Report of the Academic Program Review Committee
For the Department of Physics & Physical Oceanography
Memorial University of Newfoundland

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1. Summary of the Review Procedure

Members of the Review Committee met with Dr. E. Simpson (Vice-President, Academic), Dr. C. Loomis (Vice-President Research), Dr. C.R. Lucas (Dean of Science), and Dr. C. Jablonksi (Dean of Graduate Studies) on the evening of April 2, 2003. This meeting provided an opportunity for discussion of general issues such as the place of the Physics & Physical Oceanography Department (**hereafter referred to as the Department**) within the University, and identification of specific issues that the Review Committee might usefully consider during its meetings with the Department.

Over the next two days the Review Committee members toured the Department's teaching and research facilities, and met with:

1 All faculty members at a meeting focused on issues related to undergraduate and graduate studies;
2 Faculty members in condensed matter physics at a meeting focused on research and general issues;
3 Faculty members in physical oceanography at a meeting focused on research and general issues;
4 Two faculty members individually (at their request);
5 Undergraduate students, mostly in the 3rd and 4th years of the program;
6 Graduate students;
7 Post-doctoral fellows;
8 Administrative and research support staff;
9 Teaching support staff;
10 A group consisting of representatives of units having current or potential academic ties with the Department. The units represented were the Faculty of Engineering & Applied Science, the Faculty of Medicine, the Ocean Sciences Centre, and the departments of Biochemistry, Biology, Chemistry, Computer Science, Earth Sciences, and Mathematics & Statistics;
11 The Head of the Department (Dr. John Whitehead), on two separate occasions;
12 The Dean of Science and Associate Dean of Science (Dr. Grant Gardner) on two separate occasions.

Our discussions with these individuals and groups augmented information contained in the Self-Assessment document that the Department supplied to us.

We were pleased with the enthusiastic cooperation we received from all of these individuals and groups. The two-day review was completed with none of the organizational problems that could easily have occurred during such a busy schedule. We would like to acknowledge the very professional role played by Ms. Joan Bessey from the Centre for Institutional Analysis and Planning in ensuring the success of this review.

2. Summary of Key Issues

The Department has an active and focused research program, an average of slightly more than 1 graduate student per faculty member, and a broad and carefully delivered undergraduate teaching program of high quality. With predictable retirements and planned hires, there will be 16 regular faculty members in the Department by September 2003. Of these 16, the only 2 who will not have external funding will be new hires applying to NSERC for the first time. It is realistic to expect that all faculty members will have external funding by April 2004.

Faculty members are actively involved in University governance and external professional activities. The teaching and research roles of the Department are supported by a conscientious and effective group of technical, administrative and teaching staff. The high morale and sense of shared purpose within the Department made this Academic Program Review a pleasure to conduct.

This is not to say that everything is perfect. The most significant issues we recognized during our review are outlined below. These are elaborated on in other sections of the report, but are brought together in this opening chapter to emphasize their importance. None of these key issues can be addressed solely by the Department; they all require cooperation from higher levels of the University administration. Unless these issues are addressed, the Department could lose key personnel, and rapidly decline from a star department in the Faculty of Science to a rather mediocre one.

2.1 Need for more faculty members

The faculty complement has declined in recent years to the point that the Department is hard-pressed to offer the number of courses needed by its undergraduate and graduate students, while maintaining research productivity. Offers have been made to three potential faculty members. If these offers are accepted, there will be a faculty complement of 16 after predictable retirements occur. This number includes five physical oceanographers, which both the committee and the Department feel is appropriate. Given the Department's accomplishments and potential in its other main research areas, a total faculty complement of 20 is warranted. This faculty complement, which is typical of other similar-sized Canadian universities, should include a Tier I Canada Research Chair in photonics.

2.2 Too few rewards and opportunities for advancement among the non-faculty Departmental personnel

Many of the Department's accomplishments have been achieved with the help of a high-quality technical, teaching and administrative staff. The Department's ability to meet its goals for the future hinges on retention of individuals whose work appears to be systematically undervalued both in terms of current salary and opportunities for advancement. The Aiken job classification system apparently places less value on a person who has unique technical skills than it places on a mid-level clerk supervising a

small group of lower level clerks. Such a system may be appropriate in a commercial environment but is highly demoralizing in a university environment where a more diverse range of skills needs to be recognized and rewarded appropriately.

