

# Academic Program Review

Department of Biochemistry

Self-Study Report

09 March 2009



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# Supporting Documents

## 1998 Review Report

## Undergraduate Studies Documents

- Student Advising Sheets
- Honours Thesis Guidelines
- Supervisor Guidelines
- Winter 2005 Exit Survey & Report of the Head

## Graduate Studies Documents

- Policy on the Mode of Operation of the Graduate Studies Committee
- PhD Transfer Policy and Procedure
- PhD Comprehensive Exam Procedure

## Other Departmental Policy Documents

- Policy on Adjunct appointments
- Policy on Cell Culture Room
- Policy on Student Laboratories
- Policy on Undergraduate Courses

## Data Documents

- Academic Performance Report, Fall 2007
- Academic Unit Profile 2006-07
- CareerSearch 2002 Entries
- CareerSearch 2004 Entries

## *Curricula vitae* of the faculty

## Course Outlines 2007-08

## Course Exams 2007-08





The five original members of the Department of Biochemistry (L to R): Dr. Peter J. O'Brien, Dr. L. A. Woodrow Feltham, Helen Kennedy, Veronica Hillier, and Munden Bray.

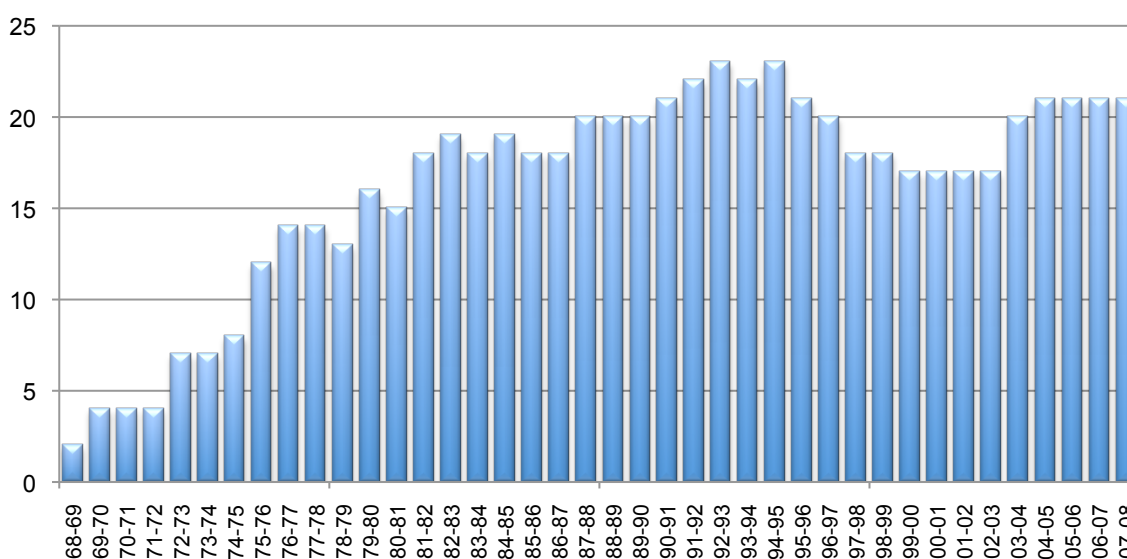


# 1 Background

## Brief History & Date programs started

The Department of Biochemistry was established in 1967 with a faculty complement of two: Dr. L.A.W. Feltham and Dr. P.J. O'Brien. Three staff brought the department complement to 5. The department grew rapidly and by 1977 had a faculty complement of 14. Ten years later, in 1987, there were 20 faculty members and that is more or less where we have remained since.

Figure 1.1 • Faculty Complement in the Biochemistry Department



A list of those who have served as full-time faculty members in the department since its founding is given in Appendix 1.1.

## Program Development

From inception, the department offered both undergraduate and graduate programs in Biochemistry. We graduated our first graduate student (**R. Olinescu**, supervised by **Dr. P.J. O'Brien**) in 1970. Since then, as we have grown in numbers, we have added a PhD in Biochemistry, and expanded the range of undergraduate offerings to include joint honours degrees with four other academic units, as well as undergraduate and graduate programs in Food Science. The chronological evolution of programs offered by the department as they were introduced in the University Calendar is given in Table 1.1.

**TABLE 1.1 • Chronology of Program Development in the Dept of Biochemistry**

1968-69	the department at its inception offered both a general and an honours program for undergraduate Biochemistry majors, as well as an M.Sc. in Biochemistry for graduate students.
1970-71	the PhD program in Biochemistry was introduced.
1975-76	an honours program for Nutrition Majors was introduced. This program consisted of 3 years at Memorial and 1 year at Acadia and was the forerunner of what was later called the Dietetics program.
1981-82	(though it might have been as early as 1979-80), a general and honours program in Food Science, and a general and honours program in Nutrition was introduced. The original "honours program for Nutrition Majors" was renamed "the Honours program for Dietetics majors". In addition, a joint honours degree program in Biochemistry and Experimental Biology was introduced.
1986-87	the M.Sc. in Food Science was introduced
1987-88	the PhD in Food Science was introduced.
1990-91	a joint honours degree program in Biochemistry and Chemistry was introduced.
1993-94	a general degree for Dietetics majors was introduced. In addition, two minors programs were introduced in Biochemistry and in Nutrition
1995-96	the Food Science undergraduate program was deleted from the Biochemistry Calendar entry.
1997-98	joint honours degree programs in Biochemistry/Physics and Biochemistry/Behavioural Neuroscience and Nutrition/Behavioural Neuroscience were introduced.
2003-04	Notice was given in the Calendar of the department's intent to discontinue the Dietetics programs.

## Strategic Plan and Goals of the Department

In 2007, Memorial University completed its most recent strategic plan. The objective of the plan is to build on the success of Memorial University's previous plans and to outline the important priorities that will guide the university in its next five years and beyond. The plan outlines 29 major goals under five pillars: Students; Research, Creative Activity, and Scholarship; Needs of the Province; Conditions for Success; and Institutional Responsibility.

One important outcome of the most recent Strategic Plan was an explicit adjustment of Memorial's Mission Statement to reflect the University's efforts in recent years to recruit students both nationally and internationally, and to become more involved in international ventures. The mission statement is:

*Memorial University is an inclusive community dedicated to creativity, innovation and excellence in teaching and learning, research and scholarship, and to public engagement and service. We recognize our special obligation to the people of Newfoundland and Labrador.*

*Memorial welcomes students and scholars from all over the world and contributes knowledge and shares expertise locally, nationally, and internationally.*

In all of its activities as part of Memorial University, the Department of Biochemistry subscribes to the mission of the University, and to the set of core values and principles (Appendix 1.2) set forth in the Strategic Plan

## **Previous unit reviews<sup>1</sup>**

The Department of Biochemistry has been reviewed three times previously: in 1979, 1985, and 1998.

### **1979**

The review was conducted from October 15–18, 1979 by Dr. K.K. Carroll (Dept. of Biochemistry, University of Western Ontario), Dr. J-P. Julien (Dept. des Vivres, Université Laval), and Dr. D.S. Layne (Dept. of Biochemistry, University of Ottawa).

In completing the department's first review in 1979, the review committee noted that the department was relatively strong with an impressive esprit de corps, that it enjoyed the respect of other units, and that it had good communications nationally and internationally. The committee was satisfied that the department had the expertise to teach an honour's degree in Biochemistry and that teaching loads were not excessive and were comparable to other Canadian Biochemistry departments. They criticised the third year undergraduate laboratory in general biochemistry, which was felt to need more direct faculty participation, and they recommended an elective laboratory for non-majors. They also cautioned the department about the courses needed to develop an accredited Food Science program

The department had 10-12 graduate students at that time, mostly from outside the province. The committee was impressed with the students but less so with their course requirements, which they felt were minimal. The committee also criticized the uninformative listing of graduate courses in the University Calendar.

The committee noted that the research interests in the department had formed based on the interests of individual faculty members and they noted that it is not easy to establish a defined research objective except by care in the way new appointments are made. Nevertheless they believed that the department should give consideration to the development of concerted effort in specific fields. They did emphasise, however, that high calibre scholarly work in several areas of

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<sup>1</sup> Comments on infrastructure from previous reviews have not been included as these are not particularly germane to the present.

biochemistry is necessary for a well based department, and that **good** scholarly work (their emphasis) should not be undermined in the interest of influencing research directions.

The committee also noted that a definite decision had been made to establish a research thrust in the food sciences and they suggested that this should be made to tie in with the Nutrition and Dietetics program.

In looking at the potential for interaction with other units, the committee noted that interactions with Engineering, and Fisheries (now the Marine Institute) could be developed in areas of Food Science, they noted good interactions with the Marine Sciences Research Laboratory (now the Ocean Sciences Centre), they noted a relative lack of interactions with the Departments of Biology and Chemistry, and they firmly recommended a greater integration of faculty with the Faculty of Medicine.

## 1985

The review was conducted from May 01–03, 1985 by Dr. H.H. Draper (Dept. of Nutrition, University of Guelph), Dr. W.C. McMurray (Dept. of Biochemistry, University of Western Ontario), and Dr. E.D Murray (Dept. of Food Science, University of Manitoba).

The 1985 review complimented the department on its impressive development in areas of research and graduate studies but noted that there were indications of serious strains in the structural integrity of the department. They were concerned about (1) the lack of a distinct focus in the activities and future planning of the department, and (2) a potential split of the food sciences component from the department.

The committee report divided the research activities of the department into three groups. The first, “Biochemistry”, which included 10 faculty members with research interests in basic biochemistry, was identified as a strong and independently viable academic unit with strong connections in the Faculty of Medicine. The second, “Nutrition & Dietetics”, included 3 faculty members from the first group with research interests in metabolic nutrition and 3 faculty members interested in applied human nutrition or dietetics. The third, “Food Sciences”, included 3 faculty members, which was thought to be below the critical mass necessary to form an independent department.

By the time of the 1985 review, all 16 full-time faculty members in the department held extramural grant support totaling \$1.3 million mainly from MRC and NSERC. They judged that the vigorous intellectual leadership of the Department Head (Dr. S. Mookerjee) had led the department to attain a status comparable with other Biochemistry departments in the country in a relatively short period of time. But, while they noted a good esprit de corps among the faculty, they also noted morale problems relating to the heterogeneity of interests that led to conflicts of goals and priorities within the department. It was clear to members of the 1985 review committee that, with the exception of some members in the Food Science field, most of the faculty would be more at home in the Faculty of Medicine than in the Faculty of Science. Accordingly, three of their final recommendations were:

- *the Senior Administration should take vigorous action to secure a home for the department within the Faculty of Medicine, one that maintained the identity of the department.*

- *the main teaching of the Nutrition and Dietetics should also be transferred to medicine and that the Dietetics program should be re-patriated.*
- *the faculty with research/teaching interests in Food Science should be granted a separate administrative and academic structure within the Faculty of Science with ties to the Faculties of Engineering, and Business, and to the College of Fisheries.*

The committee noted that the department had established strong graduate programs in Biochemistry, Nutrition and Food Sciences with effective recruitment of students. Morale among students seemed high and did not seem to be affected by any problems and divisions within the department. One failing noted by the committee was the lack of an area where graduate students could congregate outside of their research space.

The committee noted that graduate instruction was largely oriented to bench-work rather than being course-work, and that, while courses offered represented mainly the research interests of the faculty, they did provide a reasonable cross section of (then) current areas of investigation. They noted that the department needed a better critical mass in the area of molecular biology. They also recommended that the department increase travel funds to allow more visits of external speakers.

The committee thought that the department's teaching load was equitable and distributed appropriately, comparable to that in other Canadian Biochemistry departments, and commensurate with the balance expected for a group with high research productivity. Enrolments were seen as healthy except in Nutrition/Dietetics beyond third year and in the Food Science program where the committee remarked on the small number of students graduating from the programs. The committee noted the potential for intermeshing the Food Science program with the Fisheries College (Marine Institute) to develop an integrated pathway for the flow of people and projects.

