Committee on Educational Policy
Undergraduate Program Review

Department of Mathematics
University of California, San Diego
March 6-7, 2008

Introduction

The Committee on Educational Policy (CEP) review committee for the Department of Mathematics met on March 6 and 7, 2008. The committee had previously received material from the Chair of CEP and the Associate Vice Chancellor for Undergraduate Education (AVCUE). This material included (1) a letter dated May 7, 2007 from the chair of CEP to the chair of the Department of Mathematics, (2) the Department's Self-assessment report dated January 28, 2008, (3) supporting material, including course schedule and enrollment data, courses taught, grade distribution by courses, funding and support summary, instructor ratings from CAPE, faculty workload policies, teaching statistics for mathematics, physical sciences and the general campus, ladder-rank faculty demographics, degree requirements, degrees awarded, distribution of majors by college, data collected by the Office of the AVCUE, retention and time to degree, UCEUS results, alumni survey, UCSD Career services survey, and (4) the report of the last review of mathematics in 1997-8 and subsequent letters from the chairs of mathematics, the chair of CEP and the acting Dean of the Division of Natural Sciences.

The committee met on March 6th with the chair, vice-chair and faculty undergraduate teaching coordinator, with faculty, with visiting faculty and teaching assistants, with undergraduates and with placement director, MSO and advising staff. On March 7th, the committee met with a representative from the college Deans of Advising, once again with the chair, vice-chair and MSO, and finally with the Associate Vice Chancellor for Undergraduate Affairs, Associate Dean of Physical Sciences and representatives from the office of the Academic Senate and the Senior Vice Chancellor for Academic Affairs.

Description of the current operation of the department

The department currently has 57 Academic Senate faculty, including an LSOE and an LPSOE. There is a Department Chair (Sam Buss), a Vice Chair for Undergraduate Education (Ian Abramson) and a Faculty Undergraduate Teaching Coordinator (John Eggers). There is also a Graduate Vice Chair (Jim Lin). On the staff side, there is an MSO (Nancy Hartley) and 13 other staff members.

There are 133 PhD and MA students and approximately 500 undergraduate majors. The department provides service teaching to the whole campus, with approximately 18,000 students enrolled per year. The department's service teaching ethos can be summarized

by saying that no student who meets the requirements is turned away. Rising student numbers on campus have led to rising students numbers in service and major classes.

Service teaching covers essentially calculus and probability, including the 10A-B-C sequence and 20 A-B-C-D-E-F sequence for the former and 11 for the latter. A probability laboratory has recently been introduced.

Incoming freshmen are tracked to monitor their performance in the lower-division prerequisites. This information is subsequently used, e.g., to modify prerequisites to ensure that students are well prepared as they continue through the system.

A departmental Student Affairs Committee was started in the 2002 to coordinate all aspects of undergraduate teaching. It comprises the Vice-Chair for Undergraduate Affairs, LSOE and LSPOE lecturers, the director of Math Testing and Placement (Bruce Arnold) and student affairs staff.

The department has introduced a number of new majors recently, and there are currently 6 B.A. degrees offered and 2 B.S. degrees (note that page D-124 of the catalog copy only mentions 7 degrees). Some majors have been expanding, some have been stable, and some have been decreasing in number.

The standard faculty course load is 4 per year, down from the previous value of 4.5. Classes are distributed among the entire ladder-rank staff, but a significant proportion of courses is given by visitors. This is particularly true for the lower-division classes, where currently 39% of classes are taught by permanent faculty. Visitors, or rather temporary instructors, include senior faculty on sabbatical from other institutions, faculty fellows, postdocs, S. E. Warschawski Assistant Professors and Ph.D. students – "Associate In" instructors.

The staff numbers have been increasing to handle the larger number of majors. This has led to increasing budgetary deficits as unfunded positions have been filled, and the corresponding funds have vanished. There are clear concerns that the rise in student numbers anticipated in the next few years will make the budgetary situation worse.

