to accomplish its goals;
- Pamela Bustos reviewed Question Three, on goal achievement by the program;
- Maureen Salzer reviewed Question Four, on the program's ability to continue to accomplish its goals, and
- Deb Nordgren reviewed Question Five, on the program's plans for the next five years, and Question Six, on how the program will continue to improve in quality.
- The editor for the review was Deb Nordgren.

The Council met with Chad Scott and Steven Rosenberg on April 4, 2007.

The review was approved by the PRPC on May 17, 2007.

1. What are the program's purposes?

The Math and the Computer Science Department has developed and expanded over the last 36 years to meet the needs of UWS's students, the university's mission as well as the business and community sector. In 1970, five degrees were offered in the Department between liberal arts and Secondary/Elementary Ed.

Over this 30 year space the department has added: Pre-Engineering and a Dual Engineering Degree; expanded Liberal Arts courses in preparation for graduate school; introduced Computer Science and Discrete Applied Mathematics.

The Department is in line with the UWS Liberal Arts' mission. This department supports the general education program as well as providing service courses for other departments and majors such as Teacher Education, Social Work and Business. The department has well defined goals which adjust to the changes in the academic field as well as changes from all non-academic stake holders.

2. By what means does the program accomplish its goals?

The Mathematics Department serves the university through its offerings both in the General Education curriculum and through courses which specifically serve other programs.

A. Description of Curriculum

Courses in the General Education Curriculum

As to the first, all non-remedial courses in mathematics, that is, excluding MATH 090 and 095, satisfy the three-credit core requirement in mathematics. The department targets its General Education offerings at a broad spectrum of student needs and interests.

- Thus, for mathematics and computer science majors and minors, as well as those in the sciences and pre-engineering, several courses are appropriate, including Math 115 (Pre-calculus); Math 240 (Calculus I); Math 241 (Calculus II), and Math 242 (Calculus III).
- Math 130 (Statistics) serves the needs of students in Geographic Information System (GIS), Social Work, Political Science and Criminal Justice.
- Math 150 and 151 are appropriate for students in business majors.
- Math 230 is appropriate for students in elementary education majors.
- For all other students, Math 112 (Introduction to Contemporary Mathematics) provides a stand-alone course in liberal arts mathematics. Math 112 is part of no other sequence and thus serves those students who do not intend to pursue the traditional algebra/pre-calculus/calculus sequence.

Offerings for Other Programs

- The department has several other offerings which serve other programs. These include Math 115 and 130 for the Applied Geographic Information Systems minor.
- Social Work majors may take Math 130 to fulfill program requirements.
- All majors in the Department of Business and Economics (DBE) must take either Math 151 or 240.
- The Chemistry major requires Math 240 and 241.
- The Secondary Education major in Chemistry requires Math 115.
- The minor in Physics requires Math 240 and 241.
- Students in the Criminal Justice program may take Math 130 as an option to fulfill graduation requirements.
- Political Science students are "strongly urged" to take Math 130.
- Majors in Elementary Education are required to complete Math 230 and 231.
- Students in the sciences, including Psychology, are occasionally advised to take Math 130 (Introduction to Abstract Mathematics) if they are con-sidering post-graduate study.

Curriculum Design in General Education Curriculum

The department observes the guidelines established by the Committee on the Undergraduate Program (CUPM) of the Mathematical

Association of America and implements most of its recommendations, offered most recently in 2004. These include offering “suitable courses” and examining the “effectiveness” of the traditional offering in algebra. In place of that course, the department has made available such alternative courses as “liberal arts mathematics” (Math 112, Introduction to Contemporary Mathematics) and “introductory statistics” (Math 130, Elementary Statistics).

Curriculum Design for Mathematics Majors and Minors

With respect to specific CUPM recommendations for the Mathematics major and minor, the department has instituted several curricular changes, tailored to achieve a number of objectives:

- CUPM recommendation C1 urges mathematics departments to provide for student progress over the course of taking the major and for careful analysis of data.
- Math 310 (Introduction to Abstract Mathematics) has been designed to function as a bridge from the more computationally oriented lower-division courses to the more abstract upper-division, proof-based courses, in line with the CUPM recommendation to develop students’ mathematical thinking and communication skills.
- Math 371 (Statistics) responds to the CUPM recommendation for “careful analysis of data.”
- CUPM recommendation C2 urges departments to ensure that students experience a variety of technological tools and computer programming languages.
- Requiring CSCI 210 (Introduction to Programming) of all mathematics majors and minors is a means of achieving this goal, as do many other courses in analysis which incorporate computer algebra systems.
- CUPM recommendation C3 urges mathematics departments to provide a broad view of the mathematical sciences.
- Students who take the department’s comprehensive mathematics major take coursework in both continuous and discrete mathematics. Coursework in higher algebra is also required of all math majors, while Geometry is available as an elective. Applied and stochastic methods are subjects taught in the required cluster of Math 370 (Probability) and Math 371 (Statistics).
- CUPM recommendation C4 requires study of mathematics in depth, including a senior-level project leading to a written and oral report.
- While declining student interest required deleting some advanced courses, the department is committed to provide an in-depth experience in abstract algebra and analysis by way of a special topics course, offered in an independent-study format.
- The second part of recommendation C4 is met by Math 399 (Mathematical Sciences Seminar), which requires collaboration between the student and a faculty member determined by the student’s interest.

B. Human Resources

The department currently employs five tenured or tenure-track faculty members and four senior lecturers. All of the former have terminal degrees in the field of Mathematics.

The department also employs a program assistant on a half-time basis. It lost two full-time professors and has experienced some personnel turn-over. Two tenure-track members have been added since 1999.

C. Fiscal Resources: *Internal Funding*

The department uses S&E funds to support graders and lab assistants and to purchase supplies and software.

Classroom modernization funds from the Student Technology Fee Committee have purchased various items of hardware.

External Funding

In 2003, Victor Piotrowski received a grant of \$387,603., from the National Science Foundation as principal investigator research project in cybersecurity. Steve Rosenberg and Shaun Lynch were named as Senior Personnel. This funding source was used to support the cybersecurity program within the department, with other benefits to the program, including development of CSCI/Math 437 (Cryptography).

Faculty Development

Since 1999, department members have received at least one faculty development grant or other professional development funding each year. Prof. Sergei Bezrukov has shown a particularly high level of productivity in research.

These monies have made it possible for faculty members to travel to professional meetings to present papers and keep abreast of recent developments in the field. Students have sometimes accompanied faculty members to meetings of the Wisconsin Section of

the Mathematical Association of America.

3. Is the program accomplishing its goals?

A. Meeting concerns of the NCA report

There were no specific NCA recommendations for the Mathematics Department. Math 112 (Introduction to Contemporary Mathematics) is offered as a “liberal arts math” course.

B. Student success

The only evaluative measures of students included in the report is a reference to a departmental goal of grade point average of 2.0 (c) or higher for students in each course and comparisons of the results of each semester in each class from year to year.

C. Preparation for the workplace and for post-graduate study

The Mathematics Department has graduated 41 students and included information on the status of 30 of them in jobs related to their major field of study. Student feedback was not included in this study.

D. Promotion of active learning and attention to gender and diversity issues

The Mathematics Department provided evidence of their efforts to increase promotion of active learning and attention to gender and diversity issues through attending workshops and in faculty position searches through giving preference to female candidates when all other factors are identical. They do note that only one third of mathematics doctorates are awarded to women.

E. Commitment to scholarship and awareness of current practices

The review contains a listing of faculty publications, a locally sponsored math seminar (GRATKO) and presentations at professional conferences.

F. Engaging students in mathematics

The Mathematics Department sponsors the Mathematics and Computer Science Club to provide extended opportunities for of interaction with students and faculty including guest speakers, student feedback, attendance at conferences and social events. Faculty members have also been active in promoting undergraduate research through mentorship of their majors on projects. An example of outreach and recruitment effort is serving as host for a “math meet” for area high schools.

G. Advisement processes

The Mathematics Department follows standard university advisement procedures. They also assign advisees to faculty in their major area.

H. University and community service

The department has representation on university committees and in community service both at the local and regional levels.

Note: The Mathematics Department review did not provide information on assessment data including student evaluations, student performance such as PPST scores for mathematics education majors.

4. Can the program continue to accomplish its goals?

The self study does not specify which areas the program wishes to develop, although the recent addition of a faculty member in Discrete Mathematics seems to indicate that this is or is hoped to be a growth area since other faculty members also have this or similar expertise. PRPC asks whether the employment prospects in this area are good, given that the program traditionally places teachers to a greater extent than mathematicians, according to the self-study.