Two other of their final recommendations were:

- *There was no need for an external Head but that it was important that the Head should maintain a strong research program of their own*
- *The department should formulate priorities for new appointments.*

## 1998

The most recent review was conducted from May 30 – June 03, 1998 by a committee chaired by Dr. Carl Breckenridge, then Chair of Biochemistry at Dalhousie University, Dr. Peter Jones (Dept. of Food Science, University of Manitoba), Dr. Peter Loewen (Dept. of Microbiology, University of Manitoba), Dr. Rick Yada (Dept. of Food Science, University of Guelph), Dr. Carolyn Harley (Dept. of Psychology), Dr. Allan Stein (Dept. of Chemistry), and Mr. Mike Mannion (graduate student).

The committee noted that the department, while small compared to Canadian departments of Biochemistry or Nutrition or Food Science, provided a very good education to its students, although they also noted an increase in teaching responsibilities for most members of the department. They noted that, while total graduate student enrollment is good, the Biochemistry and Food Science graduate programs individually barely achieved a critical mass of students and they expressed concern about the interaction of the two programs.

The committee noted that the department had a strong well-funded research program with many individual strengths in research. However, they noted that there was division between the Food Science group and the rest of the department and that the situation had been poorly handled by the University over the years since the previous review, which had recommended that Food Science form a separate unit. They observed that failure of the senior administration to implement recommendations from previous review committees and departmental self-study documents had caused some prolongation/festering of old problems.

The committee stated that the department must focus on core strengths. They identified the two principal issues to be a) maintenance of core strengths, and b) resolution of the rift that they perceived to exist between some members of the Food Science faculty and the Biochemistry and Nutrition faculty.

The 1998 review committee made 23 recommendations, which are listed in Appendix 1.3. What follows is a condensed account of the committee's general comments in some of the areas of their review. A copy of the full report is included among the Supporting Documents.

The Biochemistry and Nutrition undergraduate programs were viewed by the committee as solidly based didactic offerings. While quality was considered high, there was concern that it was not uniform and the committee urged the department to be careful to balance demand and enrollment, with ability to deliver and quality. The committee noted that the department did not do a good job in providing career advice to students. Based on the input they received, they recommended that the department carry out a thorough review of courses including a review of laboratories to improve the quality of the laboratory experience.

The committee noted that students in the graduate program in Biochemistry displayed high camaraderie and collegiality. They felt that the low number of graduate students in the program was a weakness. They encouraged the department to increase graduate student recruitment, and to review graduate student stipends.

In their review of the graduate program in Food Science, the committee concluded that the program had a very narrow focus and that it was difficult to justify or maintain a graduate program with three research-active faculty in the area. The committee presented a number of options for resolution of the situation and recommended that the program be phased out and replaced with an interdisciplinary program.

In addition, in reviewing both graduate programs, the committee felt that graduate supervisory committees were not effectively used in the department.

The committee noted that this was a research-intensive department, that it was recognized nationally and internationally for its research, and they commended the department for its significant contribution to total University funding (6% in 94-95). One concern noted by the committee was teaching loads, which they viewed as being heavy in comparison with those in medical schools and research institutes across Canada and commensurate with other universities where biochemistry is taught within a Faculty of Science. In their review of faculty expertise for graduate programs, the committee encouraged the department to develop "areas of research emphasis". To strengthen research expertise in the department, the committee supported the department's hiring priorities (at that time: protein structure-function; and signal transduction) and they encourage the department to aggressively seek funds from CFI. Finally, the committee

stated that it was critical that any Food scientists in the department adapt their research programs so that they and their graduate students could become full participants in the Biochemistry program.

## Biochemistry Departments in Canada

A search of the NSERC grants database at l'Observatoire des Sciences et des Technologies (OST) at l'Université du Québec à Montréal, using 'Biochemistry' in the Departments field<sup>2</sup>, indicates that there were 23 such departments in Canada that were awarded individual research (Discovery) grants during the period 2000-2008. One of these – the Department of Chemistry & Biochemistry at the University of Guelph - has been a 'plain' department of chemistry since 2005-06<sup>3</sup>.

Of the remaining 22, ten departments are located in Faculties of Science (Table 1.2); and the other twelve are located in Faculties of Medicine (Table 1.3).

<b>TABLE 1.2 • Canadian Biochemistry departments based in Faculties of Science</b>			
<b>University</b>	<b>Department</b>	<b>Number of Faculty<sup>4</sup></b>	<b>Number of "Biochemists"<sup>5</sup></b>
Simon Fraser University	Dept of Molecular Biology and Biochemistry	24	24
University of Victoria	Dept of Biochemistry and Microbiology	16	11
University of Lethbridge	Dept of Chemistry and Biochemistry	21	6
University of Regina	Dept of Chemistry & Biochemistry	10	4
Carleton University	Institute of Biochemistry	21	
Laurentian University of Sudbury	Dept of Chemistry & Biochemistry	19	7
University of Windsor	Dept of Chemistry & Biochemistry	23	9
Concordia University	Dept of Chemistry & Biochemistry	24	6
Memorial University	Dept of Biochemistry	20	16

<sup>2</sup> French-speaking universities and their departments have not been tabulated. They are: l'Université de Montréal, l'Université de Sherbrooke, l'Université Laval, and l'Université de Moncton.

<sup>3</sup> Guelph now has a Department of Molecular & Cellular Biology within its College of Biological Sciences. There are 42 faculty members affiliated with the department.

<sup>4</sup> The number of faculty in each department in Tables 1.2, 1.3, 1.4 and 1.5 was counted from the faculty listing on their respective web pages and are subject to the accuracy of the website; Adjunct, Emeritus, and Retired faculty were not included in the count.

<sup>5</sup> The number of Biochemists was estimated by examining faculty research interests; those that were clearly or closely related to areas of biochemistry were counted.

<b>TABLE 1.3 • Canadian Biochemistry departments based in Faculties of Medicine</b>		
<b>University</b>	<b>Department</b>	<b>Number of Faculty</b>
University of British Columbia	Dept of Biochemistry and Molecular Biology	20
University of Alberta	Dept of Biochemistry	26
University of Calgary	Dept of Biochemistry and Molecular Biology	57
University of Saskatchewan	Dept of Biochemistry	27
University of Manitoba	Dept of Biochemistry & Medical Genetics	57
McMaster University	Dept of Biochemistry and Biomedical Sciences	41
Queen's University	Dept of Biochemistry	27
University of Ottawa	Dept of Molecular and Cellular Biology	31 (24 + 7)
University of Toronto	Dept of Biochemistry	55
University of Western Ontario	Dept of Biochemistry	32
McGill University	Dept of Biochemistry	31
Dalhousie University	Dept of Biochemistry and Molecular Biology	27

In their annual rankings, Maclean's magazine groups Canadian universities into three categories: Medical/Doctoral; Comprehensive; and, Primarily Undergraduate. Memorial University is one of the 11 Comprehensive universities. Other Comprehensive universities with Biochemistry departments are: Simon Fraser University, the University of Victoria, the University of Windsor, the University of Regina, and Concordia University. In all six 'Comprehensive' universities with Biochemistry departments, the department is based in a Faculty of Science. (The University of Guelph is also a 'Comprehensive' university.)

All of the Universities listed in Table 1.3 belong to the Medical/Doctoral category in Maclean's groupings.

## **Nutrition and Food Departments in Canada**

A search of the OST NSERC database using 'Food' or 'Nutrition' in the departments field, indicated that there were 9 and 11 such departments, respectively, in Canada that were awarded individual research (Discovery) grants during the period 2000-2008. These faculties, schools or departments are listed in Tables 1.4 and 1.5.

**TABLE 1.4 • 'Food' departments in Canadian universities<sup>6</sup>**

University	Department	Faculty	Number of Faculty
University of British Columbia	Faculty of Land and Food Systems <sup>7</sup>	Faculty of Land and Food Systems	52
University of Alberta	Dept of Agricultural, Food and Nutritional Sciences	Faculty of Agricultural, Life & Environmental Sciences	66
University of Saskatchewan	Applied Microbiology and Food Science <sup>8</sup>	College of Agriculture and Bioresources	
	Dept of Food and Bioproduct Sciences	College of Agriculture and Bioresources	11?
University of Manitoba	Dept of Food Science	Faculty of Agriculture and Food Sciences	9
University of Guelph	Dept of Food Science	Ontario Agricultural College	17
McGill University	Food Science and Agricultural Chemistry	Faculty of Agricultural and Environmental Sciences	10
Dalhousie University	Food Science and Technology <sup>9</sup>	Faculty of Engineering.	6

Most of the 'Food' departments are associated with Faculties whose focus can be described broadly as agricultural studies. The University of British Columbia and the University of Alberta are different in incorporating human nutrition under this umbrella.

<sup>6</sup> Not included in this table are departments corresponding to one grant from the University of Lethbridge (Agricultural, Food and Nutritional Sciences), one from McGill (Food Science), and those from the former department of Foods & Nutrition at the University of Manitoba, which became Human Nutritional Sciences in 2002-03. The search returned entries both for the Dept. of Food Science and for the Faculty of Agriculture and Food Sciences at the University of Manitoba; since the Faculty encompasses the department, there is a single entry in the table.

<sup>7</sup> The University of British Columbia combines three undergraduate degree programs (Agroecology; Food, Nutrition & Health; and, Global Resource Systems) under the Faculty of Land and Food Systems. The Food, Nutrition & Health program has a spectrum of majors from Food Science to dietetics.

<sup>8</sup> Appears to have been reorganized within the College of Agriculture and Bioresources

<sup>9</sup> Now part of the Dept. of Process Engineering & Applied Science (PEAS) in the Faculty of Engineering.

**TABLE 1.5 • ‘Nutrition’ departments in Canadian universities<sup>10</sup>**

University	Department	Faculty	Number of Faculty
University of British Columbia	School of Family & Nutritional Sciences <sup>11</sup>	Faculty of Land and Food Systems	–
University of Alberta	Dept of Agricultural, Food and Nutritional Sciences	Faculty of Agricultural, Life & Environmental Sciences	66
University of Saskatchewan	Division of Nutrition and Dietetics	College of Pharmacy & Nutrition	8
University of Manitoba	Dept of Human Nutritional Sciences <sup>12</sup>	Faculty of Human Ecology	13
Ryerson University	School of Nutrition <sup>13</sup>	Faculty of Community Services	11
University of Guelph	Human Health & Nutritional Science <sup>14</sup>	College of Biological Sciences	20
University of Toronto	Dept of Nutritional Sciences	Faculty of Medicine	40
McGill University	School of Dietetics & Human Nutrition	Faculty of Agricultural and Environmental Sciences	10
Université de Montréal	Nutrition	Faculté de médecine	14
Université Laval	Science des Aliments et Nutrition	Faculté des sciences de l'agriculture et de l'alimentation	28
St. Francis Xavier University	Human Nutrition <sup>15</sup>	Faculty of Science	8

Most of the ‘Nutrition’ departments are associated with Science or Life Science Faculties. As noted above, exceptions are the University of British Columbia, the University of Alberta, and (possibly) l’Université Laval.

One other point to note is that Faculty and Department rearrangements and/or renaming have occurred in quite a number of the ‘Food’ and ‘Nutrition’ departments in the past ten years.

<sup>10</sup> Departments not identified by this search include the Dept. of Family Relations and Applied Nutrition in the College of Social and Applied Human Sciences at the University of Guelph, the Division of Nutritional Sciences at Brescia College, the Dept. of Applied Human Nutrition at Mount Saint Vincent University, and the Dept. of Nutrition and Dietetics at Acadia University.

<sup>11</sup> Now incorporated into the Faculty of Land and Food Systems

<sup>12</sup> Incorporates the former Dept. of Foods and Nutrition

<sup>13</sup> formerly: Nutrition, Consumer/Family Studies

<sup>14</sup> formerly: Human Biology and Nutritional Sciences

<sup>15</sup> formerly: Dept. of Nutrition and Consumer Studies

## Process used to prepare the Self-Study report

*But Mousie, thou art no thy-lane  
In proving foresight may be vain:  
The best laid schemes o' Mice an' Men,  
Gang aft agley,  
An' lea'e us nought but grief an' pain,  
For promis'd joy!*

The Self-Study report was drafted by the Department Head with the assistance of many individuals in assembling data at steps along the way. The original plan was to draft a chapter, send it out to the appropriate people for comment, revise, and repeat until a polished draft turned into a final document. In the event, time went by too quickly, and a first draft had, of necessity to become a final draft in fairly short order.