Analysis of the strengths and weaknesses of the department's program

The committee was extremely impressed with the quality of the department's undergraduate program. Faculty, visitors, staff and TAs work together to provide outstanding education for both majors and non-majors. The CAPE scores received by the majority of instructors show that most students appreciate these efforts and value what they have learnt.

The department has been active in certain new majors to respond to perceived student need and to changes in the applications of mathematics. About 1/3 of the majors plan to continue on to graduate school, but other career paths, including education, are supported.

The continuing small numbers in the Applied Scientific Programming are cause for concern, as is the drop in numbers in Mathematics & Computer Science, even if the latter can be attributed to outside economic factors. The rise in overall numbers reflects well on the department's ability to attract students, and is proportionally larger than the overall growth in campus numbers. In parallel, there is no real evidence of grade inflation, which is impressive for such numbers and dealing with non-majors.

The committee was particularly impressed by the efforts undertaken to coordinate large lower-division classes. These include careful monitoring of student performance, support of TAs, and producing uniform quizzes and exams. The work of John Eggers has clearly been immensely helpful here. TAs and visitors alike commented on how this coordination had helped them come to grips with teaching large classes. Coordination is not compulsory and was viewed as positive by those faculty who make use of it.

Some faculty carry out a lot of mentoring of undergraduates outside the classroom. This is laudable, but it is important that such efforts be recognized, if only by promoting them as best practice. There is no doubt that 199s in mathematics are difficult to set up and to advise, given the huge gap between freshman mathematics and research in mathematics. Nevertheless the committee was surprised at the low number of students enrolling in the honors major (4-6 per year), especially given the very high quality of the top undergraduates in the program.

TAs are knowledgeable and passionate both about mathematics and passing on that knowledge to undergraduates. They had concerns about students continuing on through the major with an inadequate understanding of what mathematics is really about. They are a collegial group and are keen to help each other and pass on useful information. They appreciate the training they receive. However, there was concern that TAs received essentially no systematic teaching advice or evaluation after the first year. Also guidelines on grading in lower-division classes for readers seemed lacking.

The maximum value of 35 students per TA section was viewed as uncomfortably high, undercutting the TA role in making personal contact with undergraduates. A TA is typically assigned 4 sections a week, requiring her to interact with potentially 140 students. The committee recognized that the finite budget probably means this number cannot change.

Classes taught by candidate-level "Associate In" instructors were viewed as positive both for the students taking them and for the graduate students giving them. The 3C/4C sequence was viewed as well coordinated for the Associates In. From a financial perspective, Associates iI are efficient.

The creation of the Student Affairs Committee has been a positive development, leading to a unified voice on curriculum issues, to which faculty have responded constructively. Dealing with enforcing prerequisites automatically for lower-division classes is an example of an initiative based on data that has improved the program.

The creation of the honors sequence was viewed as another positive step. Making mathematics appealing to high-achieving lower-division students is a clear way of dealing with potential student apathy and loss of enthusiasm for the subject. It was heartening that almost all students the committee met were passionate and enthusiastic about mathematics.

The quality and professionalism of the advising staff was noted. In particular, outreach efforts and liaisons with local community colleges are exemplary. However, students did not seem fully aware of some of the options available to them with the honors sequence. A certain amount of initiative and self-motivation is certainly desirable, but maybe the publicity or communication with the students about this kind of thing is not getting through. Also, some students seemed unaware of the existence of faculty coordinators for each major.

Advising on applying to graduate school was on the one hand clearly taken very seriously by the advising staff and on the other hand viewed as lacking by some undergraduates.

The College Deans of Advising were extremely positive about the department. They mentioned in particular the responsiveness of the advising staff. They were also very positive about the Calculus Lab, which was also viewed by the TAs as a great way to interact with students and motivate them.

There was a concern expressed that some of the majors graduating had an insufficient grasp of fundamental notions of mathematics such as proofs, taught first in Math 109. A related issue, however, was that of students who discover too late that mathematics is not for them, especially if they have delayed taking 109 until late. One possible solution, mentioned both by students and by the advising staff, would be to have a 1-unit P/NP lower-division seminar class outlining what upper-level college mathematics is about. Such introductory classes exist in other departments. Experience has shown that it can be difficult to keep them on topic however; they have a tendency either to swell up to 4 units or to become a venue for faculty to talk about their latest research. Some faculty also commented on the naivety of students about subfields of mathematics, which is essentially the same problem.