2.3 Inadequate support for graduate students

The University has a goal of doubling the number of graduate students. This goal has no realistic chance of success unless more money is put into graduate student fellowships. The stipends paid to graduate students in the Department are increasingly uncompetitive on a national scale, being $3,000 to $4,000 per annum less than many other universities offer. Nevertheless, even these stipends now total approximately $300,000 annually. The School of Graduate Studies (**SGS**) provides roughly 30% of this amount ($89,000); Teaching Assistantships paid from the Department's operating budget make up another 10% ($30,000); Faculty members' external research funding pays the remaining 60% ($181,000).

After the new faculty appointments are made, the Department will easily have enough faculty members to supervise 30 graduate students. It is less clear whether this number of qualified students can be attracted to MUN at the current levels of stipend support. An increase of fellowship stipend to $20,000 would make the Department more competitive but would entail a total expenditure of $600,000 annually for these 30 students. If the contributions from the SGS and the Department remain at current levels, an average contribution of almost $30,000 a year would be required from each faculty member's external research funds. This amount exceeds the annual NSERC operating grant of all but a few of the Departmental faculty members, and does not cover the students' actual research costs. Although there may be different ways to do the calculation, the conclusion is always the same. The University's goal of increasing graduate student enrolment will not be achieved without a major injection of money, not all of which can be raised by Departmental faculty members.

2.4 An unresponsive and cumbersome budgetary system

The Department routinely learns the size of its budget half-way into the fiscal year, sometimes later. This undermines Departmental attempts at financial planning and fiscal prudence. The external members of the committee, both of whom are current or past department chairs, noted that the overall division of budgetary responsibility between the Dean of Science and the individual departments seems more complicated at MUN than at their own universities.

The Banner financial system used to monitor expenditures is widely seen, by faculty and staff alike, as being overly cumbersome to use. More responsibility for managing grant, contract and Departmental accounts seems to be downloaded onto Departmental personnel. We heard too many similar stories for this to be discounted. The University needs to ensure that mechanisms exist for such issues to be aired and addressed.

2.5 Need for Improved Communication at All Levels

We heard examples of poor communication inside and outside the Department. For instance, many people don't understand how MUN evaluates applications to the CRC and AIF programs, and so are reluctant to invest time in preparing the applications needed to tap into these programs.

3. Undergraduate Program

The committee was impressed with the thoughtful remarks we received from the undergraduate students. These students expressed their appreciation of the Department's willingness to accommodate all reasonable student requests, and to ensure that bureaucratic rules don't create barriers to their ability to graduate in a timely manner. From what we were told, this does not appear to be universally the case in other Science departments.

The Department's flexibility is evidenced by a broad range of senior level course choices that are not unreasonably limited by prerequisite requirements. Students are routinely consulted as to which senior courses should be offered in any given semester. Given the high quality of the comments we received from the students, we think that the Department could benefit from a more formal and regular consultation process with the undergraduate students on a wider range of issues.

Recommendation 3(i): *We encourage the Department to develop a format, independent from the existing course evaluations, in which students can provide feedback on the overall structure of the undergraduate program.*

3.1 First Year Course Offerings

The Help Centre and the computer-based laboratories are successful and innovative Department resources, which are appreciated by students. We are concerned that overcrowding could easily detract from their value. The instructional staff members noted that the number of these laboratory sessions has been decreasing and the enrolment in each session correspondingly increasing, making it more difficult to deliver appropriate and timely help to individual students.

Recommendation 3(ii): *We encourage the Department to devote sufficient personnel support, probably in the form of senior undergraduate students, to maintain the Help Centre and the computer-based laboratories at their current level of accessibility.*

Students suggested that PHYS1054 needs to be more differentiated from PHYS1050 in terms of course content. Specifically, PHYS1054 could include less material on mechanics and more material on electrical circuits. The computerized format of the laboratory exercises seems to lend itself well to either type of course content. We note that the Department has proposed changes to its first-year calculus-based courses and is

discussing these with the Faculty of Engineering & Applied Science (a major consumer of first-year Physics courses). The proposed changes seem likely to address the concerns raised with us by the Physics students.

Recommendation 3(iii): *We encourage the Department to continue its ongoing evaluation of the content of first-year courses in order to avoid unnecessary duplication of material and to provide the best foundation for subsequent courses.*

3.2 Second Year Course Offerings

Students felt that there was a need for an introductory course in computational physics. This might be introduced at the expense of material in PHYS2056 (Modern Physics) that is covered in subsequent courses. This issue may be resolved as part of an overall redistribution of material between first and second year following from the proposed changes to PHYS1054 just noted.