The draft self-study was circulated to all faculty, staff and graduate students in the department. A copy was also given to representatives of the undergraduate Biochemistry Society. All were invited to comment on the draft. Meetings were held with the graduate students, with faculty, and with the undergraduate representatives to receive comments before finalizing the self-study report.

In preparing the report, it was necessary to set a reference date. Accordingly, this report uses data up to the end of the 2007-08 academic year or the end of the 2007-08 financial year as appropriate. For the most part, August 31, 2008 is the cutoff for academic data, and March 31, 2008 is the cutoff for financial data.

I am indebted to Anne Sinnott, the department's Administrative Assistant who provided much data – nearly always at impossibly short notice – and who proofread the entire document and edited it for consistency. Any remaining mistakes and errors are mine. I must also thank my secretaries in the past year, Christine Squire and Betty Ann Lewis, who collected documents from the faculty, and Craig Skinner, who helped assemble the data in Chapter 10. I received help from Andrew Kim and Gail Lamkin in the School of Graduate Studies, and from Jan Hopkins in the Office of Research. I thank Erin Alcock, QEII Library, for providing the Report on Library Holdings in Chapter 10. I would like to thank Dr. Maureen Dunne for all of her help in our efforts to have a look at our undergraduate curriculum. Finally, thank you to all those who, thanks to my addled brain, I have forgotten to mention by name.

*Ducunt volentem Fata, nolentem trahunt*

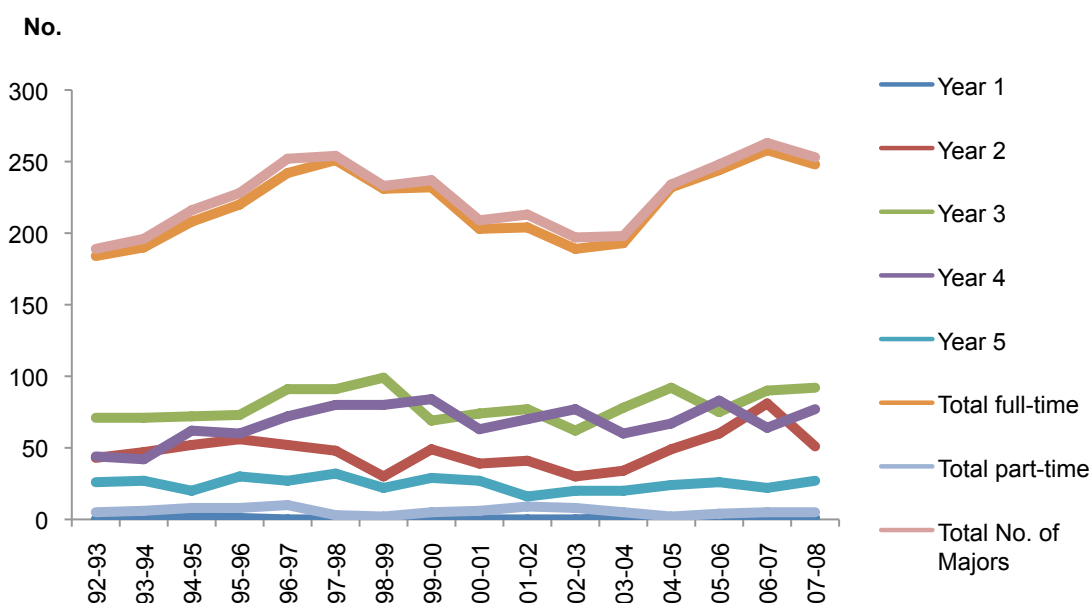


## 2 Undergraduate Student Information

### Number of full and part-time students in undergraduate programs

Based on data from Academic Unit Profile Reports, the department registered 248 full- and 5 part-time majors in 2007-08. This number is a slight decrease on the previous year but a significant increase since the 2000-01 academic year when there were 203 full- and 6 part-time students. Taking a somewhat longer term view, the number of majors has cycled between ~200 and ~250 since the mid 1990s.

Figure 2.1 • Majors in the Biochemistry Department



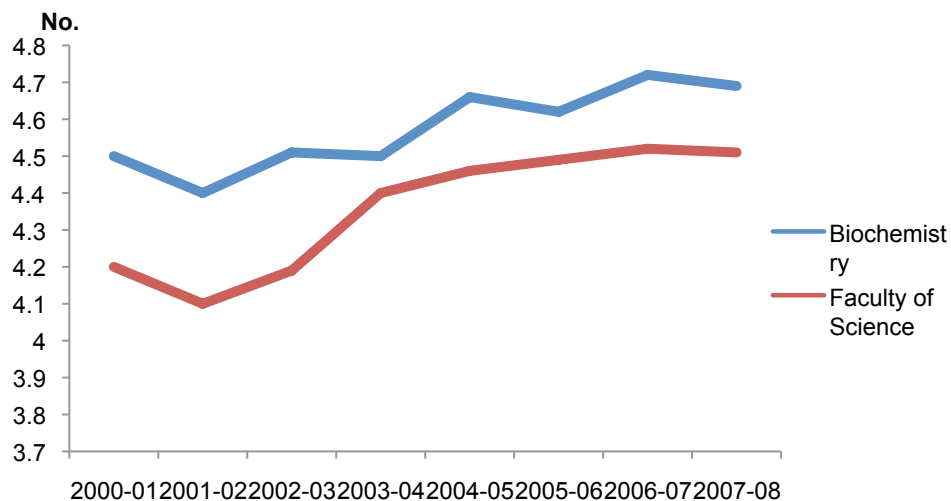
These data may underestimate the number of majors by ~50. Analysis of the online Section Status Summary reports for each semester since Fall 2000 indicates that there were on average 246 declared majors for each semester in 2000-01 and 290 in 2007-08 (see below).

Within the Faculty of Science, the department's share of majors has risen from 16.2% in 2000-01 to 20.5% in 2006-07. The department ranks second (in a tight contest with the Department of Biology) in terms of share within the Faculty.

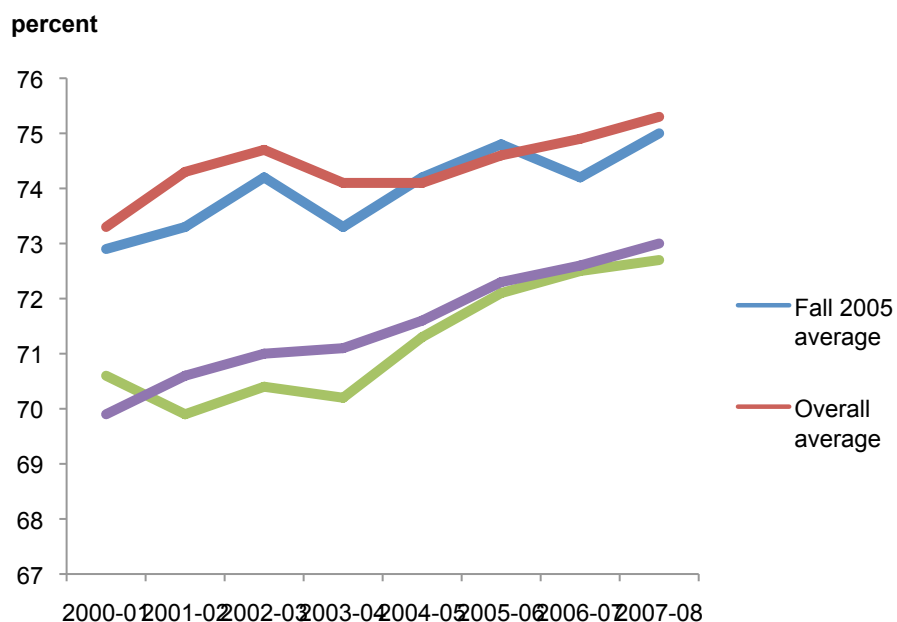
From the Academic Performance Profile Fall Reports since 2000-01, the average Biochemistry Department student takes 4.6 courses a semester, has a semester average of 73.8%, and a cumulative average of 74.3%, and is female (64.7%). Our students take the highest course load in the Faculty; they have one of the highest semester averages; and they have the highest cumulative

average. On average only 2% of our students can be classified as low achievers<sup>16</sup>. These numbers have remained relatively stable over this time period. In a nutshell: we attract and teach good students. The fact that Biochemistry is viewed as a good entry point for Medicine is likely a contributing factor.

**Figure 2.2 • Average Course Load per Semester**



**Figure 2.3 • Cumulative Average of Biochemistry Students**



<sup>16</sup> Low achievers are defined as students who do not meet the minimum academic standard in a semester, *i.e.* a semester average of at least 50%.

Figure 2.4 • Percentage of Low Achievers

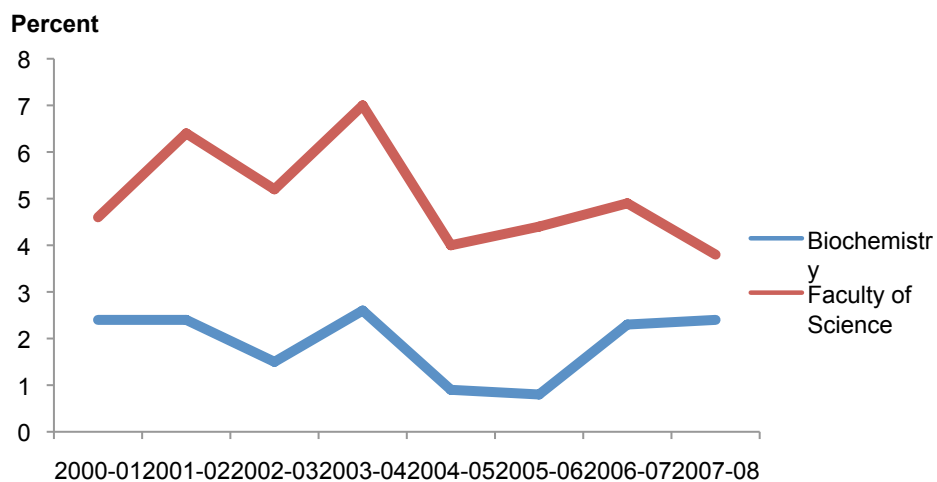
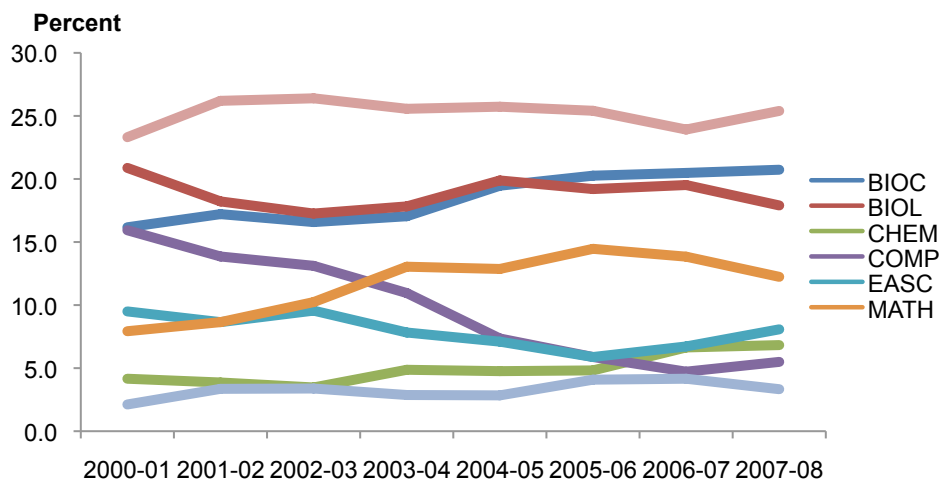
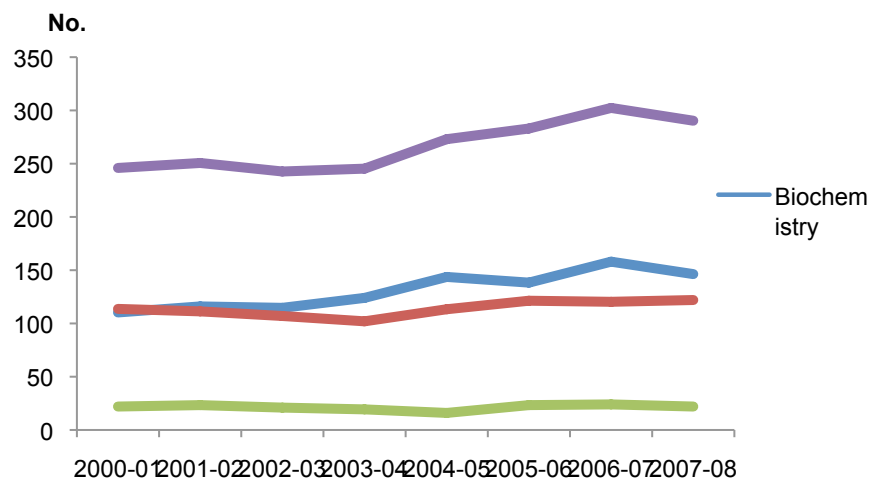