A related question is whether the department will be able to sustain its mathematics education major without a dedicated tenure-track or tenured faculty member in this area. Clearly, academic staff members do not have iron-clad long-term commitments from the administration regardless of their performance and would suffer first if staffing were to be reduced. Further, academic staff members do not normally serve on department or university committees, including committees in the area of Teacher Education, and therefore the department is not represented by a faculty member in this area.

PRPC does not find a need for additional staffing in CIS beyond what has been promised by the Provost subsequent to the writing of the self-study.

The number of majors is small, the courses for the major have small enrollments, and they are taught by senior faculty. On the other hand, mathematics provides one of the core general education requirements which is taught primarily by academic staff and has high enrollments, leading to the department's high credit-hour production numbers.

No student evaluation information was provided. PRPC requests that this information be submitted.

Like many departments and programs on campus, mathematics needs more S & E funding, in particular to sustain faculty development. Mathematics faculty members are highly productive in research and scholarship in comparison with other programs on campus (see paragraph on teaching loads, above) and are fully entitled to the same allocation as any other program or department.

The self study notes that the current physical space in Sundquist is damaged and inadequate.

5. What new purposes is the department to address in the next five years?

With recent faculty hires and existing expertise, the Department expects to become a center for Discrete Mathematics in the upper Midwest. This involves continuing the current seminar and possibly hosting future conferences in this area. This would be very beneficial to the Department as well as the entire institution.

The Department does not address if there is a need for additional resources to move forward on this direction. It may be inferred that the work would be done within existing faculty and staff resources and that conferences would be conducted on a cost-recovery basis.

With the elimination of the CIS major and the move of the CIS faculty to the Math & Computer Science Department, the Department has conducted an analysis on the integration of the CIS program. The analysis indicates there will be a need for additional instructional (.7) and support staff.

How will the department continue to improve in quality?

The Department expects that converting existing ad-hoc instructional staff to tenure-track faculty will allow them to move forward with planning for the Department. This would be especially important for stabilizing the mathematics secondary education program. Approval has not been sought or received from the Administration for this conversion.

The Self-Study does not address program or student assessment as a means to improve quality.

Recognition

The PRPC notes the Department's accomplishments:

- Contributions to the Liberal Arts mission and the General Education curriculum.
- Regional recognition and contributions in the field of discrete mathematics
- Faculty who are active in scholarly activities, including the acquisition of grants.

Recommendations

1. To sustain the important secondary education mathematics major, PRPC strongly recommends that the full-time senior lectureship position held by Marilyn Toscano be made more permanent and be compensated at a higher than normal rate because Ms. Toscano currently fulfills the function of a tenure-track faculty member through her acceptance of responsibility for the secondary education major, through her extra-contractual service on the Teacher Education Advisory Council, and through her advisement of secondary education majors.
2. PRPC recommends the Department continue to discuss the analysis of the integration of the CIS program. The goals would be to provide a program to attract new students as well as meet the needs of the region. The PRPC supports the retention of existing tenured and tenure-track faculty. The PRPC expects to be notified of the decision of the Department on the alternative chosen and

the fiscal impact.

3. PRPC recommends the Department work with the campus institutional researcher to develop a formal assessment of the program and graduates of the program.
4. PRPC recommends that the program seek to sustain and enlarge its number of majors so that all faculty and teaching academic staff members in the Department teach similar numbers of students each semester/year, creating an equitable load distribution within the department.
5. Regarding the program assistant's position being increased to fulltime from halftime, PRPC requests a comparison with other departments on campus for: numbers of faculty and academic staff members, numbers of ad hocs, numbers of majors, allocations of work study funding, etc. At present we cannot make a recommendation in this area without comparative data.
6. PRPC recommends that all departments that endure the conditions in Sundquist receive some facilities improvement that would acknowledge the substandard working conditions in Sundquist in comparison with other campus buildings such as Holden Fine Arts, Erlanson, Old Main, and Barstow. While the proposed academic building is often mentioned as a potential cure for this inequity in working environments, its appearance on campus and the beginning of its use are far in the future and thus irrelevant to the current situation. The administration should discontinue using the "new" building as an excuse for maintaining substandard working conditions for faculty and staff housed in Sundquist.
7. PRPC strongly recommends that the Provost, the Budget Review Council and Faculty create and sustain an equitable, campus-wide faculty development funding formula that treats all faculty equally by providing equal amounts of faculty development monies to all faculty members in all departments.
8. PRPC recommends the development of a plan to attract and retain more tenure-track women and minority students into the Department. Competitive salaries based on market conditions need to be a part of the plan.