

SFU SIMON FRASER UNIVERSITY
MEMORANDUM

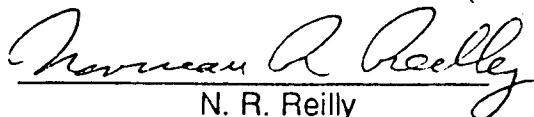
S.90-26

To: L. Salter Acting Vice President Academic	Date: February 26, 1990 From: N. R. Reilly Acting Chairman Mathematics & Statistics
Subject: Response to Review	

The response of the Department of Mathematics to the External Review Report was given formal approval at the departmental meeting on Monday, 26 February 1990. The first draft of the response had been discussed at the departmental meeting on November 30, 1989 at which it was agreed "that the chairman would write a second draft incorporating most of the written suggestions that he had received, and provide that to the faculty for their final comments before sending it on to the Dean of Science".

Since the review took place, the Department has made good progress on several of the developments discussed in the Report of the Review Committee:

1. The M.Sc. programme in Mathematics Education admitted its first class in September, 1989. The calibre of the 15 students currently in the programme is excellent.
2. The Actuarial Certificate Programme received the approval of Senate in December, 1989 and discussions have already taken place with one local actuarial consulting firm that plans to establish a scholarship related to the programme.
3. A system whereby intended mathematics majors are matched to advisors is being established in order to identify, encourage and guide good students. The undergraduate programme requirements are also under review.
4. A search is currently under way for a director of the Statistical Consulting Service and plans have been put in place to extend the service to the Harbour Centre Campus in the next expansion phase there.
5. Detailed plans for the Institute for Statistics and Data Analysis and the Institute for Applied and Computational Mathematics are currently being drafted.
6. Implementation plans are currently being drafted for the introduction of a structured M.Sc. program in Applied and Computational Mathematics and the revamping of the Ph.D. program.


N. R. Reilly

cc: Dr. C. Jones, Dean of Science
NRR/ml

**SIMON FRASER UNIVERSITY
MEMORANDUM**

To: Prof. L. Salter, Acting
V.P. Academic

From: C.H.W. Jones, Dean
Faculty of Science

Subject: **External Review of
Mathematics & Statistics**

Date: January 30, 1990

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Please find attached the External Review Report of the Department of Mathematics and Statistics. The report is a model of clarity and brevity, as indeed is the Department's response.

It would be appropriate for me to comment on a number of the major recommendations.

Recommendation 2

The Dean and Chair of the Department should investigate thoroughly the working conditions of the department's lab instructors and take immediate steps to ensure that these individuals have the opportunities for holidays and professional development.

This matter has been discussed with the Chair of Mathematics & Statistics. Several steps have been taken to begin to address the concerns expressed.

i) For 1989-90, the Department of Mathematics & Statistics was allocated an additional 40 B.U. of teaching assistantships to provide some relief to the hard-pressed laboratory instructors. This was equivalent to 1 full T.A. per semester for Fall and Spring to assist the laboratory instructors in their tasks.

ii) An additional laboratory instructor position for Mathematics & Statistics is included in the Faculty three-year budget plan for catch-up and growth.

iii) I have discussed with the Chair the role of the workshops and their staffing by T.A.'s and laboratory instructors. The current mode of operation of the workshops is remarkably manpower intensive and the Department may wish to reconsider whether or not this mode of instruction could be modified to better match the resources available.

Regarding III 5 page 5

Teaching loads in the department are above average for the Faculty of Science but not excessive with respect to other similar departments across Canada. Professors should participate in grading at the lower level.

I was a little surprised by this observation, or at least the comments that teaching loads in Mathematics & Statistics are above the average for the Faculty. The Report does not present any data to support this conclusion.

During 1990, I will undertake a review of all teaching loads in the Faculty of Science to further explore this question.

Recommendation 6

We suggest that the University review its teaching assistant policy since the time spent teaching may be one of the causes of the lengthy completion times for graduate degrees.

A Faculty of Science Task Force was struck in Fall 1989 to review teaching assistant work loads within the Faculty. This is an important issue which has emerged in several recent external reviews and should be addressed directly by the University.

Recommendation 7

The Chair and the Dean of Science should investigate obtaining further university funding for research assistantships for support of graduate students.

Recent Access Funding has led to an increase in the number of graduate stipends and graduate scholarships available across the University. These are the only sources of University support for graduate students other than through the T.A. programme.