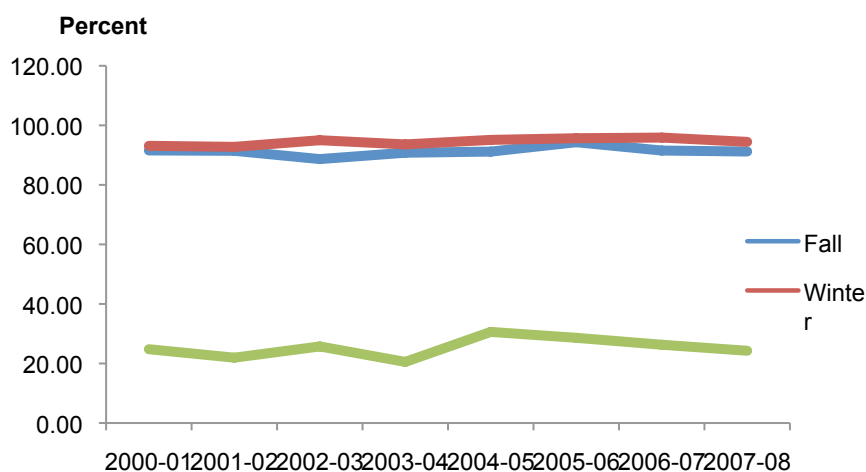
Figure 2.5 • Percentage of Majors by Academic Unit in the Faculty of Science



**Figure 2.6 • Number of Majors by Academic Program in the Department of Biochemistry**

The increase in the number of majors since 2000-01 is due primarily to an increase in the number Biochemistry majors.

During the Fall and Winter semesters, between 92% and 95% of our declared majors overall are registered in courses. For BIOC<sup>17</sup> majors, on average 95% of majors are registered in Fall or Winter; for BNTR majors, 93% are registered; for BDIE majors 77% are registered<sup>18</sup>. Approximately 20-25% of majors register for courses during the Spring semester. Some of these are students who finish first year but need to complete required Chemistry, Mathematics or Physics courses so that they can progress properly in the program in their second year.

**Figure 2.7 • Percentage Enrolment of Majors by Semester**

<sup>17</sup> Abbreviations used: BIOC, Biochemistry; BNTR, Biochemistry(Nutrition); BDIE, Biochemistry(Dietetics).

<sup>18</sup> The latter number is lower because Dietetics students completing their fourth year of study at Acadia University are listed as non-registered; and, because students admitted to Dietetics have had a variety of backgrounds that do not always necessitate taking courses as they "catch up" with the program.

## Academic quality of students when accepted into programs

There are no restrictions on the number of students admitted to the major in Biochemistry or in Nutrition<sup>19</sup>.

Admission to the major in Biochemistry or Nutrition requires that students have completed at least 30 credit hours and have successfully completed a slate of courses with a minimum overall average of 60% as follows:

TABLE 2.1 • First Year Program Requirements	
Biochemistry	Nutrition
<ul style="list-style-type: none"> <li>English 1080, 1110 (or equivalent)</li> <li>Chemistry 1050, 1051 (or Chemistry 1010, 1011 or 1201, 1001)</li> <li>Mathematics 1000, 1001 (or Mathematics 1090, 1000)</li> <li>Physics 1050, 1051 (or Physics 1020, 1021), or Biology 1001, 1002</li> </ul>	<ul style="list-style-type: none"> <li>English 1080, 1110 (or equivalent)</li> <li>Chemistry 1050, 1051 (or Chemistry 1010, 1011 or 1201, 1001)</li> <li>Mathematics 1090, 1000 (or Mathematics 1000 and one elective)</li> <li>Biology 1001, 1002 or Physics 1020, 1021 (or equivalent)</li> </ul>

In addition to the above, prospective biochemistry majors must be eligible for admission to Chemistry 2400<sup>20</sup>. This requirement is intended to ensure that when students finish first year they can progress directly in to and through the Biochemistry program in three years.

The major differences in the admission requirements are in Mathematics and in Physics. For these two majors programs, the subsequent program regulations differ thereby permitting a slight difference in admission requirements.

In practice, although we receive applications from a small number of students with borderline qualifications, the majority of applicants are well above the minimum.

In the 2007-08 academic year, the department admitted 50 Biochemistry majors and 61 Nutrition majors. Taken together, these students had an overall average of 73.9% in the ten courses that are required or recommended for admission. The averages for the two cohorts, 75% and 73.9% for Biochemistry and Nutrition respectively, do not appear to be significantly different<sup>21</sup>.

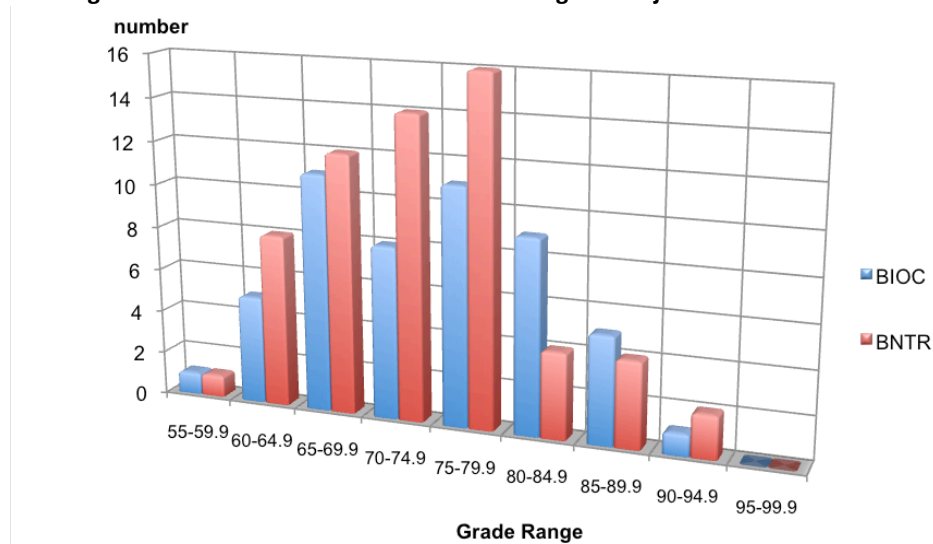
<sup>19</sup> Strictly speaking, our programs lead to degrees in Biochemistry, Biochemistry(Nutrition), or Biochemistry(Dietetics). For simplicity throughout this report, the latter two will be referred to as Nutrition and Dietetics, respectively. This terminology is also used in the University Calendar. The issue of the name of the Nutrition program is raised in Chapter 11.

<sup>20</sup> The pre-requisites for Chemistry 2400 are: Chemistry 1051 or 1031; or Chemistry 1010 and 1011 with a grade of at least 80% in each; or Chemistry 1011 with a grade of at least 85%; or Chemistry 1001 with a grade of at least 65%.

<sup>21</sup> The marks recorded on each student's application for admission to the major were tabulated and used for this analysis. The tabulation listed two marks in Biology, Chemistry, English, Mathematics and Physics; no attempt was

The distribution of overall grade average for the cohorts is shown below:

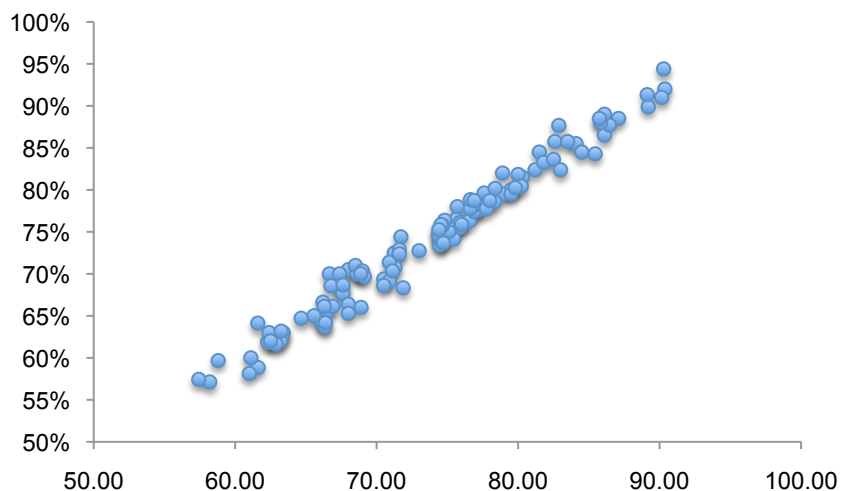
**Figure 2.8 • Distribution of Admission Average of Majors admitted in 2007-08**



The medians were 74.6% and 74.5%.

A comparison of the average mark obtained in eight science subjects with the overall mark (which included two English courses) shows a strong correlation ( $R^2 = 0.97$ )(Figure 2.9). Four students were admitted whose averages were borderline. Two of them had a ten-course average >60% but a science average <60%.

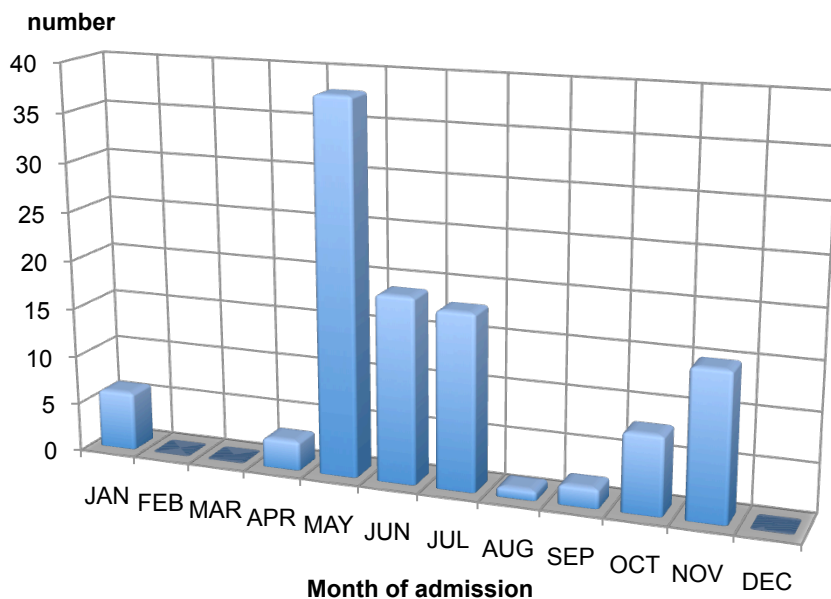
**Figure 2.9 • Correlation of Ten course average with Science average of Majors admitted in 2007-08**



made to distinguish between different courses in a subject, e.g. between Chemistry 1010, 1011 and Chemistry 1050, 1051. Where three marks were known, the best two were recorded. Where a mark was not known, it was omitted. In a few cases, the marks associated with transfer credits were included.

The department receives applications for admission to the major throughout the year and processes them as time permits<sup>22</sup>. Applications received during the winter semester are usually held until after the release of grades at the end of April. We also see a flurry of applications in the weeks prior to registration in July and again in November.

