

University of Washington Correspondence

# INTERDEPARTMENTAL

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March 7, 2005

To: Gail Dubrow, Associate Dean for Academic Programs, The Graduate School  
From: Selim Tuncel, Chair of Mathematics  
Subject: Report of the Decennial Review Committee

After sharing the report of the Review Committee with the members of the Department of Mathematics, I discussed it in detail with our Executive Committee and several other department members. I am writing to pass on our comments. Let me start by conveying the Department's thanks to the Graduate School for organizing the review, and to the Review Committee for carrying out a thorough review. We agree with the opening observation of the report that "The Department of Mathematics has made dramatic progress since the last review", and we are pleased that many of the Department's achievements are recognized in the body of the report. We also agree with many of the recommendations. I will discuss the recommendations regarding the undergraduate and graduate programs in separate sections after commenting on other areas.

We intend to continue our research excellence by making excellent appointments. We are pleased that the College of Arts and Sciences and the University have been supportive of our efforts in this direction. We will continue to look for opportunities to deepen our collaborations with other units on campus, as well as with other organizations, and in particular the Pacific Institute for the Mathematical Sciences (PIMS) and Microsoft Research.

Mentoring of junior colleagues for success in their careers and for integration into the Department is a responsibility we take very seriously. The annual meeting of the faculty member with the chair provides a formal mechanism for communication between the faculty member and the Department. Expectations for tenure and promotion are made very clear in workshops run by College of Arts and Sciences and in the handout prepared for these workshops. We recommend the workshop to the assistant professors and associate professors, and have shared the handout with them; we will continue to do so on an annual basis. The Department explicitly assigned a mentor to each assistant professor for a number of years. This practice was discontinued two years ago when we were informed that it was not supported by the University. We will be glad to return to this practice.

We are pleased to see the Department's outstanding outreach activities recognized in the report. We are aware of the significant impact of this work on the community, and we believe the University is aware of the impact as well. We will continue to support colleagues involved in these activities, and endeavour to involve other colleagues.

## **Graduate Program.**

The recommendations of the Decennial Review Committee regarding our graduate program include soliciting student input on making better use of meetings between TAs and instructors, investigating the possibility of offering a professional Master's degree building on the ACMS program, and making adjustments to our system of preliminary exams.

Formal weekly meetings are only required of TAs assigned to Math 124 and 125 in autumn and winter quarters. Each spring quarter, the Department, with the help of CIDR, conducts an annual survey of all TAs in these courses. The questionnaire includes an item in which TAs comment on the weekly meetings. Based on last year's survey, the Department revised the timing and content of the weekly meetings. The Department will take the results of the Spring 2005 survey into account in planning the meetings for 2005–2006.

The Department currently offers a professional Master's degree in which students may elect to specialize in either optimization or numerical analysis. As currently structured, the program takes approximately two years to complete. However, the degree requirements include a number of upper-level undergraduate courses that a conscientious undergraduate at the UW would usually take prior to formally entering the graduate program. Consequently, a five-year combined BS and MS degree that builds upon the ACMS program, or the Mathematics undergraduate program, appears to be feasible.

A fully developed five-year professional degree program would almost certainly include courses offered by the Departments of Applied Mathematics, Computer Science & Engineering, Mathematics, and Statistics, and most likely will require some changes to the requirements for the ACMS undergraduate degree.

The Decennial Review Committee made two recommendations regarding our system of preliminary examinations: offer exams more frequently and provide faculty proctors during the exams.

Until the early 1990's, the department gave preliminary exams in three subjects, required students to pass written exams in all three, and written preliminary exams were held in both late March and in mid September. Under that system, it was common for students taking prelims in the spring to “write-off” their course work in both autumn and winter quarters, concentrating instead on studying for prelims. To encourage beginning students to focus more heavily on their coursework and on making the transition to research, the Department voted to discontinue the March prelims beyond 1992.

To prevent lengthening the mean time to completion of prelims, the Department instituted the “3.8 rule” under which students could pass one prelim by obtaining sufficiently high grades in the corresponding course. It also instituted two additional subjects in which prelims are offered in, thereby increasing the number of preliminary exam subjects to five, while leaving the required number of prelim passes unchanged at three.

In the spring of 2004, the Department approved the “Oral Prelim Option”, which is designed to encourage an early transition to research. By electing the oral prelim option, a

student is able to complete the third prelim by carrying out reading on a special topic that leads into current research and taking an oral exam.

With our ability to attract some of the top applicants, in recent years the great majority of our PhD students have completed all three, or at least two, prelims in the first year. We have encouraged students to make finding a research area and a PhD advisor the main focus of the second year by taking special topics courses and doing reading with faculty. The critical transition into research has long been one of the fundamental challenges of PhD programs in mathematics, and indeed is among the focal points of the VIGRE program of the NSF. The success we have had in helping the students to make this transition was recognized in the VIGRE site visit about a year ago, which resulted in a second five-year VIGRE grant to the three mathematical science departments. We expect the oral prelim option to lead to further progress in this direction.