Recommendation 3(iv): *We encourage the Department to continue developing plans for a computational physics stream at the undergraduate level. During the planning exercise a solution to the student request for an introductory course in computational physics should become apparent, whatever the eventual decision on the computational physics stream.*

3.3 Third and Fourth Year Course Offerings

Senior-level teaching laboratories suffer from antiquated equipment. Non-operational equipment causes unnecessary levels of frustration in what otherwise seem to be well thought out opportunities for students to develop useful experimental skills. The Department has recently spent $17,000 on new equipment that will allow the introduction of a substantial photonics component into the two senior laboratories, PHYS3900 and 3920. This equipment will not be deployed until next academic year because it was purchased near the end of last fiscal year (fiscal year-end was March 31, 2003).

Availability of general purpose computers equipped with scientifically relevant software such as Matlab, Mathematica, and compilers for FORTRAN and C++ is currently inadequate. This issue needs to be addressed if students are to get the most out of current courses. It will be even more essential to have such facilities if the Department expands its course offerings in computational physics.

3.4 Interdisciplinary Undergraduate Programs

The committee is pleased to see that the Department is making an effort to attract a wider range of students through a new undergraduate program in Environmental Physics. Such interdisciplinary programs highlight the role of physics in a broader scientific and social context. This is consistent with a national trend toward interdisciplinary programs, and is also consistent with research strengths within the Department.

3.5 Course Requirements for the Honours Program

The Department's Honours program is an excellent one that produces well-educated graduates. However, the number of courses required in this program appears to us to be at the high end of comparable programs across Canada.

Recommendation 3(v): *As the Department considers its options for expanding its undergraduate and graduate course options, it should re-evaluate the number of courses required for the Honours BSc degree. Careful pruning of required courses may release faculty teaching resources for other uses without unduly degrading the quality of the Honours degree.*

4. Graduate Program

Our meeting with graduate students was well attended, and left the overall impression that graduate students are pleased with the education they are receiving and with their personal interactions with faculty members.

4.1 Number of Graduate Students

There are 22 graduate students currently in the Department, including 2 MSc students in interdisciplinary programs. The committee considers that this number is good, given the level of individual NSERC support to faculty members and the level of support provided by the SGS. The anticipated imminent addition of 3 new faculty members can reasonably be expected to produce an increase in the graduate enrolment, perhaps to as many as 30 students. Attracting these students and providing adequate funding for them may be a problem, as is discussed in the next sub-section.

4.2 Funding for Graduate Students

The Department guarantees minimal annual support of $14,000 for MSc students and $15,500 for PhD students. These amounts are increasingly uncompetitive on a national scale, being $3,000 to $4,000 less than offered at many other Canadian universities such as Simon Fraser, UBC, Calgary and Ottawa. Even at the current rates, the graduate students now in the Department require support of ~$300,000 annually (excluding the 2 MSc students in interdisciplinary programs). In contrast, the baseline support available to the Department from the SGS is only $89,100. Teaching assistantships of $1,500 per annum, which are guaranteed to each graduate student and paid from the Department's operating budget, total another $30,000 per annum. Faculty members contribute the remaining $180,000 of the $300,000 needed annually for students' stipends. This is an average contribution of more than $11,000 from each of the 16 faculty members, and does not include the actual cost of the graduate students' research activities.

An increase in the number of graduate students to 30 will be difficult without an increase

in the amount of University support. The importance of increased University support for graduate studies cannot be overemphasized at a time when other Canadian universities are offering greater incentives to attract graduate students. For example, the University of British Columbia waives tuition fees for its PhD students; the University of Toronto is moving to do the same. In contrast, Memorial University charges higher PhD fees retroactively to students who transfer from an MSc to a PhD program.

An increase in the number of graduate students to 30, and an increase in the graduate stipend to a more competitive $20,000 would require an annual expenditure of $600,000. This doubling of expenditure on graduate stipends cannot be sustained entirely from faculty members' research grants and contracts. If the contribution from the SGS and the Teaching Assistant stipends were to remain at current levels, these sources would provide only $89,000 + (30 x $1,500) = $134,000 (or 22%) of the $600,000 required. The remaining $466,000 (or 78%) amounts to an average contribution of almost $30,000 from each of the Department's 16 faculty members. This is more than the annual NSERC operating grants of all but a few of the faculty members, and does not include the actual cost of the graduate students' research activities.