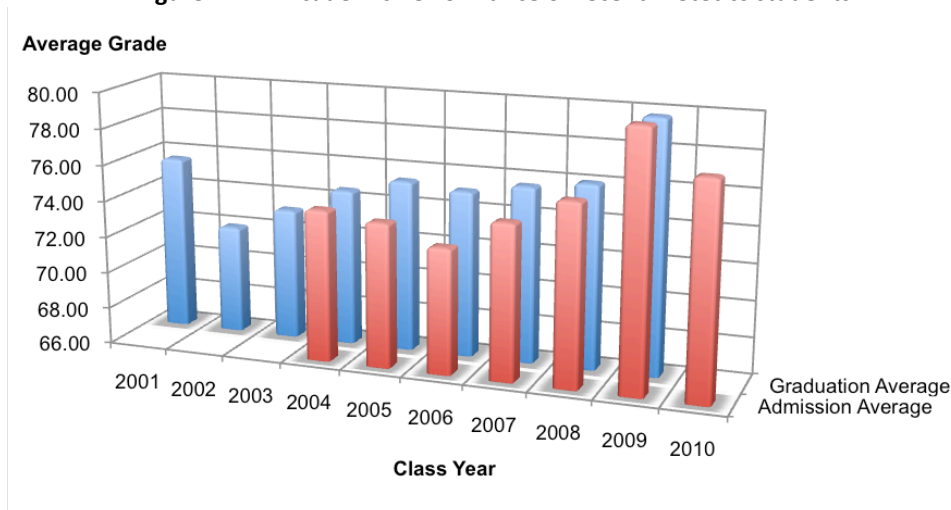
**Figure 2.10 • Number of Majors admitted by month in 2007-08**



Entrance to the program in Dietetics was on the basis of competition for a fixed number of places (ten). To be eligible for consideration, an applicant had to have completed a minimum of 30 credit hours in ten courses. The cumulative average on admission<sup>23</sup> of students in the Classes of 2004-2010 was 75.6%. The cumulative average of students who graduated from the Classes of 2001-2009 was 75.25%. The individual trends are shown below:

<sup>22</sup> The department has amended a note in the 2009-10 Calendar entry recommending that students apply by May 31 so that their applications can be processed before the busy July registration season when department staff are also on holiday.

<sup>23</sup> The mark on admission was deemed to be the cumulative average on the student's transcript in the semester prior to enrolling in Biochemistry 2010.

**Figure 2.11 • Academic Performance of recent Dietetics students**

In reviewing transcripts to collect this data, it was observed that ~2 students in each class have since returned to Memorial to complete study in other areas such as Medicine, Education and Nursing. This is in addition to those students who left the program without completing it that are noted in section 2.1.4 below.

## **Scholarships and other awards earned by students after entering program**

### **University Scholarships**

Students in our programs are generally eligible for scholarships awarded to students in the faculty of science by the Senate Committee on Scholarships and Financial Aid. For example, in recent years, students in one of our programs have received the Faculty of Science Opportunity Fund Scholarship (\$1000; 2005-06), and the Bruce Pardy Family Scholarship (\$2000, 2005-06; \$2500, 2006-07).

### **Biochemistry Department Scholarships**

There are currently 6 scholarships and 1 bursary available specifically to students enrolled in Biochemistry programs:

<b>TABLE 2.2 • Scholarships Awarded in the Dept of Biochemistry</b>		
<b>Scholarship</b>	<b>Value in 2007-08</b>	<b>Eligibility</b>
Dr. L.A.W. Feltham Scholarship	\$1200	BIOC beyond 2 <sup>nd</sup> year
The Loughney-Brosnan Scholarship in Biochemistry	\$1700	BIOC (Hons) in final year
The Au Family Scholarship in Biochemistry	\$1300	BIOC in final year with extracurricular activities
The AstraZeneca Scholarship	\$4000	Hons in final year; rotates between Biology, Biochemistry, and Chemistry
The Grace Morgan Scholarship in Nutrition	\$1200	BNTR in final year
The Newfoundland Margarine - Unilever Canada Scholarship	\$1400	BNTR (Hons) in final year
The Newfoundland Home Economics Association Scholarship	\$750	BDIE (Hons) in 2 <sup>nd</sup> year of program
The Dr. Patricia Giovanetti Memorial Bursary	\$600	BDIE finishing 2 <sup>nd</sup> year of program

### Faculty of Science Awards

As they progress through their programs, students may also be nominated to the Dean's List. The requirements for inclusion on the Dean's List are detailed in the University Calendar and are also governed by Faculty of Science regulations.

The top 10% of students in the Faculty, who were full-time in two of the three preceding semesters, and completed at least 27 credit hours in two semesters, and with an overall GPA of 3.5 in the preceding academic year are eligible to be nominated. Faculty of Science regulations require an average of at least 80% in two of the three semesters, a grade of A in seven courses taken, and that seven of the courses be Science courses.

In 2007-08, 244 students were named to the Dean's List. Of these, 68 (28%) were Biochemistry students. (33 were BIOC majors; 28 were BNTR majors; and, 7 were BDIE majors)

Students who are named to the Dean's List for four consecutive years receive the Dr. Lou Visentin Award<sup>24</sup>. Students from Biochemistry have been well represented in receiving this award over the years. In 2007-08, of 29 recipients, eleven were Biochemistry students. In 2006-07, seven of the 21 recipients were from Biochemistry.

The top student in 4<sup>th</sup> year receives the Dean of Science Book Prize<sup>25</sup>.

### Convocation Awards

Our students are eligible for three Biochemistry awards made at Convocation:

<sup>24</sup> Named for the former Dean of Science.

<sup>25</sup> One Book Prize is awarded in each Academic Unit.

- University Medal for Academic Excellence in Biochemistry (Top Biochemistry student)
- Society of Chemical Industry Merit Award in Biochemistry (Top Hons. Biochemistry student)
- Grace Morgan Prize in Biochemistry (Nutrition) (Top Hons. Nutrition student)

At the May 2004 Convocation, Paul Boland, an honours student in Biochemistry was awarded the Governor-General's Silver Medal as the top undergraduate student in the graduating class. A list of Convocation Award Winners is included as Appendix 2.1.

### Biochemistry Department Graduation Prizes

The department sponsors a number of awards of its own for graduating students each year:

TABLE 2.3 • Biochemistry Department Graduation Awards	
<b>Mookerjea Prize</b>	Awarded to students who are on the Dean's List for all years of their programme.
<b>Head's Prize</b>	Awarded to Honours students in Biochemistry or in Biochemistry (Nutrition) who have received an 'A' grade in all BIOC courses (i.e. courses with a BIOC number) and to Honours Dietetics students who have received an 'A' grade in all courses with a BIOC number at Memorial and all Nutrition/Foods courses at Acadia University.
<b>Brosnan Prize</b>	Awarded to Honours students in one of our joint honours programs who have received an 'A' grade in the 26 required courses of the program.

From 2003 to 2007, the Dairy Farmers of Canada donated an award annually to the department for a student in the undergraduate Dietetics program who had received an internship placement. The award consisted of a painting of a cow (naturally!) and a cheque in the amount of \$1000. A list of Graduation Prize Winners is included as Appendix 2.2.

### Outside Awards

The department is proud that, over the course of its forty year history, four of its graduates have been named the Rhodes Scholar for Newfoundland. Most recently, these were Paul Boland, B.Sc.(Hons.) (2004), who was named Rhodes Scholar for 2006; and, Luke Pike, B.Sc.(Hons.) in Biochemistry & Chemistry (2007), who was named Rhodes Scholar for 2007.

Undergraduate students have also competed for, and been awarded, NSERC postgraduate scholarships:

<b>TABLE 2.4 • NSERC Postgraduate Award Winners 1998-2007</b>		
<b>Academic Year</b>	<b>Student</b>	<b>Award</b>
2007/2008	Nichole Cumby	NSERC CGS M
2006/2007	–	
2005/2006	Sarah Battcock Julie Brophy Krista Hewlett	NSERC CGS M NSERC CGS M NSERC CGS M
2004/2005	Kelley Bromley Andrew Roberts	NSERC CGS M NSERC CGS M
2003/2004	Gillian Sheppard	NSERC PGS M
2002/2003	–	
2001/2002	Anna Shawyer	NSERC PGS A
2000/2001	Christopher Sharpe Chidam Yegappan	NSERC PGS A NSERC PGS A
1999/2000	–	
1998/1999	Keegan Au Blue Lake Teri Stuckless	NSERC PGS A NSERC PGS A NSERC PGS A

Of these students, five accepted their awards and went on to pursue graduate studies. The others declined their awards in favour of medical studies.

### Attrition from and retention in programs

We have no reliable data on attrition from the Biochemistry and Nutrition programs.

A small number of majors do leave our programs if they are accepted into the School of Pharmacy or into the School of Nursing. In a few instances, these students will try to complete their outstanding program requirements in Biochemistry if their schedules in the other School permit.

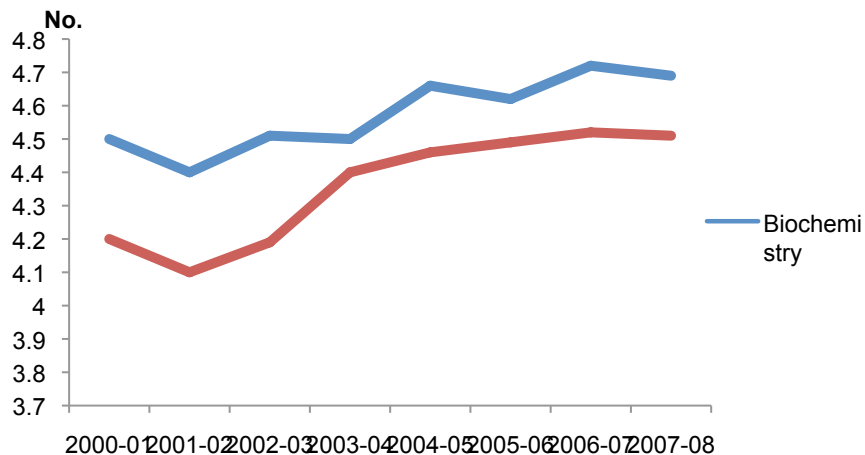
From 2004 to 2008, five classes have graduated with degrees in Dietetics. Of 54 students admitted, 44 graduated with B.Sc.(Dietetics) degrees, and three others completed their programs but could not be awarded a second Science degree under University regulations. This represents a conversion rate of 87%. Of the remaining seven students, three left the program for Pharmacy, one completed the Nutrition program and is now in Nursing, and one left to do graduate studies in Medicine. Two students did not complete degrees at Memorial.

### Average time to graduation

Majors in our programs take the highest course load per semester in the Faculty of Science. Data from Academic Performance Reports for the past eight years indicates that the average course load

of our majors has increased from 4.4 to 4.7 courses in the Fall semester. On that basis, the average length of program of the average Biochemistry student has decreased from 9.1 to 8.5 semesters over this time.

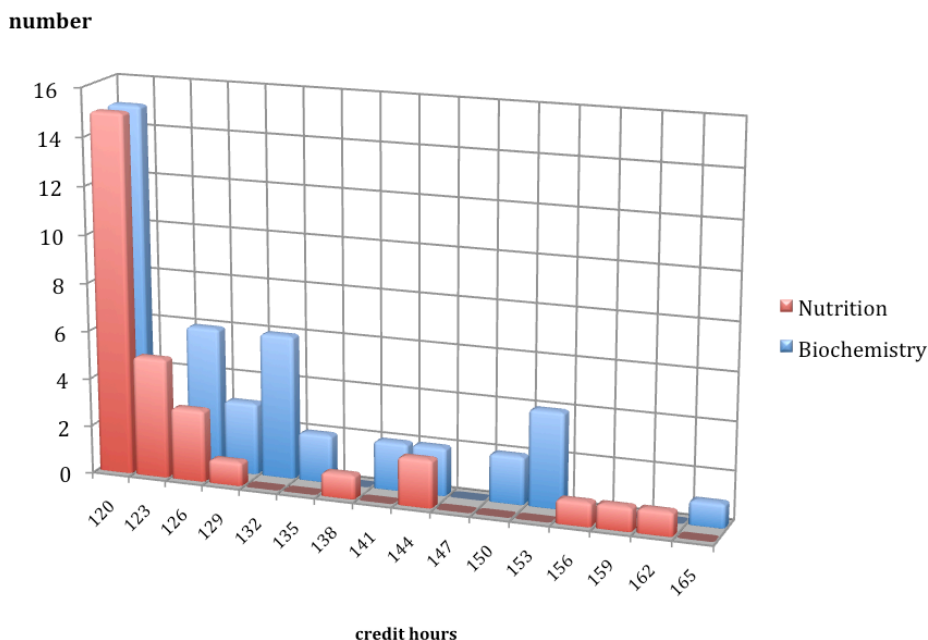
**Figure 2.12 • Average Semester Course Load of all Biochemistry majors**



By comparison, the course load of the average student in the Faculty is 0.2 courses less than the average Biochemistry student. Their average load has also increased during the same time period from 4.1 to 4.5 which translates into an estimated time to completion of 9.8 to 8.9 semesters, respectively.