Recommendation 8

The Dean of Science should form an ad hoc committee to investigate space problems within the Department and formulate plans for the acquisition of additional space and the detailed design thereof.

The Faculty of Science has a standing committee on space which in Fall 1989 reviewed the overall space allocations and space needs within the Faculty.

In Fall 1989, the Department of Mathematics & Statistics was allocated ca. 2,000 sq. ft. of additional space, as a result of moves associated with completion of the Applied Sciences building. This has helped to alleviate the space problem for workshops and for graduate students.

Since the review a new building initiative has been announced. A new classroom complex, which is scheduled for completion in 1991-92, will be built off Kinesiology and Physics and close to Mathematics & Statistics. This building will provide additional office space for faculty and graduate students in Mathematics & Statistics.

Regarding VIII 1 pp 10-11

Should the Department create officially recognized sub-units (e.g. Applied Math, Statistics,...)? Formation of ad hoc committee.

The Department proposes to bring forward proposals for the establishment of an Institute of Statistics and Data Analysis and an Institute of Applied and Computational Mathematics. I welcome these initiatives.

Regarding VIII 2 pp 11-12

Not in favour of the formation of a faculty of Mathematical Sciences at the present time.

The external reviewers concluded that the Department should not, at the present time, leave the Faculty of Science to establish a Faculty of Mathematics. The Department has accepted that the timing does not appear appropriate for such a move.

The Department has stated that it has been and continues to be a fully participating member of the Faculty of Science and I completely concur with that view.

In summary, I would comment that the Department of Mathematics and Statistics is to be congratulated on the very positive assessment of the Department as a whole and its stature on the national and international scene. As noted in the external review, the Department has a number of outstanding scholars and several areas of significant research strength. The energy and quality of recent new appointees was also noted and this indeed augurs well for the future.

C.H.W. Jones

CHWJ:rh:Encl.

c.c. N. Reilly, Acting Chair
Department of Mathematics & Statistics

A REVIEW OF THE DEPARTMENT OF MATHEMATICS
AND STATISTICS

SIMON FRASER UNIVERSITY

MARCH, 1989

I. INTRODUCTION

Early in 1989 the Dean of Science at Simon Fraser University formed an ad hoc committee charged with the task of performing an in depth review of all aspects of the Department of Mathematics and Statistics at the University. The committee consisted of Dr. P.J. Browne, Head, Department of Mathematics and Statistics, University of Calgary as Chairman, Dr. W.S. Edelstein, Department of Mathematics, Illinois Institute of Technology, Dr. J.G. Kalbfleisch, Dean, Faculty of Mathematics, University of Waterloo and Dr. B.L. Funt, Department of Chemistry, Simon Fraser University. On March 13, 14, 15 the committee visited the university and conducted interviews with the President, the Vice-President (Academic), the Vice-President (Research), the Deans of Graduate Studies, Science and Education, the Chairs of the Departments of Mathematics and Statistics, Biosciences, Physics, Chemistry and Computing Sciences, faculty members, laboratory instructors and students. Information and statistical data were made readily available and the committee is more than satisfied that every opportunity to perform a thorough review was provided.

The committee found the department to be a congenial group of academics genuinely interested in and concerned with the well being of their discipline, their students and their university. We understand that from its inception the department has tried to achieve a broad coverage of the mathematical sciences: the committee sympathises with this aim and judges that it has been achieved in large measure. The department has many strong points and accomplishments of which it can be justifiably proud.

II. THE FACULTY

The Department has a number of outstanding scholars recognized on national and international fronts and has several areas of significant research strength. Logic and combinatorics are particularly strong within pure mathematics. In applied mathematics and statistics too, the department has recognizable strength. Overall, we were impressed by the level of research activity and scholarship.

While we found the proportion of faculty members funded by NSERC to be a little low by national standards, those who are supported have good grants many of which are significantly above the national average. We also noted success in Conference, Equipment, Infrastructure and Team grants in addition to the standard NSERC/SSHRC operating grants.

In general the department has a group of faculty whose collective expertise is more than adequate to staff a broadly based undergraduate programme and who can offer graduate supervision in most areas of modern mathematics and statistics. In this sense then we see the fulfillment of the original aim of breadth at both undergraduate and graduate levels. We were impressed by the energy and quality of recent young appointments which augur well for the future. We would encourage the department to continue its philosophy of breadth in future development as chances for hiring new faculty arise through overall university expansion and from vacancies arising from retirements, resignations, etc.