The major problem reported by the department is financial. Faculty members appear to be teaching a full load, comparable to the standard in the field today. However, the resulting need for visitor and lecturing professors is not met by normal allocations, and deficit spending has become the norm.

Recommendations

These are in no particular order. Some were discussed during the exit interview, some were not.

1) The classes in the second half of the 20 sequence, 20D-E-F, are essentially independent. It was not clear that the order D-E-F is actually optimal. In addition, the prerequisite of 20F for 109 could lead to problems with students who have taken F last. The 109 prerequisite might more rationally be 4 quarters of the 20 sequence, so that students could take 109 after 20D, 20E or 20F. This would encourage students to take 109 earlier. The class is viewed as crucial to the decision whether a student should major in mathematics. It was noted that 20F is a prerequisite for a reason, namely that 20F introduces proofs, but students did not appreciate this. They felt discrete mathematics (whether at UCSD or at community college) was the most helpful preparation for 109.

2) The fact that 5 of the majors are B.A.s and 2 are B.S.s seems anomalous. Certainly investigating whether in today's job market students might be better off with a B.S. rather than a B.A. seems warranted.

3) TAs valued the training they received during their first year, but would welcome the idea of some refresher training or evaluation during following years.

4) Faculty explained that visitors received clear instruction at the beginning of their time teaching in the department. The use of historical data as a guide on grading was viewed as helpful, but there were worries that some visitors might feel pressured to conform strictly to these data, which are meant as guidelines.

5) There was strong agreement from TAs that some weaker students were being allowed to continue. There needs to be strong communication between faculty and TAs as to what is acceptable as a passing performance.

6) Several students pointed out that there were few undergraduate courses on combinatorics, despite the department's stellar research record in the field.

7) Providing a lounge for upper-division math majors seems like an important way to build morale and community for the majors. A similar issue was noted for Masters students in the Graduate Report.

8) Students seemed unaware that faculty advisers were assigned for each of the eight majors, possibly because the advising staff does such a good job dealing with most queries. Nevertheless, setting up an e-mail address for questions to the faculty member responsible for each major, so that he or she can deal with questions about the major in conjunction with the advising staff, might be helpful.

9) Anne Hoger's letter of February 24, 1998 (D-233) mentions the committee recommendation that "regular meetings with client departments be held to facilitate communication…" The committee realizes that obtaining feedback from client departments can be difficult. The current review structure does not explicitly contain a mechanism for doing so. However, it would be useful to have some mechanism in place for subsequent CEP reviews of departments with large service teaching loads to aid in

understanding how successful the service teaching is, or at least appears to be. This is really a recommendation to CEP as well as to the department.

10) The LSOE and LPSOE appear to be doing an excellent job. Their efforts supporting the (optional) "coordination" of assignments and exams reduce the faculty burden of teaching large classes. Consequently, would it not make sense to hire another lecturer to help further in reducing large loads? Understandably the department values research, but at what point does the added pressure of large class sizes, which may potentially increase, become too much of a burden to the faculty's research activities?

11) The current policy of distributing classes evenly among the permanent faculty seems to be fair from the faculty perspective, but it is not necessarily in the best interests of the students. CAPE data for the past 5 years shows that large classes were re-assigned to faculty whose teaching was poorly received in prior instances of the same course. Some faculty are demonstrably effective in large course while other faculty are more effective in small courses, so the committee urges that faculty teaching assignments be tailored so as to deliver the best teaching to the students.

The current reward for teaching large classes, namely 1/10 of a credit for classes over 200, is too little to be taken seriously by many faculty and also fails for classes near the borderline. One faculty member reported losing the credit when his enrollment dropped by just a few students, from just over 200 to just under. Better incentives for effective teaching of large courses seem to be needed, if only from a psychological perspective. The goal would be that those who are good at teaching large classes would want to do it rather than be penalized by being forced to do it. The Vice Chair for Undergraduate Education is the person who can facilitate this.