Another way of looking at length of time in program is the number of credit hours completed at graduation.

**Figure 2.13 • Credit Hours completed at time of Graduation by Program**

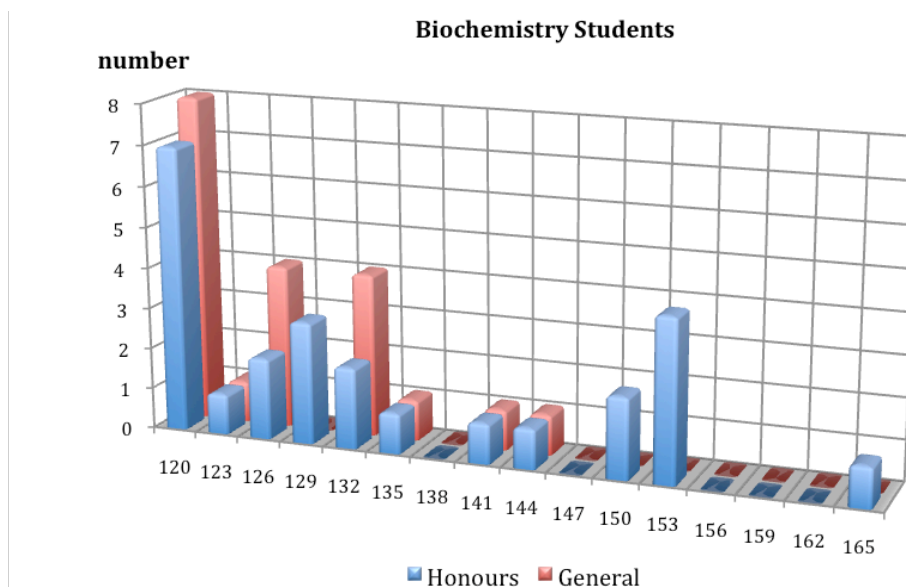


For the 2008 graduating class, 50 out of 75 (66.67%) completed their programs in 120-129 credit hours<sup>26</sup>. A higher percentage of general degree students (72.5%; 29 out of 40) completed in this time than did honours students (60%; 21 out of 35). This is not unexpected since a number of honours students will first complete a general degree before doing the honours. It is not unusual for students who are unsuccessful with their applications to professional schools, such as Medicine, to return for an additional year to do this. Thus, there is a small cluster of students with 150-159 credit hours.

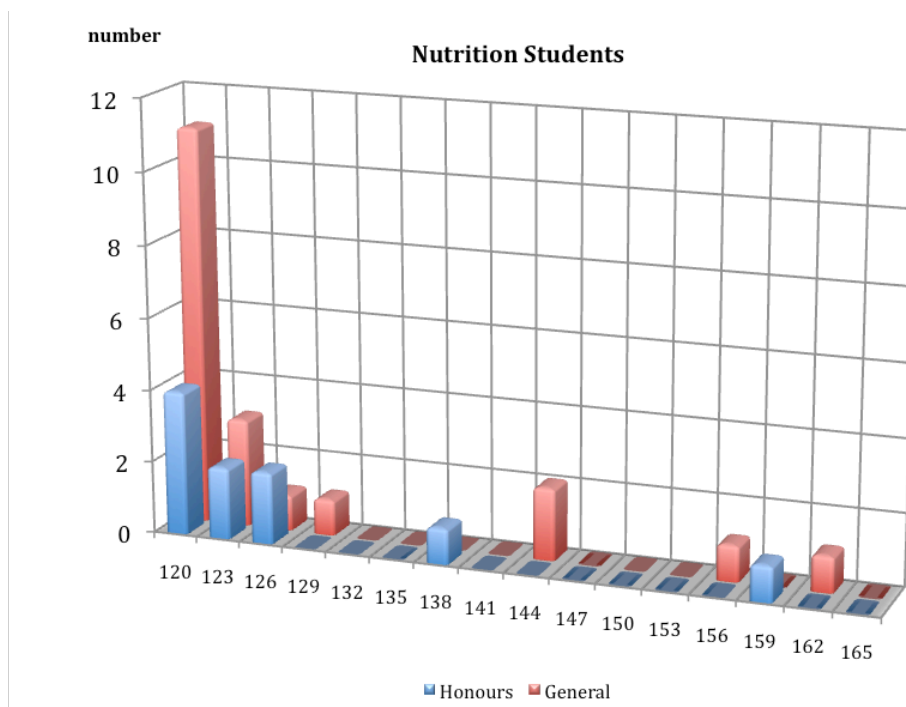
Other variations in number of hours completed would be due to students completing requirements for minors programs, or who changed major and had already completed courses that give them more electives than usual.

A greater percentage of Nutrition majors (80%) complete their programs in 120-129 credit hours than do Biochemistry majors (57.8%).

**Figure 2.14 • Credit Hours completed at Graduation by Degree**



<sup>26</sup> Not all students can complete our programs in 120 credit hours. Depending on their high school courses and grades, students may have to complete three Chemistry, three Mathematics, or three Physics courses in first year.



## Student involvement in departmental governance

Historically, the department does not involve students in governance.

At the present time, an undergraduate student serves only on the Safety Committee. While this practice within the department was initiated by the current Head in 2005, it is now a requirement of the Faculty of Science Safety Policy that an undergraduate student be appointed to this committee. In making this appointment, the Head has asked the Biochemistry Society for a nominee, in general seeking a student who has an interest or a stake in safety issues. For example, students who have allergies that might be exacerbated by working conditions in the Biochemistry Department have been appointed so that they may bring their perspective to the committee.

The following undergraduate students have served on the department's Safety Committee:

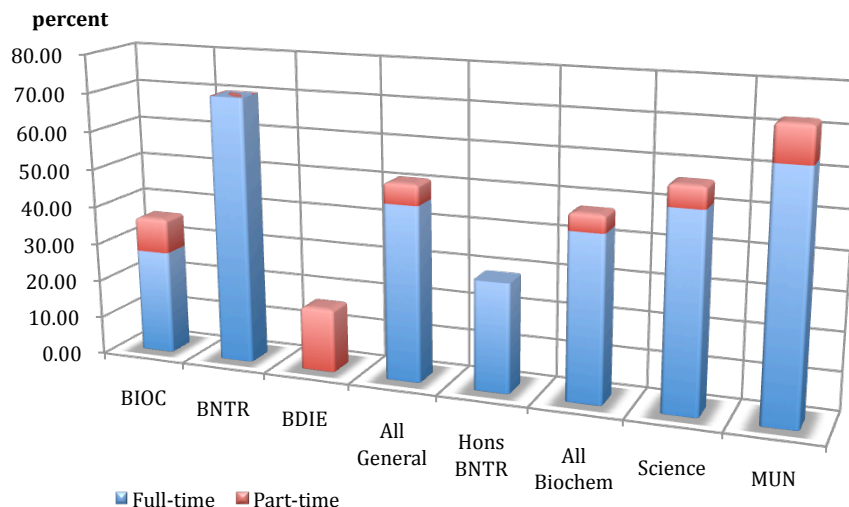
2005-06	Heather Young
2006-08	Amy Henderson
2008-09	Brendan Webber

## Post-graduation activities by students

In early 2004, the Province's Department of Education surveyed students who graduated from Memorial University in 2002. The survey (CareerSearch 2004) provides a snapshot of graduates two years following the completion of their programs. It reported data for Biochemistry (11 of 15 graduates), Nutrition (20 of 29) and Dietetics (6 of 9) majors and for the Nutrition honours (7 of 8

graduates) program<sup>27</sup>. There were insufficient responses from Biochemistry (1 of 5 graduates) and Dietetics honours (1 of 1) students for inclusion.

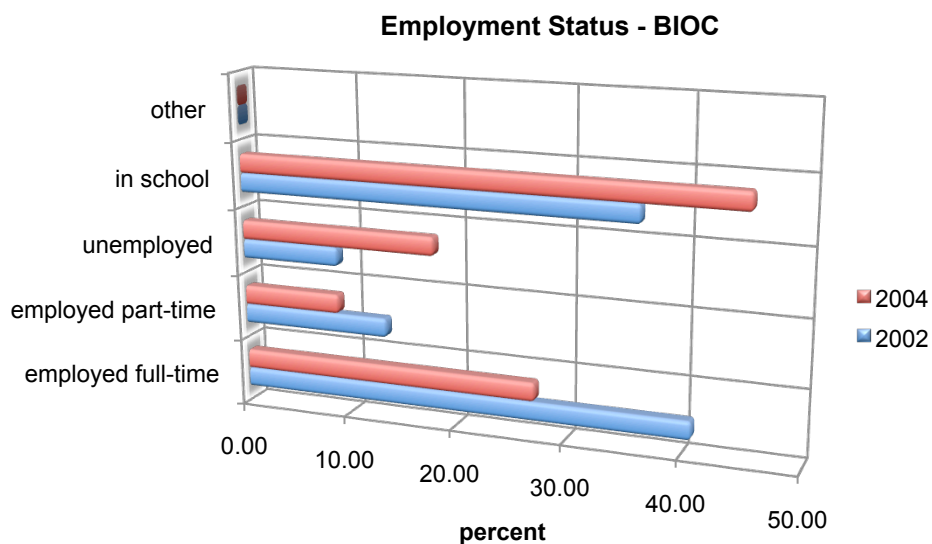
**Figure 2.15 • Employment Status of 2002 Biochemistry Graduates by Major and Degree**



Within two years of graduation, 38% of BIOC majors, and 59% of BNTR majors had secured either full- or part-time employment<sup>28</sup>. BDIE graduates had secured only part-time employment.

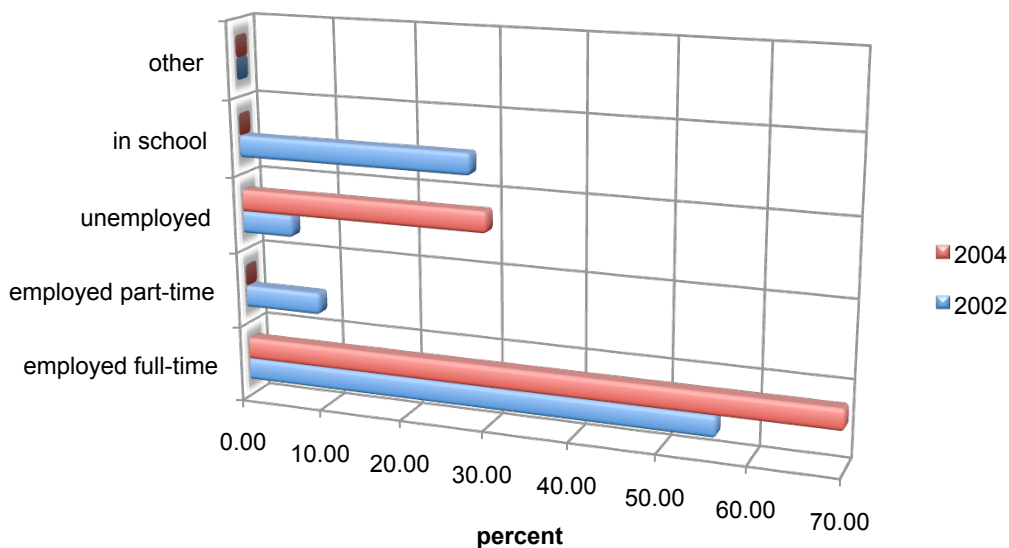
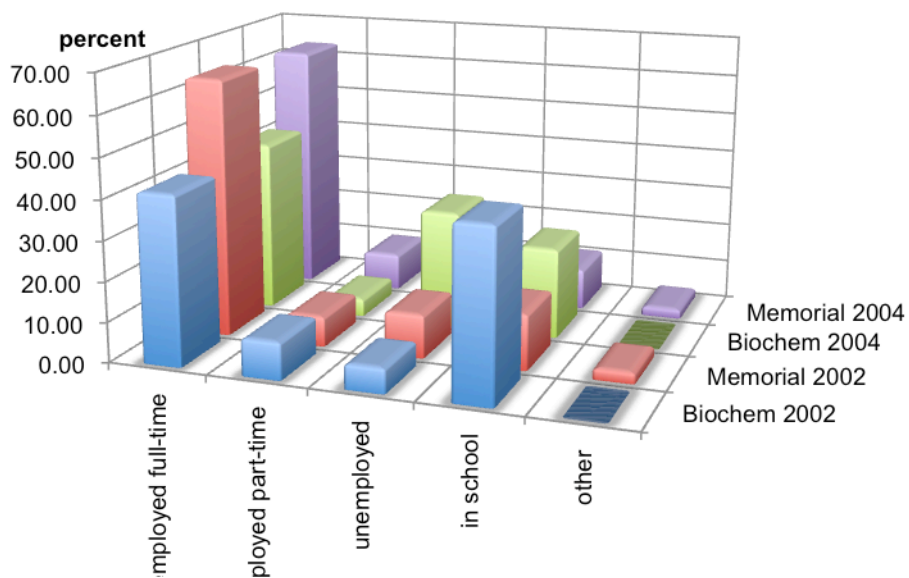
This pattern is essentially unchanged from that obtained in the 2002 CareerSearch Survey, which looked at students who graduated from Memorial University in the year 2000.