III. THE UNDERGRADUATE PROGRAMME

1. It is natural in a large modern North American university for the Department of Mathematics and Statistics to have a large service component in its undergraduate teaching programme. This reflects the fact that students from many disciplines will require at least introductory mathematics and statistics. In our judgement, the department takes this service role seriously and responsibly and as such is in accord with what we understand to be a university policy to the effect that a given discipline should be taught only by the 'department of the discipline'. The department is thus to be applauded for resisting the spread of (for example) statistics courses and for offering instruction in mathematics and statistics to students from a wide variety of other units.

At the first year level the department has a number of similar courses in calculus designed for various groups of students. This situation is not uncommon among mathematics departments and can be defended pedagogically. Little or no fiscal saving would result from combining these courses into a single offering for the numbers of

students involved would require the scheduling of several parallel sections.

2. We were impressed by the system of 'workshops' associated with introductory courses and particularly by the dedication and enthusiasm of the 'lab instructors' who supervise these classes. The workshops are popular with students and in our judgement offer the required individual instruction to offset the large lecture classes. They are particularly effective in overcoming 'math anxiety' experienced by so many students.

Some hope was expressed that the very best students be identified early in their careers and offered more challenging programmes. The 'honours supplement' for calculus designed and offered by the workshop system is an excellent first step in this direction. We noted also the Putnam competition training sessions. In general we sympathised with the hope and so offer

RECOMMENDATION 1. The Department should take steps to identify excellent students as early as possible in their programme and offer challenging programmes to them.

We were concerned about what might be termed as the working conditions of the lab instructors. With the pressure of the timetable of the academic year, these individuals frequently are unable to schedule a full holiday to which they are entitled. They should also have opportunities for professional development, such as attendance at pedagogical meetings, time to assess new texts, teaching software and so on. We judged the service given to the department by these individuals to be outstanding -- they are genuinely committed to having their students learn, understand and appreciate the course material.

RECOMMENDATION 2. The Dean and Chair of the Department should investigate thoroughly the working conditions of the department's lab instructors and take immediate steps to ensure that these individuals have the opportunities for holidays and professional development.

In one form or another it is quite likely that more manpower will have to be provided in the workshop system.

3. We were concerned with the large number of courses taught by visitors and sessionals. In particular we noted that the department has had two faculty members on unpaid leave for the last few years. The funds released from the salaries of these individuals are used to hire visitors/sessionals and in general provide more teaching (in terms of courses) than would be provided by the two faculty if they were at home. A quick calculation by the Chair showed this shortfall to be 8 or more courses. On the surface it appears that, to staff its courses, the department has to rely on two regular faculty members being on leave without pay, and this situation seems undesirable.

RECOMMENDATION 3. The Department should develop a strategy for reducing its dependence on visitors and sessional instructors.

We also heard concerns that standards and workloads expected of students can vary substantially from year to year when visitors are assigned lower level classes. This is particularly the case when the visitors are not familiar with local conditions. We feel it would be helpful for the Department to produce detailed course syllabuses, including the amount of time to be spent on individual topics, for courses assigned to visitors. It may be possible to appoint a regular Department member to be in charge of a given course so that a visitor assigned this course has a resource person to turn to for guidance.

RECOMMENDATION 4. The Department should offer detailed guidance to its visitors and sessionals in order to maintain consistency in the quality of instruction and the demands placed upon students.

4. The committee studied the regulations governing the degree requirements pertaining to the major and honours programmes offered by the department.

We noted that there is a minimum requirement of only one course in linear algebra and we wondered if this were sufficient. We believe that all graduates in mathematics and statistics should have some exposure to

probability and statistics and to computing science; yet it seems that the regulations do not guarantee this. We would suggest that the Department consider developing a common core requirement for the first two years to which additional requirements for the various streams or options could be added in the third and fourth years.

In general we are satisfied that an appropriate spread of courses is available (and taken by most students) to build a well rounded degree: it is mostly the structure of the degree programmes that needs a careful review.

RECOMMENDATION 5. The Department should conduct a thorough review of the regulations governing its degree programmes with the above points in mind.

5. We considered teaching loads in the department. In comparison with other science departments they appear above average but not excessive in comparison with other mathematics and statistics departments, especially when we take into account the direct support provided by lab instructors and teaching assistants for large lower level classes. In this connexion we feel that professors should take a more active role in the grading of mid-term tests and final exams at the lower level.

