External Review Report

Department of Mathematics
San Francisco State University

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External Reviewers:
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The SFSU M.A. in Mathematics program is of the best quality in terms most measures, including the success of the graduates, intensity of the graduate faculty’s research, and friendly and efficient learning environment. The program is highly successful in placing graduates into top PhD programs. Some of them have acquired tenure track positions upon the completion of their PhD. The program thus serves well the CSU-UC pipeline in STEM education. The program is also successful in training graduates for teaching careers in community colleges as professors or university environment as lecturers. This success significantly contributes to the workforce needed in the community and fills a gap that cannot be achieved by other universities in the area. The interaction between the students and faculty is exemplary. Both current students and alumni indicated that the faculty have open-door accessibility, are very friendly and are ready to help. Through this excellent interaction, students are able to write high quality theses. About 50% of the students theses have been published in refereed journals. The quality and intensity of the graduate faculty’s research are outstanding. Four faculty members received NSF CAREER awards, one in 2011, two in 2010, and one in 2004. Another faculty member has published two papers in Annals of Mathematics (2011, 2003) and one paper in Inventiones (2011). Seventeen (17) faculty members have been awarded 62 research grants in the last five years. The number and award amount of research grants received from NSF, NIH, AFOSR, State of California, and other agencies are impressive. The faculty has also produced a large number of research monographs, textbooks, edited volumes and software. Overall, both research quality and overall output of the SFSU graduate faculty places them among the most research-intensive mathematics departments in the nation.

To make this strong and productive M.A. Mathematics program sustainable, we recommend the following six improvements to better support the students and faculty. First, there is room to expand the graduate program to accommodate the need of training students for industrial and business employment. Some graduate courses in statistics, computational mathematics, and applied mathematics may be offered for this group of students. The increased number of graduate students will enable the department to make the program’s course requirement more flexible so
that students can have more choices of courses for their career goals. The program’s expansion to M.A. Mathematics with concentration in Computational Mathematics and with concentration in Statistics is a possible approach to fill the gap. Second, the faculty members are overworked. The number of mathematics faculty professors has decreased dramatically in recent years, and an increased number of hires in the next five years should be seriously considered by higher administration. Third, more space is needed to properly house GTAs, RAs, postdoctoral researchers, visitors, lecturers and some non-TA graduate students. The current arrangement of 4 TAs in one office with two desks prevents them from conducting any research in the office. Some research groups need to have proper research labs to support their application for grants from certain agencies, such as NIH and DOE. Fourth, based on the standard 3+3 teaching load and the intensity of the research, more WTU credits ought to be given to the faculty who supervise graduate students. Fifth, a predictable SFSU budget to graduate students through GTA should be planned, in a timely manner, to facilitate the graduate admission and financial support. Sixth, proper computer technical support should be provided to both faculty and graduate students for software installment, hardware setup and maintenance.

Detailed elucidation of our six recommendations above is included in the itemized responses to the review questions given below. We wish to stress that our review is consistent with the key recommendations in Section 1.2.1 from the Fifth Cycle. In our view, the following six items from the previous review remain on the agenda:

1) Increase interaction with businesses and agencies that provide non-academic careers for mathematicians  
2) Add an MS in Statistics (Developing the concentrations listed above would be the best first step in that direction)  
3) Limit T/TT teaching loads to 9 WTUs per semester  
4) Provide more office space  
5) Provide more staff support  
6) Assure appropriate consistency of course syllabi

Our itemized review assessment below is according to items listed in the Worksheet for Program Review. The assessment presents the evidence for our External Review Rating and Importance scores provided in the Worksheet table.

1A. Balance in course offerings: The current courses are consistent and offered on a regular basis. They are highly successful in training students for subsequent PhD programs and teaching careers. The department plans to expand the graduate program and increase the number of students to fill the gap for educating student who will go to industry. This will require more flexibility in the course requirements, and also more course offerings in computational mathematics and statistics.
Paired courses are available, but there are issues to be addressed. Graduate students expressed dissatisfaction with paired courses taught at the undergraduate level.