12) The current system having non-permanent faculty teach the majority of math classes appears to be working well: a cursory review of CAPE data for the past 5 years suggests that the post-doctoral and visiting faculty instruction is well received by the students, with fewer "recommend faculty" scores below 50% than registered by the permanent faculty. Nevertheless institutional monitoring of effectiveness seems to be warranted.

It is also not clear why this system has to result in such a large percentage of the service classes being taught by visitors. The committee understands the importance of such positions in the career developments of young mathematics faculty and is not trying to denigrate the work of the visitors, but the question of who should *predominantly* teach the 90% of the students that take mathematics courses is a valid one.

13) An effort should be made to avoid assigning especially difficult classes to visiting instructors coming from a different system or who have little teaching experience. An example of a class to avoid might be 10A, which is so basic that it can be hard to teach without prior experience. In contrast, classes like 20E and 20F are probably a better match for many visiting faculty.

14) The Calculus Lab was universally appreciated. The College Deans of Advising advocated expanding it to cover more theoretical material. It is not clear this is really its purpose, but the committee urges that it be continued, at least in its current state.

15) The College Deans of Advising mentioned the possibility of online placement tests. This was not discussed during the meeting. Given the record of the Director of Math Testing and Placement, the committee is confident this issue will be addressed appropriately in due course.

16) The committee did not examine the status of the 20B and 20D MATLAB sections, but there is clearly some tension between the department and CEP about these classes. The situation with the 11L class seems quite the opposite, for reasons that were unclear to the committee.

17) The role of faculty input in the Student Affairs Committee was unclear. Do faculty rotate on and off it, or is the Vice Chair the only faculty member? Faculty buy-in seems good; would adding a rotating member help transparency (and in training future Vice Chairs) or make reaching consensus more difficult?

18) On the budgetary side, the temporary FTE funding seems inadequate for the current structure, particularly in funding for TAs. The department feels that this financial uncertainty has hobbled initiatives such as the use of MATLAB in courses. The committee feels that the changing face of mathematics teaching and research of the recent past, as recognized by the department, means that the funding formulae for mathematics may be outmoded.

C. Fred Driscoll, Department of Physics, UCSD
Martin Scharlemann, Department of Mathematics, USCB
Stefan Llewellyn Smith, Department of Mechanical and Aerospace Engineering, UCSD (chair)

San Diego: Department of Mathematics
La Jolla, California 92093-0112

February 5, 2009

STEVEN CONSTABLE, Chair
Committee on Educational Policy (CEP)

MARK THIEMENS, Dean
Division of Physical Sciences

SUBJECT: Response to 2008 CEP Undergraduate Program Review - Mathematics Department

I am writing in response to the CEP Undergraduate Program Review report, for the review held March 6-7, 2008. We thank the review committee for a careful and thoughtful job; we are gratified that they recognized many of the substantial successes of our undergraduate program and are appreciative of their suggestions for improvements. We are particularly gratified that the review committee appreciated the Mathematics Department's service teaching ethos of ensuring that all students who meet the requirements should be accommodated, and also their stated appreciation for the quality of our undergraduate program. As they wrote, "Faculty, visitors, staff and TAs work together to provide outstanding education for both majors and non-majors."

I respond below, point-by-point, to most of the recommendations and comments by the review committee.

Coordination of lower-division courses. The committee recognized that this has been very successful in improving instructional quality and ensuring the uniformity of the many lower-division service courses. The department is continuing this, of course.

Although, the committee recommended the department consider hiring an additional LSOE/LPSOE to expand this effort, the department feels that having two lecturers for this work is about the right level. Of course, the department can reconsider this in the future, especially if the scopes of LSOE/LPSOE duties expand or contract.