**Figure 2.16 • Comparison of Employment Status of Biochemistry Graduates in 2000 and 2002**

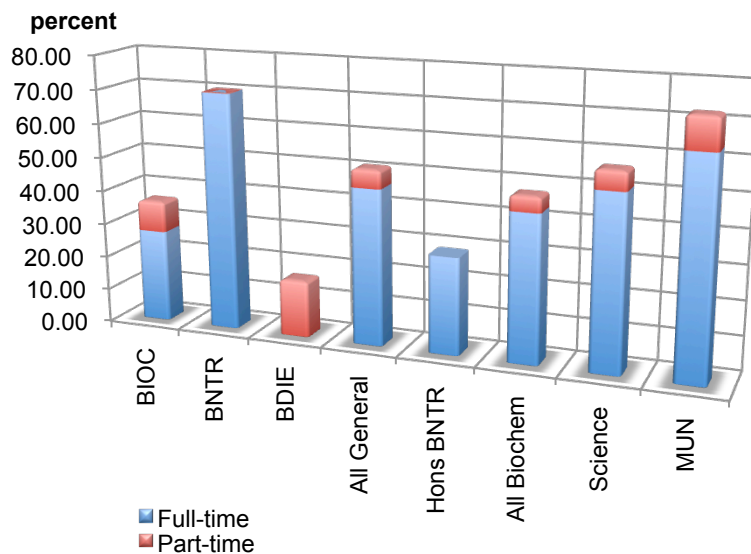
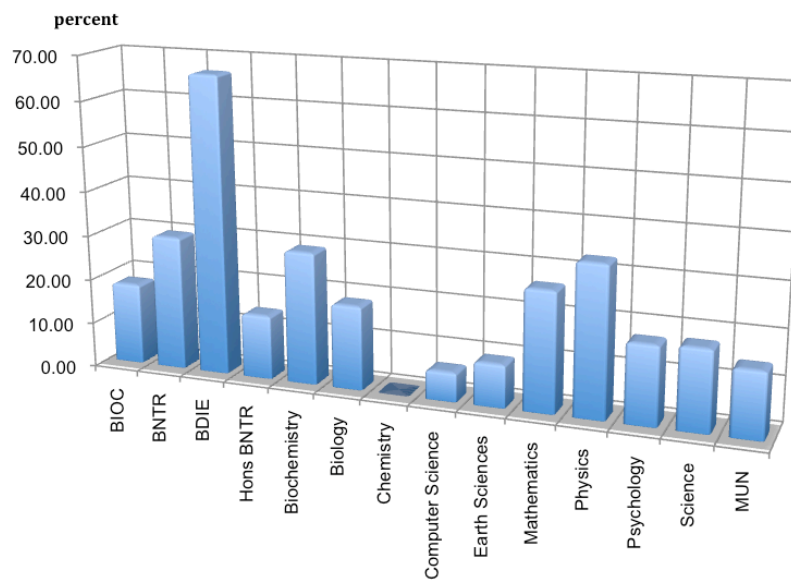


<sup>27</sup> Copies of the relevant tables from CareerSearch 2004 and from the earlier CareerSearch 2002 are included with the Supporting Documents.

<sup>28</sup> Full-time employment refers to any employment involving more than 30 hrs of work a week.

**Employment Status - BNTR****Employment Status**

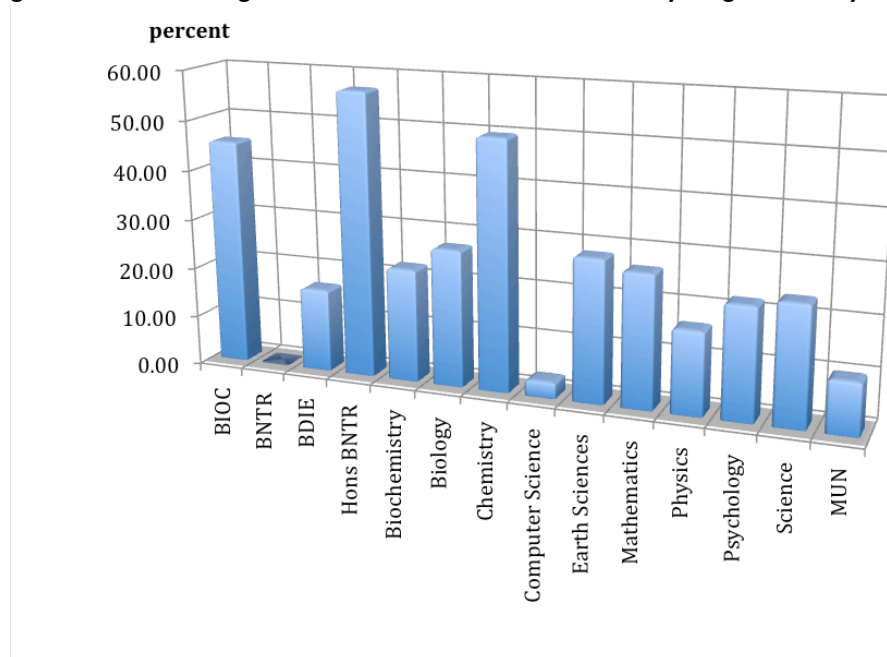
The percentage of our graduates who found full- or part-time employment after graduation compares well with that in other units of the Faculty of Science. It is noticeably lower, however, than that of the University as a whole. This can be explained by the number of our graduates who continue to professional or graduate schools.

**Figure 2.17 • Percentage of 2002 Graduates Employed by Department****Figure 2.18 • Percentage of Graduates Unemployed by Program and by Department**

With the exception of BDIE graduates, the percentage of graduates who were unemployed was consistent with other units in the Faculty and not all that different than the University as a whole.

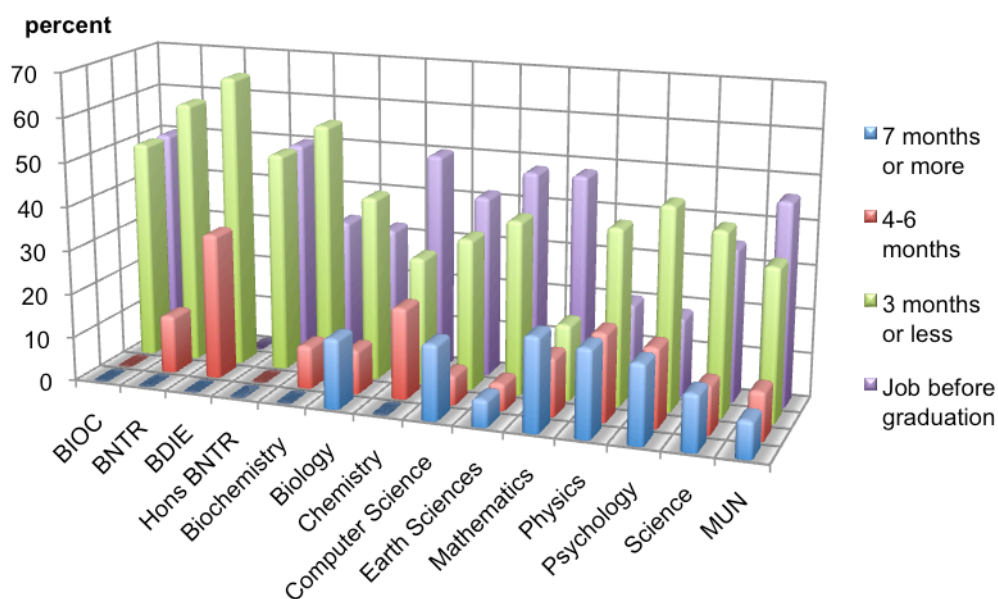
Since a degree in Biochemistry is seen as an entry point for careers in the health and allied health professions, it is not surprising that a higher percentage of our graduates were in school two years after graduation.

**Figure 2.19 • Percentage of Graduates in Further Education by Program and by Department**



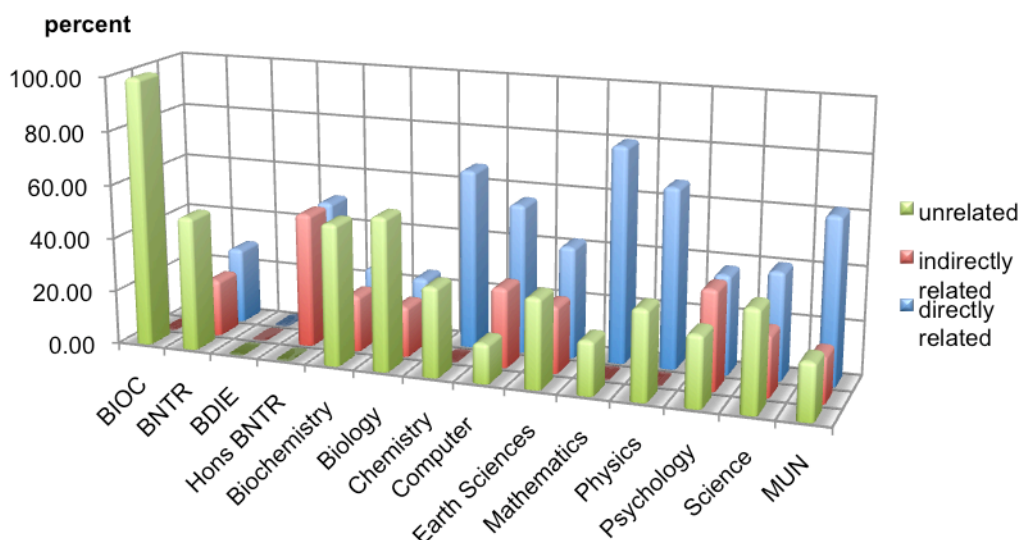
Of those students who were employed in full-time jobs at the time of the survey, most obtained them within 3 months of graduation. This success rate was similar with that of other departments and across the University.

**Figure 2.20 • Length of Time to obtain a Full-time Job**



For all of the Biochemistry graduates who responded, full-time jobs were at least partially related to their academic training in 47% of graduates. This is a lower percentage than found across all University graduates where the rate was 78%, however, it is reasonably similar to the rate found across the Faculty of Science (63%).<sup>29</sup> It can be seen that none of the BIOC graduates had jobs related to their programs, whereas 56% of all Nutrition graduates did.

**Figure 2.21 • Relation of Job to Academic Training by Program and by Department**



Eighty percent of our 2002 graduates were still in Newfoundland when surveyed two years later. Of those who had left the province, 4 were in Nova Scotia, 3 in Ontario, 1 in Alberta, and 1 was outside Canada. All of the BIOC majors, 74% of BNTR majors, 67% of BDIE majors, and 71% of BNTR honours students were in Newfoundland. These numbers are comparable with those of the Faculty of Science (77% in Newfoundland) and the University (78% in Newfoundland).