Raising significant external grant and contract money from a wider variety of sources is of course desirable. However, the Departmental faculty members feel they are already working hard to cover their existing teaching, administrative duties, graduate student supervision and research. The committee finds it unlikely that they will generate sufficient new external funding to cover such increases in graduate fellowship expenses. The University has an obligation to increase its contribution to graduate fellowships at least proportionally to the increased cost of such fellowships.

Recommendation 4(i): *If the University's plan to increase the numbers of graduate students is to succeed, there is a clear obligation to inject significant new money into graduate support.*

4.3 Graduate Course Offerings

Given the high priority that the Department places on undergraduate teaching, it is difficult with the current faculty complement to offer on a regular basis even the four graduate courses required by MSc students. This has implications both for timely completion of the MSc program and/or for transfers from the MSc into the PhD programs.

This problem is now being handled by offering courses that are taken jointly by graduate and undergraduate students. Graduate students were generally critical of the value of such courses, feeling that they are aimed at an undergraduate audience. Undergraduates complained that the lack of distinction between undergraduate and graduate students within such courses put them at a scholastic disadvantage. The committee considers that it is not good practice to offer courses that are taken by both undergraduate and graduate students unless obvious additional work is required of graduate students. Even then, doing so creates a particularly difficult problem for graduate students who have

completed their BSc degree in the Department and see this as needless repetition.

Proposals to increase graduate student enrollment will require a careful assessment of current teaching requirements, and adequate acknowledgement that there is a significant investment in time and effort associated with each additional graduate student.

Recommendation 4(ii): *The committee urges the Department to consider ways of delivering the required graduate courses in a timely and effective manner, which does not involve teaching common courses to both undergraduate and graduate students.*

4.4 Graduate Student Infrastructure

Although the laboratory and office space available for graduate students is generally good at the moment, this may not be the case if the graduate numbers increase significantly. Office furnishings appear to be cast-offs that are in very bad repair.

As is the case with undergraduate students, the availability of general-purpose computers is a problem for some graduate students. Computer availability is highly variable around the Department, with some students (mostly physical oceanographers) having modern computers on their desktops and others having little or no easy access to computers.

Recommendation 4(iii): *The Department should investigate ways to improve the poor quality of office furnishings for graduate students. Good quality used furnishings are occasionally available as surplus from other areas of the University, and are routinely available at quite reasonable prices from the local private sector.*

4.5 Communication with Graduate Students

Graduate students expressed uncertainty about basic issues such as Departmental policies regarding transfers from MSc to PhD programs, and why the levels of student support vary within and between departments. The committee was told that graduate students have requested meetings with the Departmental faculty to discuss such matters but that such meetings have not taken place.

Recommendation 4(iv): *The Department should arrange regular meetings, perhaps once or twice per academic year, with graduate students to discuss general issues related to all aspects of the graduate program. These meetings should involve at least those faculty members on the Graduate Studies Committee. The committee believes that such meetings would pay big dividends for relatively little effort.*

5. Research Issues

5.1 Research Focus in the Department

The Department has wisely chosen to focus its research efforts in three major areas. This has allowed development of useful interactions within the Department that have generated significant research capability on a regional and national scale.

All faculty members remaining in the Department after September, 2003 will either have NSERC support or will be applying for it for the first time; several will have support from more than this single source. This is a notable accomplishment for any physics department in Canada, and an outstanding accomplishment for any department within Memorial's Faculty of Science.

The present strengths of the Department are in physical oceanography, experimental and theoretical soft condensed matter physics, and numerical simulations of a wide variety of physical and biological systems. The Department also has a tradition of high-profile work in atomic and molecular physics. With pending retirements, the Department has shifted the focus of this latter effort toward photonics, and has recently hired a junior faculty member active in this area.

5.2 Allocation of Faculty to Research Areas

The physical oceanography group is currently very active in national and international programs involving colleagues from other departments and institutions, and in the full range of the marine-related activities at MUN. The current search for two new faculty members in this area, if successful, will bring the group to five faculty members, which both the Department and the committee feel is an appropriate number.

Recommendation 5(i): *The committee believes that physical oceanography is a logical research focus for the Department, and that a core complement of 5 faculty members in this area is appropriate. This view concurs with that of the current faculty members.*

To strengthen their research effort in photonics, the Department has proposed the appointment of a Tier II Canada Research Chair (CRC). The committee feels very strongly that a Tier I CRC in photonics is necessary in order to provide national and international visibility for this emerging program. An attractive scenario would be to appoint a Tier I CRC as soon as possible with another junior appointment to follow in this area. These two new appointments would bring the faculty complement closer to the total of 20 that the committee members feel is appropriate for the Department. This number is based on comparisons with physics departments at other similar-sized Canadian universities, as shown in the following table. (These numbers were gathered from departmental web sites). The same conclusion is supported by consideration of teaching requirements in the Department, as discussed in Section 9.2.1 of this report.