6. We noted the popularity and success of the Co-op programme and offer a suggestion that the department consider a co-op programme in conjunction with the Faculty of Education for the training of mathematics teachers. (The University of Waterloo has such a programme.)

We also noted the offering of courses in actuarial mathematics at the downtown campus. In our opinion this is an area which could develop into a strong and popular programme provided that the department can acquire properly qualified permanent staff in this area.

IV. GRADUATE PROGRAMMES

1. Recent trends in the department have seen enrollment growth in foreign students with the numbers of Canadian students remaining

constant. Of late the foreign students have largely come from one country (PRC). This is a national phenomenon but it does present some possible difficulties connected with the lack of diversity among the foreign students and the necessity of financial support for them. Along with every department in the country, this department should debate whether it wishes to place a limit on this trend.

2. In general, graduate degree programmes seemed sound but we noted the absence of a graduate level course in functional analysis. Such a central area should be offered to graduate students.

3. We examined data concerning the time graduate students require to complete their programmes in the Department. While this time seems average or low by standards at the university, it is high by national standards; e.g. in our experience a student ought to be able to complete an M.Sc. programme within five or six semesters. We wondered whether this long completion time placed the Department (and indeed, the university) at a disadvantage in attracting good Canadian students.

We were also concerned with the work loads required of a graduate student in connection with a teaching assistantship. Again, we are concerned that these local demands may place the department at a disadvantage in attracting good students.

RECOMMENDATION 6. We suggest that the University review its teaching assistant policy since the time spent teaching may be one of the causes of the lengthy completion times for graduate degrees.

We note that work loads can increase for a student who is a teaching assistant for several different courses at the same time and we urge

the Chair to bear this in mind when assigning duties to teaching assistants.

Average NSERC grants in mathematics and statistics are much lower than those in the experimental sciences. Thus when many students in those disciplines are supported in the summer from research grants, students in this department must continue with teaching assistantships. We would encourage faculty members to support graduate students from their grants as much as possible and we add

RECOMMENDATION 7. The Chair and the Dean of Science should investigate obtaining further university funding for research assistantships for support of graduate students.

At first glance the number of graduate students looks large, but when we consider the average duration of a graduate programme the programme is more in line with national averages.

4. We were impressed with the joint Master's programme offered with the Faculty of Education and we commend the Department for its progress in this important area.

5. We were concerned about the quality of space provided for graduate students. It is reported as poor and scattered about in remote locations. Graduate students need to be part of the Department. We have recommendations on this topic in the next section.

V. DEPARTMENT SPACE AND FACILITIES

1. While the problems with Departmental space may be eased to some extent in the near future, there are several questions needing attention.

(i) The department has no lounge/coffee room where faculty, graduate students and even senior honours students can mingle and interact not only socially but also professionally in a relaxed setting. Many departments regard such a facility as extremely important and its absence here is regrettable.

(ii) Accommodation for graduate students is unsatisfactory both in its quality and location. It is important that these students be brought

into central departmental space in order that they become an integral part of the department's life.

(iii) The space provided for lower level course workshops is inadequate: we also had reports of the air being 'stuffy' leading to less than optimal working conditions for students and instructors.

(iv) The space in which the MacIntosh network is located is not well suited to teaching.

Overall then there are many pressing space problems and we offer

RECOMMENDATION 8. *The Dean of Science should form an ad hoc committee to investigate space problems within the Department and formulate plans for the acquisition of additional space and the detailed design thereof.*

2. We heard concerns from many quarters about the level of computing support for all aspects of the department's activities. There is a need for some computing facilities in the workshops for the purposes of enrichment and demonstration connected with the lower level courses. Concerns were expressed about the lack of support for statistical packages owing to the operating system on the mainframe computer. The availability of properly supported central and local computing facilities is increasingly important for teaching and research in mathematics and statistics.

We noted that while the department does have some computing equipment already, it falls across a spectrum of types and makes and seems to indicate a rather ad hoc development. Accordingly we suggest

RECOMMENDATION 9. *The Department should form a committee to review all aspects of computing support and to develop a plan for the co-ordinated acquisition of further equipment and support.*

VI. OTHER DEPARTMENT ACTIVITIES

1. We were impressed with the work of the department in the general area of high school liaison. Problem sets for schools,

programmes/seminars on campus for teachers and students, the special course MATH 190, the booklet "Mathematicians Work", etc are all indicators of excellence. We urge the Department to continue with its first class efforts in this important area.