Teaching by Associate Instructor (AI's). The review committee approved of the department's use of AI's. The department expects to continue assigning courses to AI's at about the same level. The quality of instruction has been good, especially with the fact that many AI's begin with a closely supervised teaching experience in precalculus. We only allow those graduate students with outstanding TA evaluations to become associate instructors. The department recently instituted online TA evaluations, and these promise to be invaluable for selecting appropriate candidates for AI's by more accurately identifying graduate students who are excelling in instruction.

Now more than ever, graduate students are expected to teach their own course as a prerequisite to getting hired at a teaching institution. We are thus filling a crucial need

for the graduate students who will be entering the job market, and also filling a need to provide outstanding instruction to our undergraduates.

Teacher training for TAs: As the review committee noted, the department provides good teaching training for first-year TA's, but lacks comprehensive training for later years. As a step to improve this, the department plans to organize a graduate seminar (Math 501, Seminar in Teaching Development) devoted to discussing teaching skills and strategies: this seminar is expected to be open to participation by both graduate students and faculty. In addition, the department has instituted online TA evaluations starting in Spring 2008. These have been enormously successful, garnering over 50% response rate in Fall 2008, and even more importantly they have generated many detailed and thoughtful comments from undergraduate students about the performance of TAs in their sections. These online evaluations provide valuable feedback to TA's.

Teaching assignments for teaching visitors. The review committee suggested that teaching visitors should be spared teaching 10ABC because its low level makes it difficult for teaching visitors to know what to expect from students. This depends in large part on the background of the teaching visitor (e.g., it may be very true for someone from a leading European university, but may well not be true for someone from a not quite so prominent US university). We have not made any formal change in these assignments, but it is a good point to keep in mind.

We often place first-time teaching visitors in coordinated calculus classes when feasible to give them a controlled introduction to the UCSD teaching environment.

Student affairs committee: This was praised by the review committee who suggested broader faculty participation (beyond the Undergraduate Vice-Chair and the LSOE/LPSOEs). We have not broadened participation yet, but it could be a good idea.

Based on the success of the undergraduate student affairs committee, we started a similar graduate affairs committee in Fall 2008, with participation by staff members, by the Chair, the Graduate Vice-Chair, and the senior TA.

Section sizes. As the review committee agreed, sections with more than 35 students are larger than optimal. Indeed, section size would be better at 30 students or lower. (The review committee report understated our problems of section sizes; unfortunately, in many cases, sections are nearly 40 students large.) Workload and financial constraints have not allowed us to improve this situation. One would expect that the TAFTE given to the math department should provide sufficient funds to lower section sizes to 35 students. Perhaps not taken into account is that TAFTE are also used to fund graders and to hire undergraduates who work in the calculus lab. The net result is that we consistently do not have enough TAFTE to lower section sizes. Almost all other UC campuses have sections in the 30 student range.

Honors calculus sequence. This year-long honors calculus sequence is being taught for the first time this year. It began with approximately 36 students in the fall quarter, and is continuing this winter quarter with approximately 23 students. So far, it seems

successful, but the department will evaluate its effectiveness and its level of difficulty. Ideally, we would like increase its enrollment so that approximately 30 students complete the year-long sequence. We would also like to increase the number of future mathematics majors in the honors calculus sequence; either by attracting more students who plan to major in mathematics, or by recruiting the enrolled students to the mathematics majors.

Calculus lab. The department will continue this highly successful lab, run by graduate TAs and undergraduate tutors, in spite of anticipated TAFTE budget cuts, because of the effective instructional services it provides to students. In fact, as part of strengthening the teaching of Matlab in Math 20D/20F, special undergraduate Matlab tutors will be hired in a pilot program this Spring to ensure students get the specialized help they need in learning how to use Matlab for Differential Equations and Linear Algebra applications.

Proof-based courses. The committee identified a need for more exposure to theorems and proofs earlier in the curriculum. So far, this has not been implemented. We are sympathetic to the committee's recommendation, but it needs to be balanced against the service nature of our lower division courses. (The honors calculus sequence has a lot of theorem proving, but reaches only a small number of students.)