Numbers of Faculty Members in Selected Canadian Physics Departments

University	Faculty Complement	Comments
Dalhousie University	23.5	Physics & Atmospheric Sciences
McMaster University	28	Physics & Astronomy
University of Guelph	20	Guelph & Waterloo have a joint graduate physics program
University of Waterloo	28	
Queen's University	27	Physics only
University of Manitoba	23	Physics & Astronomy
University of Calgary	23	Physics only

Recommendation 5(ii): *The committee supports the Department's planned expansion into the area of photonics, but believes that appointment of a Tier I CRC plus a junior appointment, rather than a Tier II CRC, is necessary to produce the desired research impact. This would bring the faculty complement closer to 20, which the committee feels is a reasonable number of faculty members for the Department.*

5.3 Retention of Technical Personnel

The Department has a core of highly qualified technical support personnel, without whom many of its research functions would be placed in jeopardy. The ability to reward these individuals adequately and to offer them career advancement possibilities must become a priority for the University. This matter is addressed in more detail in Section 6 of this report.

Current University policies restrict the ability of individual faculty members to use their external funding to pay research and student assistants as they deem necessary. This is an unreasonable restriction that appears to contravene the spirit of NSERC research guidelines, and does not exist at either of the home universities of the external members of this committee. The University ought not to allow bureaucratic considerations to create impediments to research efficiency.

Recommendation 5(iii): *The committee strongly recommends that the University revise internal policies that limit career advancement for technical personnel and that impose unnecessary restriction on how faculty members may use their external research funds for employing students and technical assistants.*

5.4 Post-Doctoral Fellows

The four Post-doctoral fellows have not been in the Department sufficiently long to allow them to form many strong opinions about the Department. Nevertheless two specific issues arose during our discussions. There is a real need for more visiting speakers with whom the PDFs could interact. There is also a desire for a greater number of PDFs both in the Department and in other cognate areas. Both these issues require money. The committee believes that the former is more easily addressed, and should be addressed.

Recommendation 5(iv): *The Department should, in consultation with the Dean of Science, find sufficient money to bring invited speakers on a regular basis. The committee feels that a budget of $10K to $15K per annum would be adequate to ensure an active seminar series. The cost of bringing in speakers for this seminar series could be reduced by coordinating with other physics departments in Atlantic Canada.*

6. Research, Teaching and Administrative Support Personnel

The Department benefits from having a dedicated and highly qualified cadre of support personnel. These individuals play a vital role in allowing the Department to achieve its high levels of research and teaching accomplishments. Unfortunately, there are systemic problems within the University that militate against retaining support personnel.

Both faculty and support staff expressed their frustration with the Human Resources classification scheme for support personnel. Highly specialized technicians fall on the lower end of the scale used to decide salary ranges.

One flagrant example involves an individual whose skills and experience may be unique not just in this province but in Canada. Without these skills, researchers across the University would be unable to maintain very expensive and heavily used research equipment. It is not too strong a statement to say that this single individual plays a pivotal role in the operation of more than a million dollars worth of research equipment across the campus, and the ability to carry out a wide range of externally funded research across the campus. Nevertheless, this individual's job is classified as being less responsible position than that of a mid-level clerk apparently because this person works alone rather than supervising others.

Similarly, the computer systems administrators who manage the high performance computer and the extensive array of PCs associated with first-year laboratories are disadvantaged vis-à-vis individuals with similar or less technically demanding responsibilities in the central computing system.

Administrative and non-faculty teaching personnel expressed a high degree of job satisfaction in terms of their interactions with faculty members and others in the Department. They also expressed serious dissatisfaction with their prospects for job advancement within the Department, or even for a regular salary increase in some cases.

Recommendation 6(i): *The University should place the highest priority on finding ways to reward rather than frustrate valued employees. The currently used Job Classification System appears in many ways to be a bureaucratic disaster that needs a complete overhaul. This will only happen if the highest levels of the University administration recognize the problem and commit themselves to fixing it.*

7. Interactions With Other Academic Units

The Department has a wide range of interactions throughout the University in both teaching and research. The committee met with representatives of all units currently or potentially involved in such interactions.