2. In comparison with other departments of mathematics and statistics the Department seems to have adequate support/secretarial staff.

However we heard concerns about long delays for the production of research manuscripts and the fact that many professors now perform secretarial tasks themselves which they, and we, do not regard as efficient use of faculty time. It seems appropriate that the Chair should prepare a detailed analysis of recent experience concerning the level of secretarial support for submission to the Dean of Science.

3. We applaud the Department's plan to expand the Statistical Consulting Service but we do not support the proposal that the Director's salary include a percentage of the fees received. We feel that this incentive scheme may easily lead to conflicts with academic priorities. Rather we feel the Director should have a fixed salary in accordance with qualifications and expertise. The overall budget of the Consulting Service may well include expectations of external revenue but we feel it important that this be revenue for the Service as a whole thus giving incentive for the Director to ensure that the Service overall survives and flourishes.

We regard it as important that the work of faculty members in connexion with the Consulting Service be regarded as scholarly activity and rewarded as such. Without this attitude and approach there is no incentive for (particularly, junior) faculty members to work on problems generated by the service. For particularly onerous projects it may be necessary to consider some teaching relief for faculty members.

Overall we see the Statistical Consulting service as providing valuable contributions to both the education of graduate students in Statistics and to the broader university community of statistics users.

4. We received some comments expressing disappointment at the level of attendance and support for seminars within the department. There was some hope that a department wide colloquium series would be established with lectures for a general mathematical audience which faculty and graduate students would be encouraged to attend.

VII. FUTURE DEVELOPMENT

1. In terms of appointments of new faculty we support the established priorities of Applied Mathematics and Statistics. Following that we would urge the Department to consider some central core areas of mathematics in accordance with its philosophy of breadth of coverage. Possible areas which ought to be considered are Algebraic Topology, Algebra, Partial Differential Equations, Control Theory: this list is by no means complete.

2. In general we see a need for additional staff particularly to reduce the reliance on visitors mentioned earlier. It is also important that the Department have its appropriate share of future overall university expansion.

We note that the Department does have a planning committee and we regard it as important that an overall development plan be produced. Such a plan should include not only staff but also questions of space, computing support etc. Given that the university anticipates some growth, the production of such a plan should be given the highest priority.

RECOMMENDATION 10. The Department should produce an overall development plan for submission to the Dean of Science.

It is our anticipation that the Dean will convey this plan to appropriate university administration officers.

VIII. ADMINISTRATIVE STRUCTURE

1. Within the Department we see the group of statisticians as ready for and wanting official recognition as a sub-unit of the department. We detect no desire to form a separate Department of Statistics. At some stage other groups (e.g. Applied Mathematics) may also seek recognition. While we would not want to see the Department fragment into a large number of groups, we support the aims of the Statistics group and urge them to develop a detailed proposal for presentation to the Department at large. There are examples (e.g. University of Calgary) where a

large department of mathematics and statistics with officially recognized sub-groups functions successfully.

While the Department does have a long range planning committee we also suggest the formation of an Executive Committee to consider all aspects of the Department's operation and to be advisory to the Chair. Such a committee should be widely representative of the department (and should contain the leader of the Statistics subgroup, if formed). We leave the initiative for acting on this suggestion with the Chair -- but should he decide to go forward we suggest he form a small ad hoc group to develop detailed terms of reference for the executive Committee for presentation to a general department meeting.

2. We turn now to the question of a new Faculty of Mathematical Sciences. While this was merely one point in our overall terms of reference, it was brought forcibly to our attention both in the review document generated by the department and in all of our interviews. Clearly, it is a source of considerable concern with faculty members.

There is no guarantee that the formation of a new faculty would bring extra resources to Mathematics and Statistics. Within the Faculty of Science, we see the department currently being treated on an equal footing with the experimental departments in terms of allocation of funds and resources. We saw no significant evidence of systematic mistreatment over the years of the Department but we do recognize that, as often happens elsewhere, the strengths and academic aims and aspirations of the department have not been fully appreciated or understood by other scientists. The mathematical sciences fall in an intermediate ground between the Arts on the one hand and the Sciences on the other; they have aspects of, and historical roots in, both sides and indeed this is the fundamental strength and attraction of Mathematics and Statistics.