Prelim authors are given explicit instructions to carefully proofread the exam. Under our current system, staff from the student services office proctor each exam, and when questions arise, the staff contact the exam author who has agreed to be accessible by phone. Providing faculty proctors may bring its own problems. The (anonymous) exam authors are the faculty in the best position to address questions regarding the exam, and a hastily answered response has the potential to cause more problems than it solves. Our Graduate Program Committee will meet to discuss this and other possible changes, such as requiring one exam author to remain in her/his office during the entire period of each exam and developing a formal procedure for addressing any mistakes found during exams.

### **Undergraduate Program.**

As the report points out, the number of majors in the department's undergraduate program has recently doubled. The Department is pleased with this increased interest, which in part has been brought about by reforms in our programs and instruction. At the same time, we face the challenge of accommodating the increase (from about 150 to 300 majors in the Mathematics degree program, and from about 240 to 480 in Math and ACMS combined). A number of the recommendations concerning undergraduate education focus on communication and connections with our students and majors.

The Department has long wanted to make space available for undergraduate majors to meet in. Experience has shown that this is not possible within our existing space. Social gatherings of undergraduates with our faculty and graduate students are an important step we began taking last year and hope to build upon in future years. Due to the size of our program, our approach has been to organize events that target specific groups of students, such as outstanding freshman, continuing students, or graduating seniors.

Our student services office provides excellent advising for our majors, but more information is always better. The suggestion to provide sample four year course schedules is an excellent one. We will prepare schedules and post them on our web site, making them accessible to majors, interested majors, and to our own faculty.

The suggested move toward course uniformity is often discussed within the department,

and we have moved in this direction in recent years. Through the reforms we have carried out, a high degree of uniformity has been built into our freshman courses, including precalculus/calculus for business students (Math 111/2), precalculus (Math 120) and the recently revised calculus sequence (Math 124/5/6) serving science and engineering students. The syllabus, homework, worksheets and final exams are all uniform for students in these courses. This has been positive change, and has helped to insure that students smoothly progress through our gateway courses. For several intermediate level undergraduate courses, such as Math 324 (Multivariable Calculus), Math 307 (Ordinary Differential Equations), Math 308 (Linear Algebra) and Math 309 (Linear Analysis), we have designated faculty who act as course coordinators. The coordinators, along with suggested syllabi, insure common content and expectations in these courses. We do not feel implementation of a common final exam or more strict uniformity is necessary in these cases; these courses do offer brief opportunities to shift the emphasis from section to section, which is desirable at this level. For a few courses, in particular Math 310 (Introduction to Mathematical Reasoning), the content, book and emphasis of the course is left entirely in the hands of the instructor. This high demand course, which is now a prerequisite for many upper division mathematics courses, is meant to be a first course in rigorous mathematical thinking and our diverse faculty have many different and legitimate means to achieve this end. The department has increased the number of sections of Math 310 offered during the academic year from two to six. Majors are given priority by being allowed to register before non-majors to make sure that students who need the course as a prerequisite to other courses have access. Quite a few non-majors are able to register for the course, but there is considerable unmet demand from non-majors.

Finally, for our senior level courses, suggested syllabi are either now in place or will soon be, to insure both the appropriate undergraduate experience and a smooth transition of our Masters students into first year graduate courses.

We offer honors students capstone experiences through the honors thesis and other opportunities. The idea of enabling all students to experience a major project requiring large scale synthesis of their mathematical education is very attractive. It may even be possible to build the experience around small groups, as computer science has long successfully done. Our undergraduate program committee will study these possibilities. The suggestion to more broadly advertise summer research opportunities is also well taken; it may be possible to link summer research with capstone experiences.

During our multi-year calculus reform efforts, we learned that improvement is continuous and requires ongoing feedback from all involved: students, course instructors and graduate student teaching assistants. Likewise, improving the overall experience for our undergraduate majors cannot occur without a continuous stream of feedback from our graduating majors. Exit surveys and individual interviews with graduates would provide valuable information. For example, a short written survey could be easily added as the final item on the checklist for when one of our advisors meets with a student near graduation. In addition, each year a random sample of (say) 25 graduating seniors could be interviewed one-on-one with the undergraduate program director. These short (10-15 minute) meetings would provide

additional useful feedback.

I am pleased to report that the funding for Math 124/5 reforms has been made permanent.

We welcome the recommendation of the report regarding the enlargement of space for the Mathematics Study Center. The MSC is a critical component of our instruction at the freshman level. Although the original plan was to include 300-level service courses, we find that the MSC operates close to full capacity. Accommodation of 300-level courses would require a significant increase in space. In addition, our 300-level courses now benefit from support provided by the Center for Learning and Undergraduate Enrichment (CLUE). As we explained in our self-study, space limitations have limited MSC support for Math 111/2 to four afternoon hours, in an adjacent room. Integration of this room in the MSC would enable us to offer Math 111/2 students support comparable to the students in other freshman courses. The flexibility resulting from this modest remodel would, in addition, improve the support provided for other courses.