Without exception these units expressed satisfaction with the existing levels of collaboration and interaction, and can see opportunities for continued expansion of these relationships. A particular area of interest was in numerical simulation, where the Department has established a reputation for itself and an enviable infrastructure. (This underscores the need to retain skilled computer systems personnel who maintain this infrastructure.)

The proposed undergraduate program in Environmental Physics will draw upon some of these interactions, and will lay a solid foundation for additional programs of this nature. Chief among these is the possibility of a greater degree of interdisciplinary activity involving the physical oceanographers. At the moment, despite being a central focus of the University's strategic plan, marine-related research has no easily identified umbrella organization at MUN.

There are currently four interdisciplinary graduate programs in the Faculty of Science: Aquaculture; Biopsychology; Computational Science; and Environmental Science. All of these programs fall under the administrative control of the Dean of Science. Taken together, these programs account for a substantial proportion of all Masters-level students in the Faculty of Science. Although increased interdisciplinary activity in the marine sciences is highly desirable, there appear to be structural disincentives to developing additional interdisciplinary programs.

From what the committee was able to determine, the problem is largely related to the flow of money through the departmental structure within the Faculty of Science. Budgets are allocated by the Dean of Science to the individual departments. These departmental budgets include allocations for the salaries of all faculty members and University-paid staff members.

Department Heads naturally feel that their first obligation is to ensure the delivery of programs within their own departments. Interdisciplinary programs require faculty members to teach the courses but have no allocation of either personnel or money independent of the departmental budgets and the Dean's budget. Not all department

Heads are willing or able to consider teaching done for the interdisciplinary programs to be part of a faculty member's regular teaching duties. In cases where such teaching is considered "overload", the faculty member can receive additional pay from the Dean of Science. However, as was pointed out to the committee more than once, busy and research-active faculty members often value their time more than a small amount of extra salary. There is a real possibility that faculty members will elect not to participate in the teaching required for these interdisciplinary programs to function.

Recommendation 7(i): *The committee sees value in interdisciplinary programs, particularly at the graduate level. The Faculty of Science should carefully review the benefits of existing interdisciplinary programs, and take steps to remove any existing disincentives to faculty members' participation in such programs. This may involve a basic re-evaluation of the place of interdisciplinary programs vis-à-vis line departments within the Faculty.*

8. Contributions to the University, the Profession and the Community

Quite apart from their research involvement on the national and international scenes, Departmental members play important roles in University governance, and participate in the full range of professional functions that one would expect from an active department. Examples are clearly set out in the Department's self-assessment document, and include membership on the University Senate, various University committees, NSERC grant selection committees, CFI review committees, and the editorial boards of major journals. In addition to activities that enhance the profession, Department members contribute to a range of community organizations such as the provincial Natural History Society.

The committee is fully satisfied that members of the Department are shouldering their share of administrative and consultative activities that make the University, the profession and the community function.

9. University Support to the Department

9.1 Space Allocation

The Department has a reasonable amount of high quality office, teaching and research space, although much of this space is in need of cosmetic repairs. The research laboratory facilities in the Department appear to be well designed, and of high quality despite their advanced age. In some cases built-in equipment that is no longer relevant could be torn out to make more useable space.

Recommendation 9(i): *The Department should work with the Department of Facilities Management to prioritize those renovations that would increase the functionality of*

research space.

9.2 Personnel Allocation and Utilization

9.2.1 Faculty Complement

The Department is hard-pressed to fulfill its teaching commitments to its undergraduate and graduate students while maintaining its active research programs.

The faculty complement has shrunk by 40% since 1991-1992 while the number of undergraduate course registrations per faculty member has risen by 50% during the same period. Many of the faculty members lost over this time contributed to undergraduate teaching more than to graduate teaching and research. As a result, the research-active faculty members have had to shoulder an increasing load of undergraduate teaching both in large-enrollment service courses and in courses for Departmental majors. Although the Department has demonstrated considerable innovation in dealing with this increased demand, this cannot help affecting the amount of time available for research and graduate supervision.

Course requirements of the graduate program (4 courses for the MSc, and 3 additional courses for the PhD) represent the equivalent of almost two full teaching loads. If increasing emphasis is to be placed upon the graduate program, these courses must be made available to students in a timely fashion, preferably in their first year, so that research and thesis completion can be expected within a time frame where the student is still eligible for support from the SGS.

Taken together, the undergraduate and graduate teaching requirements in the Department reinforce the need for more faculty members that was discussed in Section 5.2 of this report.