In our opinion, the involvement of Computing Science would be essential in any Faculty of Mathematical Sciences. However we detect a reluctance on the part of Computing Science to participate. They have only recently found their current home, are about to acquire new space, and in general regard such a reorganization as premature. We also considered but rejected the possibility that the Department of

Mathematics and Science move to the Faculty of Applied Science. Philosophically this does not seem appropriate.

We come therefore to the conclusion that, at the present time, it would not be advantageous to either the department or the university, for the department to leave the Faculty of Science. We recognize that the current Dean is anxious to ensure that the department is treated fairly and equitably. We urge him to take all possible steps to make his whole faculty aware of the considerable strengths to be found in Mathematics and Statistics. It is essential in working towards the department feeling wanted in the Faculty of Science, to ensure that it is appreciated and understood by the members of his other departments. We are confident that such steps can and will be taken.

To the Department itself we would say that it is time to put this issue aside and to concentrate on excellence in teaching, research, faculty and university governance, service, high school liaison and so on. The Department is far too good and has far too much to offer to mathematics at large, and to the university, to become preoccupied with this question of administrative location.

The committee extends its thanks to the Dean of Science, the Chair of the department and to all who helped us perform this review. We find the Department to have considerable strengths and potentials and we wish it well in its future development.

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Department of Mathematics and Statistics

The Department of Mathematics and Statistics is pleased to present the following response to

"A Review of the Department of Mathematics and Statistics"

performed in March 1989. We respond item-by-item to the various recommendations and comments found in the Review.

The Review Committee (page 1) judges that the department has achieved in large measure a broad coverage of the mathematical sciences. We emphasize that this remains one of the department's main priorities.

Recommendation 1: *The Department should take steps to identify excellent students as early as possible in their programme and offer challenging programmes to them.*

We agree completely and are working through various programmes such as Management and Systems Science, Mathematical Physics, Statistics, Applied Mathematics, Mathematics/Computing Science and, most recently, Actuarial Mathematics to achieve precisely this goal. The Departmental Undergraduate Studies Committee is also engaged in a review of this question with a view to providing more challenging programmes to major and, particularly, honours students.

Recommendation 2: *The Dean and Chair of the Department should investigate thoroughly the working conditions of the department's lab instructors and take immediate steps to ensure that these individuals have the opportunities for holidays and professional development.*

We are in complete agreement with this recommendation and are arranging discussions to see that this is done. It is of immediate importance that we pursue this recommendation. The hiring of an additional Laboratory Instructor would move us well towards a solution of this problem.

Recommendation 3 *The Department should develop a strategy for reducing its dependence on visitors and sessional instructors.*

We agree completely with the need to reduce our "dependence" on sessional instructors when this term refers to those who have minimal interaction with the regular faculty, do no research, take no part in seminars, do not supervise graduate students, do not add to SFU's prestige by attending conferences, etc. The question is - how? We can conceive of only two ways: reduce offerings or hire more regular faculty to meet the demand. We (and we hope the university) are not in favour of the first method as this would run contrary to Recommendation 1 and the comments made in III 1 (page 2) regarding the importance of the service aspect of our teaching program. Thus, simply, the problem can only be solved by replacing the teaching being done by such sessionals with teaching by regular research faculty. On the other hand we should continue to encourage "visitors" i.e., research faculty level visitors to our department and maintain ways of funding their visits which may include some involvement in teaching. The reason for this is the research expertise as well as the "world view" of mathematics which they bring to the University. Ideally, such research visitors would only teach upper levels courses, graduate courses or seminars where the regular faculty lack the specific expertise.

Recommendation 4: The Department should offer detailed guidance to its visitors and sessionals in order to maintain consistency in the quality of instruction and the demands placed upon students.

Although documentation (including a description of the grading system and the course syllabuses) concerning the teaching of Mathematics and Statistics courses is provided to a visitor or sessional and although the visitor or sessional usually discusses the course with a regular faculty member who has taught the course in the past, we agree that more communication along these lines with the new teacher would be in order. Steps will be taken to this end. For instance, a brief orientation seminar, conducted by the chair and involving other regular faculty as well, will be required of all first time teachers in the department at the beginning of each semester.

Recommendation 5: The Department should conduct a thorough review of the regulations governing its degree programmes with the above points in mind.

The department reviewed its program "structure" not long before the review took place in March. The result was that, in view of the wide diversity of subjects which can be pursued in this department, we elected to maintain a maximum of flexibility for students pursuing degrees through the department. However, as a result of this recommendation and as there remains some support for it within the department, we will undertake another review shortly in order to take some steps towards satisfying recommendation 5.