A related concern was that mathematics majors learn too late what upper-level college mathematics is like, that is to say, not until they actually take upper-level courses. As a partial remedy, Professor Abramson will offer a Math 87 freshman seminar in Spring 2009 (titled *What is Algebra, What is Analysis…?)* that will introduce students to the various disciplines within mathematics.

Weaker students being passed. The committee heard complaints that some too-weak students are being permitted to pass courses and continue in the lower division sequences. The situation had improved in the past few years, due to the enforcement of prerequisites. As part of enforcement of prerequisites, the department has been requiring a grade of C- or better to advance in the calculus sequence. This past year, we petitioned CEP to also require a grade of C- or better for advancing in upper division sequences; however, the petition was denied on the grounds that it would affect students in other majors. I tend to believe, nonetheless, that other departments would have welcomed this change.

BS versus BA. The committee recommended that most of our BA degrees could be better renamed as BS degrees. This would better reflect the technical nature of the degrees. The designation of the degrees as BA's arose since, in prior years, UCSD did not offer BS degrees.

The Department would appreciate guidance from CEP about whether it is possible to rename the degrees to be BS's, and whether degree requirements would need to be changed.

Lounge for undergraduate students. The department has improved its common areas in recent years (graduate student lounges, the Ax library, and the undergraduate reading room); however, the space situation is still subpar: the areas are fragmented, and in some

cases the furnishings are poor. The undergraduate reading room is in particularly poor condition. We also have a too-small departmental lounge that is used by faculty, staff, and students. Financial constraints have kept us from renovating common spaces as much as we would like for undergraduates and masters students. These areas should be upgraded.

Math 20DEF sequence. In an ideal world, the Department would make 20D (Differential equations) require 20F (Linear algebra) as a prerequisite. We have hesitated to do this since Chemistry and SIO have majors that require 20D but not 20F. Perhaps the Department should initiate discussions with these two departments about the possibility of changing their major requirements.

Interactions and articulation with other departments. The Department would welcome the establishment of regular meetings with other departments to communicate about the calculus courses and other mathematics curriculum issues. Sample issues to discuss could include changing the 20D and 20F prerequisites, or the use of calculators and Matlab in calculus courses.

Instructions for teaching visitors: The review committee expressed concerns about teaching visitors conforming to grading guidelines too strictly. This is not a concern we share based on the quarterly data we collect on grade distributions. The grade guidelines have served to keep standards roughly equal across courses. The guidelines, and the fact they are only guidelines, are discussed with all first-time instructors.

Combinatorics. In response to student requests for more undergraduate courses in combinatorics, the department approved changes to Math 184A and re-named it Combinatorics (from Mathematical Foundations of Computer Science) to meet this need. This revised course approval was approved effective Fall 2008. This year, other existing courses in this area are being offered more often, with Professor Graham teaching Math 152 in Fall 2008 and Professor Verstraete teaching Math 154 in Spring 2009.

Regular faculty versus teaching visitors. The review committee found that non-permanent faculty are teaching the "majority" of courses. First, this is true only for the lowest level of lower-division courses. Second, it is not a large majority. For instance, in 2008-2009, of the Math 10ABC and Math 11 courses, 10 are being taught by regular faculty including the LSOE and LPSOE, 1 by the Mathematics Testing and Placement (MTP) Director Bruce Arnold, 2 by SEW instructors with multi-year postdoctoral appointments, 2 by AI's, and 12 by teaching visitors. For Math 20ABC, and especially Math 20DEF, the proportion of courses taught by regular faculty is substantially higher. I am not unhappy with the fraction of courses taught by the different groups; however, with additional faculty, or additional SEW instructors, the mix could be better.

Distribution of classes among faculty. We had some in-depth discussions with the review committee about the desirability of having (nearly) all faculty members teach some lower-division courses: the review committee felt it might be better to protect some faculty from lower-division teaching. The department has had an egalitarian teaching structure, in which nearly all faculty are expected to teach lower division courses at

times. This has long been a tradition of the department. I do not expect this to change soon, but if it were to change, it would need to involve differential teaching credit for different levels of courses to avoid creating undesirable incentives.