Recommendation 9(ii): *The current and projected teaching workload, the level of research activity, and comparison with physics departments at comparable Canadian universities all suggest that a faculty complement of 20 is appropriate for the Department.*

9.2.2 Non-faculty Complement

The number of non-faculty personnel in the Department is adequate for the current needs, although the committee is concerned about the apparent downloading of administrative burdens from other areas of the University.

We heard complaints in several of our meetings about such downloading of responsibility onto the departmental staff, both faculty and non-faculty. This is exacerbated by financial reporting mechanisms that are widely perceived as non-functional and non-responsive.

A specific example is found in the Banner Financial System. Despite being intended to

simplify financial management of research accounts, Banner has had exactly the opposite effect. Faculty members feel unable to track expenses charged to their accounts. Departmental administrative personnel feel that tasks formerly done at the level of the Comptroller's Office are now their responsibility, with the justification being the supposed ease with which Banner allows these tasks to be done.

Recommendation 9(iii): *The University administration needs to monitor the effectiveness of their financial reporting systems to ensure that these systems are meeting the needs of the academic units as well as the needs of the administrative units.*

In a similar vein, faculty members complained about the degree of difficulty sometimes experienced interacting with the Department of Facilities Management. Work that is funded from external sources has frequently required excessive monitoring by faculty members to ensure that work is done in a timely manner, and with accountability for staying within budget.

Recommendation 9(iv): *The University should organize annual meetings with academic departments to exchange ideas on how all administrative functions of the University could be better executed.*

Recommendation 9(v) *The University should consider instituting regular reviews of all administrative units, equivalent to the Academic Program Review for academic units.*

9.3 Allocation of Departmental Budget

Apparently it is not unusual to have the Departmental budget for a fiscal year, which begins in April, remain unknown until the following November. It is not unprecedented to have the budget arrive the following February. Obviously this makes the Head's job unnecessarily difficult, and frustrates attempts to exercise fiscal prudence.

The external members of the committee were struck by the complexity of the budgetary process when compared with the processes in place at their home universities. In particular, the external members saw distinct advantages to centralizing the salary component of the budget at the Faculty of Science level, and leaving the non-salary component in the hands of the individual departments. Specifically, savings in the salary budget realized by resignations or other departures would reside at the Faculty of Science level for the benefit of all departments rather than being a one-time windfall for the department in which the departed individual was based.

Recommendation 9(vi): *The Dean of Science should consult with other faculties at MUN and with colleagues elsewhere to see whether advantages might be had by centralization of the salary component of the budget.*

9.4 Openness of Communications

Discussions with members of the University's senior administration suggested that expansion of the Department to more than 16 faculty members would be unlikely to occur unless some of the new positions were financed through external sources such the NSERC University Faculty Award (UFA) program, the CRC program, and the Atlantic Innovation Fund (AIF). This is not an unreasonable stance, given the fiscal realities faced by MUN.

Unfortunately, the process for initiating applications to these latter two sources (CRC and AIF) is not understood by members of the Department. The set of criteria by which the University judges applications to these programs is also poorly understood. In fact, nobody we spoke with in the Department or among the representatives of other departments and faculties seemed to know much about such matters. Nobody could say who inside MUN is responsible for judging the quality of submissions to these programs. Everyone knew that this was done by a committee, but the composition of the committee appears to be a closely guarded secret. Similarly, the reasons that one proposal is approved whereas another is rejected are poorly communicated to the applicants. The net result is reluctance on the part of faculty members to spend much time pursuing these applications. This works to everyone's disadvantage.

Recommendation 9(vii): *The Faculty of Science should have a clearly stated procedure for submitting proposals for CRC and AIF funding. Everyone in the Faculty of Science should know where to find these procedures.*

Recommendation 9(viii): *The University should be more open in its internal evaluation of proposals for CRC and AIF funding, and should provide more detailed critiques of the proposals to the individuals who wrote them. Successful applications could be made available as templates for additional applications.*

10. Summary of Recommendations

The recommendations made in this report are summarized below, and organized by report chapter. For example, Recommendation 3(i) is the first recommendation made in Chapter 3.