Regarding III 5 (page 5). Summary: *Teaching loads in the department are above average for the Faculty of Science but not excessive with respect to other similar departments across Canada. Professors should participate in grading at the lower level.*

In general, we are not very dissatisfied with teaching loads in the department. However, if we are to be a full participating member of the Faculty of Science we should have teaching loads in line with other members of that faculty. All faculty are expected to participate fully in the evaluation (including grading of exams) of the students in their classes.

Regarding III 6 (page 5). Summary: *Recommend Co-op program for training mathematics teachers (with Faculty of Education). Appreciates actuarial mathematics.*

We would be happy to discuss with the Faculty of Education, a co-op program for potential mathematics teachers. We note the existence of a joint graduate program with the Faculty of Education which leads to a degree of Master of Education in Mathematics Education. The certificate/minor program in Actuarial Mathematics has already been approved by Senate and will begin operation at the Harbour Centre campus immediately.

Regarding IV 1 (page 5). Summary: *High enrolment of visa students in the graduate program.*

We have recently reviewed the admission procedures for graduate students. With the growing reputation of our graduate program, the number of applicants for graduate work has greatly increased of late. We felt that it would be improper to place artificial quotas on any national group. However, we are taking additional steps to ensure that the quality of all admittees is high and also to try to attract strong Canadian candidates to the graduate programs by, for instance, writing to other universities to identify and encourage top Canadian students to do graduate work at SFU.

Regarding IV 2 (page 6). Summary: *No graduate course in functional analysis.*

Although Math 832 (Real Analysis II) contains a significant amount of "functional analysis" material and Math 833 (Real Analysis: Selected Topics) can be offered as a functional analysis course given sufficient demand, we agree with this comment. The lack of a regularly offered

functional analysis course is yet one of many inadequacies which are a direct result of our limited faculty resources.

Recommendation 6. We suggest that the University review its teaching assistant policy since the time spent teaching may be one of the causes of the lengthy completion times for graduate degrees.

We agree with a complete university review of TA workloads. A task force is now in place in the Faculty of Science to consider several questions relating to teaching assistantships. Although graduate degree "completion rates" in the Department of Mathematics and Statistics are better than those of most of the other units on campus, we agree that reducing these would be helpful in developing an even stronger graduate program. Indeed, our experience indicates that our TA duties are heavier here than in the typical North American university.

Recommendation 7. The Chair and the Dean of Science should investigate obtaining further university funding for research assistantships for support of graduate students.

The department fully agrees with such a step. For the reasons given by the review committee (mainly the lack of flexibility with NSERC funds), it would not be out of line for the department to obtain specially allocated funds for graduate student support.

Recommendation 8. The Dean of Science should form an ad hoc committee to investigate space problems within the Department and formulate plans for the acquisition of additional space and the detailed design thereof.

Recent developments indicate that the space problems in Mathematics and Statistics will be relieved (but by no means completely solved) over a period beginning January 1990 and extending for several years. This relief relates to graduate student space, Workshop space, micro computer network (teaching lab) space and, finally, office space. This additional space comes from space made available as a result of the completion of the new Applied Science Building and from new space being built in connection with the Institute of Molecular Biology and Biochemistry. We would greatly welcome an *ad hoc* committee to investigate the requisition of adequate space for the development of the mathematical sciences.

Unfortunately the problem of air quality in the new expanded workshops is not being addressed by the university and we believe it deserves great attention.

We are assured by the founding Head of the Department of Mathematics at SFU that from the very beginning a coffee room for faculty and graduate students was a high priority. Unlike most other departments, we have never had an adequate room in which to informally discuss research and teaching with colleagues, graduate students, and visitors.

Recommendation 9. The Department should form a committee to review all aspects of computing support and to develop a plan for the co-ordinated acquisition of further equipment and support.

The department has a computing committee doing what this recommendation suggests. Computing equipment development within the department can be described as in a state of infancy. It has only been four years since we started to acquire any such equipment. Recently research computing in the department received a boost with the acquisition of 12 more SUN workstations. We hope to see continued growth in this area.

We have learned that acquiring computing equipment is one thing, but getting the necessary infrastructure support necessary to maintain the equipment as productive research and teaching tools is quite another thing. We urge the University to develop an enlightened view in providing access to software and *continuing* technical support needed in connection with equipment purchases.