1B. Faculty participation: Faculty participation in teaching graduate courses and mentoring thesis students is outstanding. The research excellence of the faculty translates directly into high-level teaching of graduate courses.

1C. Space: There is a clear and urgent need for space for offices, labs and meeting rooms. The facility for mathematical biology is a step in the right direction but the room is not adequately designed for an applied and computational mathematics research lab. Four teaching assistants share one small room with two desks, and graduate students who do not teach have no office space. This prevents them from doing substantial research work on campus.

It is impressive that the department has attracted postdocs and international visitors, but it is disappointing that there is no adequate space to host them. Often they share their host faculty’s office. Providing office space to such postdoctoral researchers and international visitors will better integrate them into the department, and the resulting interactions will greatly enhance the graduate student experience.

1D. Equipment: It is impressive that the faculty hold major grants and acquire substantial computational equipment. However, the computing resources acquired from such grants are not adequately supported on campus. There is not sufficient staff to promptly set up and maintain the equipment. This hinders the progress of the funded projects.

The current availability of mathematics research software, such as Mathematica and Matlab, is good. It should be continued, and, if at all possible, it should be expanded.

1E. Library: The university has a brand-new library, with good access for faculty and students. Mathematics graduate students should be encouraged to use that facility.

1F. Graduate Student Financial Aid: The current stipends for Teaching Assistants at the rate of 600 dollars per month for teaching one remedial math class are low. The situation is particularly difficult for out-of-state students and international students. Resources should be made available address this issue. The progress will help make the program more competitive and continue to excel. Given the department’s well-documented successes, especially with students from underrepresented groups, graduate fellowships might be a fundraising target.

1G. Enrollment: Currently, the program has about 50 enrolled graduate students. Most of these have a clear goal of going to a PhD program or a teaching career. There is a need for also educating students for industrial and business work force. This will lead to a substantial increase in student enrollment, possibly an additional
enrollment of 30 to 40 students. Many of these will receive their financial support from their employers or their own resources.

1H. Diversity: The program has a very healthy diversity in the study body, in terms of age, gender and ethnicity. Students uniformly praised the welcoming and inclusive environment. This point is especially important for the success of students from underrepresented groups.

2A. GPA Requirement: Almost all entering students satisfied the GPA requirement of 3.0.

2B. Writing Competence: This is assessed through the GRE General Test. A significant majority passed this test, and the others received additional training in writing. There is a special course Communicating Mathematics (Math 729) that has been very useful in training students for writing their thesis and for their future employment. We strongly recommend that this course be continued indefinitely.

2C. Non-Native Speakers: About 20% of students are non-native speakers, and the department uses the TOEFL test to assess their abilities in English. The Graduate Coordinator has paid attention to this group of students and arranged them to attend a special course (SCI 614) to improve their English language skills.

2D. Other Admission Requirement: None

3A. Curriculum Requirements: The core requirements are courses in Analysis and Algebra, and these are consistent with standard curriculum in most major mathematics departments. We recommend that these requirements be reviewed and made more flexible, so that students have more freedom to choose courses that are most suitable for their career choices.

3B. Course content: The current course contents are appropriate. The existing classes are at a high level and are taught properly by very competent faculty. However, the variety of courses could be expanded. We see a particular need in an expanded offering in statistics, computational mathematics, and applied mathematics. A short course on computer programming or mathematical software, in addition to the existing SAS class, is highly desirable. Such courses are important to prepare students for employment in industry and business. It should work well to offer these in the late afternoons or early evenings, so that working professionals can attend the classes. Some students we spoke to also mentioned a need for more course offerings in Analysis and Geometry.