Recommendation 3(i): *We encourage the Department to develop a format, independent from the existing course evaluations, in which students can provide feedback on the overall structure of the undergraduate program.*

Recommendation 3(ii): *We encourage the Department to devote sufficient personnel support, probably in the form of senior undergraduate students, to maintain the Help Centre and the computer-based laboratories at their current level of accessibility.*

Recommendation 3(iii): *We encourage the Department to continue its ongoing evaluation of the content of first-year courses in order to avoid unnecessary duplication of material and to provide the best foundation for subsequent courses.*

Recommendation 3(iv): *We encourage the Department to continue developing plans for a computational physics stream at the undergraduate level. During the planning exercise a solution to the student request for an introductory course in computational physics should become apparent, whatever the eventual decision on the computational physics stream.*

Recommendation 3(v): *As the Department considers its options for expanding its undergraduate and graduate course options, it should re-evaluate the number of courses required for the Honours BSc degree. Careful pruning of required courses may release faculty teaching resources for other uses without unduly degrading the quality of the Honours degree.*

Recommendation 4(i): *If the University's plan to increase the numbers of graduate students is to succeed, there is a clear obligation to inject significant new money into graduate support.*

Recommendation 4(ii): *The committee urges the Department to consider ways of delivering the required graduate courses in a timely and effective manner, which does not involve teaching common courses to both undergraduate and graduate students.*

Recommendation 4(iii): *The Department should investigate ways to improve the poor quality of office furnishings for graduate students. Good quality used furnishings are occasionally available as surplus from other areas of the University, and are routinely available at quite reasonable prices from the local private sector.*

Recommendation 4(iv): *The Department should arrange regular meetings, perhaps once or twice per academic year, with graduate students to discuss general issues related to all aspects of the graduate program. These meetings should involve at least those faculty members on Graduate Studies Committee. The committee believes that such meetings would pay big dividends for relatively little effort.*

Recommendation 5(i): *The committee believes that physical oceanography is a logical research focus for the Department, and that a core complement of 5 faculty members in this area is appropriate. This view concurs with that of the current faculty members.*

Recommendation 5(ii): *The committee supports the Department's planned expansion into the area of photonics, but believes that appointment of a Tier I CRC plus a junior appointment, rather than a Tier II CRC, is necessary to produce the desired research impact. This would bring the faculty complement closer to 20, which the committee feels is a reasonable number of faculty members for the Department.*

Recommendation 5(iii): *The committee strongly recommends that the University revise*

internal policies that limit career advancement for technical personnel and that impose unnecessary restriction on how faculty members may use their external research funds for employing students and technical assistants.

Recommendation 5(iv): *The Department should, in consultation with the Dean of Science, find sufficient money to bring invited speakers on a regular basis. The committee feels that a budget of $10K to $15K per annum would be adequate to ensure an active seminar series. The cost of bringing in speakers for this seminar series could be reduced by coordinating with other physics departments in Atlantic Canada.*

Recommendation 6(i): *The University should place the highest priority on finding ways to reward rather than frustrate valued employees. The currently used Job Classification System appears in many ways to be a bureaucratic disaster that needs a complete overhaul. This will only happen if the highest levels of the University administration recognize the problem and commit themselves to fixing it.*

Recommendation 7(i): *The committee sees value in interdisciplinary programs, particularly at the graduate level. The Faculty of Science should carefully review the benefits of existing interdisciplinary programs, and take steps to remove any existing disincentives to faculty members' participation in such programs. This may involve a basic re-evaluation of the place of interdisciplinary programs vis-à-vis line departments within the Faculty.*

Recommendation 9(i): *The Department should work with the Department of Facilities Management to prioritize those renovations that would increase the functionality of research space.*

Recommendation 9(ii): *The current and projected workload, the level of research activity, and comparison with physics departments at comparable Canadian universities all suggest that a faculty complement of 20 is appropriate for the Department.*

Recommendation 9(iii): *The University administration needs to monitor the effectiveness of their financial reporting systems to ensure that these systems are meeting the needs of the academic units as well as the needs of the administrative units.*

Recommendation 9(iv): *The University should organize annual meetings with academic departments to exchange ideas on how all administrative functions of the University could be better executed.*

Recommendation 9(v) *The University should consider instituting regular reviews of all administrative units, equivalent to the Academic Program Review for academic units.*

Recommendation 9(vi): *The Dean of Science should consult with other faculties at MUN and with colleagues elsewhere to see whether advantages might be had by centralization of the salary component of the budget.*

Recommendation 9(vii): *The Faculty of Science should have a clearly stated procedure for submitting proposals for CRC and AIF funding. Everyone in the Faculty of Science should know where to find these procedures.*

Recommendation 9(viii): *The University should be more open in its internal evaluation of proposals for CRC and AIF funding, and should provide more detailed critiques of the proposals to the individuals who wrote them. Successful applications could be made available as templates for additional applications.*