Regarding VI 2 (page 9). Summary: Support/secretarial staff seems adequate. Long delays in production of research manuscripts.

We have recently hired another staff person to help relieve some of the support-related problems. Unfortunately, staff salary levels provide a deterrent for hiring technical typists familiar with the text processing capabilities of our new computer equipment. Administrative staffing is under constant review by the departmental assistant and the chair of the department.

Regarding VI 3 (page 9). Summary: Expanded Statistical Consulting Service applauded. Director should have fixed salary not based on external consulting revenues. Recognition of consulting work performed by faculty.

The department accepts the views of the review committee regarding the role of the director in the expanded Statistical Consulting Service. We have been searching for a few months for a

director, but as of this writing have not been able to finalize an appointment. As the service develops the exact role the faculty will play in its operation will evolve simultaneously.

Regarding VII 1 (page 10). Summary: *Priorities of Applied Mathematics and Statistics supported. Need for people in "core" areas.*

Since the review, a statistician (September 1, 1989) and an applied mathematician (Summer 1990) have been appointed. However, there has also been a resignation of a senior member in the area of combinatorics. The department is actively pursuing its present priorities and is taking the review committee's reference to holes in certain core areas of mathematics very seriously. Given the expectation of significant enrolment increases at SFU, the need for research capability in several areas as well as the view in Recommendation 3, the department would expect a significant number of new faculty positions to be allocated over the next five years.

Recommendation 10. *The Department should produce an overall development plan for submission to the Dean of Science.*

The department (like all other units at SFU) must periodically develop such plans. One (for 3 years) has recently been submitted to the Dean and a five year plan is under development.

Regarding VIII 1 (pages 10-11). Summary: *Should the Department create officially recognized sub-units (e.g. Applied Math, Statistics, ...)? Formation of ad hoc committee.*

The department is not very keen to see a fragmentation of the department into "officially recognized" subgroups, if by this is meant the further isolation of the individual faculty members from the dean or the vice president academic. As long as we remain a department within the Faculty of Science, such subgroups could result in an administrative nightmare which is surely undesirable. On the other hand, we fully recognize the importance of appropriate recognition being given to certain groups within the department as a vital ingredient to their development. A separate full fledged Department of Statistics (or of Applied Mathematics) is certainly a possible future development and is not opposed by the department in general. We particularly note how statistics has flourished at institutions which have supported the creation of a separate department, e.g., Waterloo, Toronto, Washington, UBC and Manitoba. As a first step we recommend the bringing forth of two proposals, one for the creation of an Institute of Statistics and Data Analysis and another for the creation of an Institute of Applied and Computational Mathematics. The responsibilities of these institutes would be to oversee and develop the

undergraduate, graduate and research programmes in the relevant areas within the department. Ideally, these institutes would be budgeted with respect to some of their activities (e.g., colloquiums, short and long term seminars, visitorships, etc.)

This and several other recommendations of the Review Committee suggests the formation of a committee. We do not agree with the nearly unending formation of new committees.

Finally:

Regarding VIII 2 (pages 11-12). Summary: *Not in favour of the formation of a Faculty of Mathematical Sciences at the present time.*

We believe the review committee misinterpreted the degree to which the department was "preoccupied" with the question of forming a faculty of mathematical sciences. We do not believe any sleep or work was lost by anyone over this question. It was not the only topic of discussion in the corridors of our department.

The formation of such a faculty at Simon Fraser University in the context of modern developments in the mathematical sciences was and is still, in our view, a good idea. No one in this department ever suggested anything other than remaining full, active and loyal members of the Faculty of Science until such a new faculty was actually formed. We were and are now fully participating members of the Faculty of Science.

Unfortunately, it is true as mentioned in the review that the School of Computing Science at present would not wish to join a new Faculty of Mathematical Sciences and that, without the participation of Computing Science, a Faculty of Mathematical Sciences makes much less sense than it otherwise would. SFU is not ready for such a significant development at present. We accept this and will continue to work in our present "administrative location".

General Comment: the department noted that the review committee's report focussed primarily on administrative and curriculum matters and missed the opportunity to make more constructive recommendations regarding our research efforts. In current times, the vital role of Mathematics, "the Queen of the Sciences", to provide necessary resources to a modern day research university is seldom questioned. It is a fact that essential areas of mathematical research have not been adequately supported due to a lack of commitment on the part of the SFU administration, and that this was not mentioned to any significant degree in the departmental reviewers' report.