3C. Student Work Product Requirements: The level and complexity of student’s assignments is appropriate. There is overwhelming evidence that students are well-prepared for a PhD program or a teaching career after graduating from the SFSU masters program.
3D. Class Size: No class has more than 30 students, and most are within the range between 8 and 30. Advanced Linear Algebra (Math 724) and Partial Differential Equations (Math 777) may be require some attention, as their recent enrollments have been low. This would change when the program gets expanded towards a student body with a career goal in industry and business.

3E. Graduation Rates: We did not see the data on graduation rates, but the number of graduates indicates that these rates are high.

3F. Quality Indicators: This is a very high quality program, as is witnessed by the publications, awards and grants of the faculty, as well as the placement of graduating students into top PhD programs and teaching positions.

4A. Requirements for Faculty: All faculty members meet the requirements for teaching in the graduate program, and almost all faculty regularly teach graduate courses.

4B. Quality Indicators: Faculty members are excellent scholars. They received numerous awards, such as the four recent NSF CAREER award. Faculty hold substantial research grants from the NSF, NIH, Air Force and other agencies. Faculty include winners of distinguished teaching prizes. They also publish in the very top mathematics journals, such as Annals of Mathematics.

4C. Currency: Faculty members are the cutting edge of research. In particular, the younger faculty members are outstanding researchers. The administration should be concerned about their retention.

4D. Diversity: Yes, this is a very diverse and inclusive faculty.

5A. Strategic Planning: The department has a plan to expand its graduate program while maintains the current strength. The details still need to be worked out, and a strategy for the next five years should be formulated clearly. This plan should be documented.

5B. Governance: Yes, the governance structure is clear and seems to work well.

5C. Communication: The department has regular faculty meetings. The Chair invites the part-time faculty to participate in these. The department offers its students excellent accessibility to the faculty. The graduate program coordinator is successful in communicating with the students. Students report that faculty are very supportive to student activities, and that they participate in student-led events.

6A. Assessment Plan: Yes, there is a clear assessment plan.

6B. Assessment Implementation: The department carefully assesses the Student Learning Outcomes for every graduate course and research thesis.
6C. Grade Distribution: In the two core required classes, Math 710 and Math 850, the grades accurately differentiate between good and excellent students. In more advanced classes, the specific grades are less important.

6D. Closing the Loop: The department has been serious about taking assessment results into consideration when evaluating their graduate program and its courses.

6E. Comprehensive Exam: A comprehensive exam exists, but it is rarely requested by a student.

6F. Thesis: The vast majority of student graduate with a Masters thesis. The department is proud of the high quality of theses. Half of the theses have been published in refereed journals. Faculty are very invested in this process, and this requires proper recognition when calculating their work load.

6G. Culminating Experience: Right now, the culminating experience options are skewed towards the thesis.

7A. Advising: The advising is excellent. Most students work closely with their thesis advisor. While the advisor is the primary resource when it comes to professional development and career planning, the department as a whole takes pride in this. We were amazed to learn that students often do not need to set up appointments to meet with faculty: they are so used to just knocking on the professors’ doors.

7B. Writing: The department evaluates student writing through written homework, exams, written projects, and a thesis proposal. Students receive ample feedback on their writing.

7C. Professional Engagement: Students actively attend seminars, and occasionally participate in workshops and conferences. They use many opportunities to get involved in the profession, through math circles, interactions with high school teachers, and interactions with scholars at other Bay Area institutions (Berkeley, Davis, Stanford, UCSF, etc.)

7D. Alumni: The department keeps in touch with its alumni.

7E. Civic Engagement: The graduate program is connected to the community through various outreach programs, such as the Math Circles.

7F. Equity and Social Justice: Within the context of the broader Mathematics community, the department does very well in this regard.

7G. Internationalization: The department has had some highly successful international students, and it attracts a host of international visitors. Faculty have close connections to colleagues in many countries, including China, Columbia and
Germany. The department has courses taught in conjunction with foreign institutions.