Teaching credit for large courses. We have not made any changes to the credit given to faculty for teaching large courses yet. This is related to the previous paragraph's discussion.

Math 20D and 20F. The department is the process of revamping the Matlab portions of Math 20D and 20F to make them more relevant to the students, and to more fully integrate the Matlab exercises into the course requirements. We are experimenting this Spring with restructuring the Matlab exercises and tests as well as providing additional undergraduate tutors with Matlab expertise in the Calculus Lab to facilitate student learning. The many applications of Matlab, including in other departments' courses, make this an important component of Math 20D and 20F.

Finances. As the review committee noted, "The committee feels that the changing face of mathematics teaching and research of the recent past, as noted by the department, means that the funding formulae for mathematics may be outmoded." In fact, the department is heavily reliant on resource formulas for TAFTE and Temp FTE, since we have long had a severe permanent budget problem in our general support budget. In short, the department's financial situation is difficult, indeed inadequate for the services we are performing. Furthermore, the situation may worsen soon, and I worry significantly about the prospect of budget cuts in the coming year or two, and the negative effects that budget cuts will have our undergraduate and graduate programs.. The Mathematics Department is well aware of its service commitment to provide a high quality of instruction to the 60 majors in 18 client departments/programs dependent on our fundamental courses and, as the Review Committee reports, the department does an excellent job in spite of such minimal basic funding. However, the greatest weakness in the department's ability to continue this high level of quality in the undergraduate service function comes from the budgetary stresses due to chronic permanent under-funding.

In closing, the department is grateful that the Review Committee acknowledged the substantial improvements the department has made to improve our undergraduate program, including instituting new majors, coordination of large lower division classes, the new Honors Calculus sequence, outreach efforts and liaisons with local post-secondary schools, enhanced TA training and online evaluations, as well as an active Student Affairs Committee to coordinate new initiatives. Improvements or changes anticipated for the near future include enhancements to Matlab instruction in 20D/F, improved articulation and communication with other departments, and trying to cut costs in grading. It is our continual goal to find better ways to educate students to think, to reason, and to master mathematics rather than just use mathematics in a rote fashion. Finally, our budgets have been very constrained, and we fear the problem may worsen substantially in the near future.

I would welcome the opportunity to discuss the undergraduate program review with you further.

Sincerely,

Sam Buss
Chair
Department of Mathematics

ACADEMIC SENATE: SAN DIEGO DIVISION, 0002
UCSD, LA JOLLA, CA 92093-0002

April 27, 2010

PROFESSOR SAMUEL BUSS, Chair
Department of Mathematics

PROFESSOR IAN ABRAMSON, Undergraduate Vice-Chair
Department of Mathematics

SUBJECT: CEP Review of Mathematics Undergraduate Program

At its April 2, 2010 meeting, the Committee on Educational Policy (CEP) considered the review report of the Department of Mathematics and the Department's response to the report.

The Committee was overall very impressed with the efforts of this Department to offer an excellent Undergraduate Program. The report lauds the quality of the Department's undergraduate program and the collaborative efforts of the faculty, visitors, TAs and staff to provide an exceptional education for both major and non-majors. Impressive is the creation of a Student Affairs Committee, the monitoring of the performance of freshmen in the lower-division prerequisite courses to ensure the preparedness of students as they continue through their course series and to respond to changes in the applications of mathematics. Of particular note are the efforts of Prof. John Eggers to coordinate the large lower-division classes including the careful monitoring of student performance, support of TAs, and the development of uniform quizzes and exams. The TAs were viewed to be very knowledgeable and passionate and classes taught by graduate students appointed as Associates-in were viewed positively both by the undergraduates taking the class and the graduate students teaching. The quality and professionalism of the advising staff was also evident.

There are, however, issues the Committee recommends the Department attempt to address; the following recommendations will be the focus at the time of CEP's follow-up review in Spring 2011:

- Reassessment of prerequisite(s) for Math 109 to prevent delay in taking Math 109 and to ensure student preparedness for math majors.
- Assessment of what is acceptable passing performance in classes and clear communication of such between faculty and TAs.
- Increase student awareness of faculty advisors for each of the majors.
- Establish mechanisms for understanding and assessing the impact of the large service teaching component required of this department.
- Consider hiring another lecturer to further help in reducing large class teaching loads. At what point does the added pressure of large class sizes, which may potentially increase, become too much of a burden to the to the faculty's research activities?
- Reconsider the re-assignment of faculty whose teaching was poor in prior instances of the same course. CEP urges that faculty assignments be tailored so as to deliver the best teaching to students.
- Reassess the appropriateness and effectiveness of assigning the majority of teaching undergraduate classes to non-permanent faculty. CEP concurs with the review committee that there is no intent here to denigrate the work of visitors, but the question of who should *predominantly* teach the 90% of the students that take mathematics courses is a valid one.
- An effort should be made to avoid assigning especially difficult classes (e.g., Math 10A) to visiting instructors coming from a different system or who have little teaching experience.
- Resolution of compliance issues between the Department and the CEP regarding the Math 20B and 20D Matlab sections.

In conclusion, however, the Committee wishes to emphasis that the above issues are, in comparison, minor compared to the Committee's overarching concern—that the funding formulae for this huge service department is

outmoded and presents a looming crisis for the campus as a whole. The temporary FTE funding is inadequate for the current structure, particularly with regard to funding for TAs. The Committee agrees with the Department's assessment and concern that the recently changing face of mathematics teaching and research puts this Department, and the campus, at great risk. The future of the Department of Mathematics is fundamental to the future of the great majority of campus departments and programs. The dedication and collegial commitment of the Department to serve the immense numbers of students enrolled in its courses without resorting to legitimate tactics to limit enrollments, i.e., request impacted status, is unquestionable. However, it seems inevitable that at some point the Department's ability to continue without added resources is mathematically impossible. The ability to prevent this looming crisis is beyond the scope of the CEP or the Senate. Nevertheless, CEP will strongly urge the administration to begin immediately a thorough assessment of the Department's funding and begin discussions for alternate funding models.

Stefan Llewellyn Smith, Chair
Committee on Educational Policy

c: P. Drake
W. Hodgkiss
F. Powell
B. Sawrey
M. Thiemens
ChronFile

ACADEMIC SENATE: SAN DIEGO DIVISION
UCSD, LA JOLLA, CA 92093-0002
(858) 534-3640
FAX (858) 534-4528

August 31, 2011

PROFESSOR PETER EBENFELT, Chair
Department of Mathematics

SUBJECT: Undergraduate Program Review: Department of Mathematics Follow Up Review

Dear Professor Ebenfeldt,

On April 11, 2011, the Committee on Educational Policy and Courses (CEP) considered the one year follow up review for the Department of Mathematics. This consisted of a report from Professor Stefan Llewellyn Smith, who served as lead reviewer for the undergraduate program review for the Department. Professor Llewellyn Smith reported that the Department has made considerable effort to address the recommendations summarized in the 2010 review of the Department (copy of report and recommendations attached) and outlined the measures taken by the department to do so. These include improving advising regarding the sequencing of MATH 109 in the major (allowing the department to retain MATH 20F as a prerequisite, which the faculty continue to feel is important) and improving the information provided to lower division Mathematics instructors about the Department's norms for determining student grades, particularly, what is considered a passing grade in those courses. We encourage the Department to continue its efforts to monitor these and other issues raised by CEP the Review Subcommittee in the coming years.

The Committee thanks you and the Department for your participation in the program review and the Department's meaningful effort to address concerns identified during this process. It is clear that the Department is committed to its undergraduate program and its majors. As there are no further concerns with the undergraduate program, the Committee considers this review cycle completed for the Department of Mathematics.

Sincerely,

Mark Appelbaum, Chair
Committee on Educational Policy and Courses

cc: D. Hamann
G. Masters
B. Sawrey
M. Todd