Biochemistry students did not depend on Student Loans to finance their education to the same extent as others. Overall, 60% of Biochemistry graduates reported that they did not have a government student loan. However, this varied a lot among the majors: 80% in the case of BIOC majors, 50% for BNTR majors, 33% for BDIE majors, and 71% for BNTR honours students. For comparison, 41% of University graduates did not have a loan. For those Biochemistry graduates who did have government student loans, the average amount was \$29,000. Once again, there was considerable variation among the majors: \$40,000 in the case of BIOC majors, \$30,000 for BNTR majors, \$14,750 for BDIE majors, and \$20,000 for BNTR honours graduates.

<sup>29</sup> Note that in the case of Biochemistry majors, there were only 3 who reported full-time employment; all reported it to be unrelated to their academic training.



### 3 Undergraduate Teaching Activity

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#### Programs Offered

As listed in the University Calendar, the following ten programs are offered by the Department of Biochemistry:

1. Major or Honours in Biochemistry
2. Major or Honours in Nutrition
3. Major or Honours in Dietetics<sup>30</sup>
4. Joint Honours in Biochemistry and Cell Biology/Microbiology
5. Joint Honours in Biochemistry and Chemistry
6. Joint Honours in Biochemistry and Physics
7. Joint Honours in Biochemistry (Nutrition)/Psychology (Behavioural Neuroscience)
8. Joint Honours in Biochemistry/Psychology (Behavioural Neuroscience)
9. Minor in Biochemistry
10. Minor in Nutrition

A chronology of program development in the department can be found in Table 1.1. The department's 2008-09 undergraduate Calendar entry can be found in Appendix 3.1, the modifications that will appear in the 2009-10 Calendar are in Appendix 3.2, the list of courses offered by the department are in Appendix 3.3, course descriptions for first year courses required for admission to the department are in Appendix 3.4, and the course descriptions of all the program courses that are provided by other departments are in Appendix 3.5.

Our core programs, the major and honours in Biochemistry have been in place since the beginning of the department. These programs were most recently revised in 1995 when our introductory and core courses were substantially revised. The first joint honours degree program (with Biology) was introduced in 1981-82. A second, with Chemistry, was introduced in 1990-91 in response to a student request for such a program; only a couple of students have since completed the program. Further joint honours programs with Physics and with Psychology followed in 1997-98. The joint programs with Psychology are our most successful joint programs. They can both be completed in 120 credit hours and are relatively free of timetable conflicts between the partner department offerings. A small number of students have completed the joint program with Physics.

In 1975-76, an honours degree for Nutrition majors was introduced. The program consisted of three years at Memorial University, and one year at Acadia University (followed by an honours semester at Memorial). This program was the forerunner of and became the Honours program for Dietetics majors in 1981-82<sup>31</sup>.

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<sup>30</sup> There have been no admissions to the programs in Dietetics since 2007. The programs are, in effect, suspended pending resolution of the future of the programs as well as the proposed Master's of Public Health Dietetics option.

<sup>31</sup> It is possible that this – and the Nutrition and the Food Science programs – was introduced in 1979-80 or 1980-81. At the time I surveyed the chronology of program development, I did not have a copy of those University Calendars to confirm this.

1981-82 also saw the introduction of a general and honours program in Food Science, and a general and honours program in Nutrition.

The mid 1990's saw a number of developments affecting the Dietetics, Food Science, and Nutrition programs. First, in order to establish what had become practice, a general degree in Dietetics was introduced in 1993-94. Second, in November 1994, in preparation for a proposed independent program in/Department of Food Science, the programs in Nutrition and Food Science were both revised and submitted to the Faculty of Science Council. The Food Science proposal was not presented to Faculty Council. This necessitated some revisions to the Nutrition program, which was approved. The department's Calendar entry from 1995-96 onwards no longer included an undergraduate program in Food Science.

Since then, other than the introduction of some new joint honours degree programs, there have been no substantive changes to the content of any of the department's programs.

In 2002, a proposal was formulated to introduce a Master's program in Dietetics based in the Division of Community Medicine, Faculty of Medicine. That proposed program was seen as replacing the undergraduate program offered in Biochemistry. At the same time, Dr. B. Roebathan, who had most responsibility for the undergraduate Dietetics program, had been hired by the Faculty of Medicine<sup>32</sup>. In view of these developments, the department wished to advise prospective students that our program would be discontinued and inserted a note in the University Calendar to that effect.

### **Major in Biochemistry**

All majors programs in the Faculty of Science require that students complete 120 credit hours, of which 78 must be science courses and at least 36 but no more than 45 credit hours must be courses in the subject of the major.

The major in Biochemistry consists of 30 credit hours in Biochemistry courses, plus Chemistry 2400, 2401 and Medicine 310A/B<sup>33</sup> which are counted as Biochemistry courses.

Students do not take Biochemistry courses in first year. Rather, most take a typical slate of first year university courses consisting of Biology, Chemistry, English, Mathematics, and Physics.

- Biology 1001/1002 provides a general background to biological systems; they are not required as prerequisites for any further program courses unless students wish to take further Biology courses.
- While Chemistry 1050/1051 provide the optimal entrée to the Biochemistry program in second year, students may also complete 1010/1011/1031. In this case, students must ensure that they complete 1031 prior to second year or they risk losing a year.

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<sup>32</sup> By mutual agreement between Dr. Roebathan and the Department, her appointment was changed to a Joint Appointment with the Faculty of Medicine on a transitional basis. She will move permanently to the Faculty of Medicine in September 2009.

<sup>33</sup> Medicine 310A/B is taught by the Faculty of Medicine but is cross-listed as Biochemistry 311A/B. Since 2004-05, our students have taken the course as Medicine 310A/B rather than as Biochemistry 311A/B.

- Two courses in English are required by University regulations.
- The Biochemistry degree requires two semesters of Calculus: 1000 and 1001. As with Chemistry, there is an alternative route in 1090/1000/1001. Completion of 1001 prior to second year is advisable so that second year Chemistry courses can be completed on time.
- Physics 1050/1051 provide a suitable background in Physics for further study in Biochemistry. Once again, an alternative route is 1020/1021/1051. In this case, completion of 1051 in second year will not delay programs.

Students are admitted to the major in Biochemistry on the basis of their academic performance in eight of their ten first year courses. The standard to meet is a 60% average.

Majors commence their formal study in Biochemistry in their second semester of second year once they have successfully passed their first semester of Organic Chemistry (Chemistry 2400). This is the key prerequisite for admission to Biochemistry 2101 and further progress in the program. In addition to these three courses, students must also complete Chemistry 2300 (Physical Chemistry). Other than these, students are free to complete elective courses. Many students take Statistics 2550, which is required in the honours program.

In third year, students become fully immersed in their programs. In the Fall, they complete Biochemistry 3106, and 3107. Most will also complete Medicine 310A and Chemistry 3100 in this semester, and many take Biochemistry 3200 as one of their subject electives. This semester is, without doubt, the most grueling of the program. In the winter semester, students complete Biochemistry 3105 and 3108, and most will complete Medicine 310B.

In fourth year, students must complete any remaining subject electives. They may choose from seven course offerings and must complete four of them<sup>34</sup>.

For students who take their program entirely at the St. John's campus, the major in Biochemistry includes six mandatory chemistry courses. Students can easily complete a minor in Chemistry through the completion of two additional Chemistry courses and many do so.

An information/advising sheet outlining the requirements of this program (and also our other programs) is available for download by students from our website, and a copy is provided to students when they declare a major, or as necessary when they visit one of the department's advisors. Copies of these sheets are included with the Supporting Documents.

### **Honours Degree in Biochemistry**

The honours program is a more demanding program and requires that students complete sixty credit hours in Biochemistry courses, 18 more than the major in Biochemistry.

In the first and second year of the program, the only difference between the major and the honours program is a requirement to complete Statistics 2550 in the latter.

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<sup>34</sup> With the introduction of a block of Special Topics course numbers, the number of offerings could be greater than seven if a Special Topics course is offered.

The third year of the program is similar to that of the major but with some distinctions, the most important of which is that Medicine 310A/B is required in the honours program (it is a subject elective in the major program). Chemistry 3410 or 3411 is also required in the honours program. In addition, students may take Chemistry 3500 instead of 3100. In practice almost all of our students (majors and honours) take Medicine 310A/B and Chemistry 3100 to ensure maximum program flexibility.

The fourth year of the honours program when students must complete 24 credit hours in Biochemistry courses provides a much greater emphasis and depth of biochemistry instruction. Students must complete a techniques course, a literature based seminar course, four fourth year subject courses from a choice of six, and a two-semester honours dissertation course.

As the honours program includes seven mandatory Chemistry courses, most honours students opt to complete the eighth course required to complete a minor in Chemistry.

### **Major in Nutrition**

The major in Nutrition consists of 33 credit hours in Biochemistry courses, plus Medicine 310A/B which are counted as Biochemistry courses.

As with the Biochemistry program, students take a typical slate of first year university courses usually consisting of Biology, Chemistry, English, Mathematics, and Physics. However, there are differences in some of the first year requirements.

- Either Chemistry 1010/1011 or Chemistry 1050/1051 provide an entrée to the Nutrition program as either will permit students to meet the second year Chemistry requirement.
- The Nutrition program does not require a second semester of Calculus, thus either Math 1090/1000 or Math 1000 alone will permit students entry to the major.
- Either Physics 1020/1021 or Physics 1050/1051 will permit students entry to the major.

As with Biochemistry, students are admitted to the major in Nutrition on the basis of their academic performance in eight of their ten first year courses and the same academic standing is required. However, it has recently been noted that prospective Nutrition majors can meet this standard by counting fewer science courses than is the case with prospective Biochemistry majors, and this should be addressed.

Nutrition majors also commence their formal study in Biochemistry in their second semester of second year. They must now complete Biochemistry 2000 or 2005, 2100, and 2101, Chemistry 2440, and Statistics 2550. Nutrition majors may elect to complete Chemistry 2400/2401 if they wish and if they have completed the appropriate first year Chemistry and Math courses. Many students also complete Biochemistry 2600 which is an introductory course in Nutrition designed for both science and non-science students alike.

There is some debate within the department about the appropriate level of Chemistry that should be required in the Nutrition program. The different Organic Chemistry requirements were also mentioned by undergraduate student representatives, who commented to the department Head that having the same requirements in both the Biochemistry and the Nutrition programs would put them on a more equal footing, and would help Nutrition students with core Biochemistry courses that they must take. More generally, the students asked that the program requirements for both degrees be evened out.

In third year, Nutrition students also become fully immersed in their programs. In the Fall, they complete Biochemistry 3106, 3200 and Medicine 310A. In the Winter semester, students complete Biochemistry 3201, 3402<sup>35</sup> and Medicine 310B<sup>36</sup>. Many students may also take one of three other biochemistry electives that are required<sup>37</sup>. If they do so in third year, they are most likely at present to take Biochemistry 3108.

In fourth year, students complete their two remaining required Biochemistry courses, and those who did not complete their choice of Biochemistry elective will take Biochemistry 4002<sup>38</sup>. By comparison with the biochemistry program, the major in Nutrition lacks breadth and depth, as well as choice at the fourth year level. A special topics course, Nutrigenetics and Nutrigenomics<sup>39</sup>, introduced in Winter 2009, may be a first step to rectify this weakness. Other topics for courses, e.g. Nutraceuticals, have been proposed but courses have not yet been developed.

### **Honours Degree in Nutrition**

As with Biochemistry, the honours program in Nutrition is a more demanding program that requires students to complete 60 credit hours in Biochemistry courses, 21 more than the major in Nutrition.

In the first and second year of the program, there is no difference between the major and the honours programs in Nutrition. Some students<sup>40</sup> will elect to take Biochemistry 2600 but this is not a required program course.

In the third year of the program, the only difference between the major and the honours programs in Nutrition is a requirement to take Biochemistry 3107 in the latter.

In the fourth year of the honours program students must complete 24 or 27 credit hours in courses which include a literature based seminar course, one mandatory Biochemistry course, a two-semester honours dissertation course, and three electives from a choice of twelve Biochemistry

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<sup>35</sup> Biochemistry 3402 has moved between Fall and Winter semesters over the years.

<sup>36</sup> In previous years, Biochemistry 3202 would also have been taken. It is not clear as of this writing whether the department will offer that course in future years.

<sup>37</sup> The number of Biochemistry electives will increase to nine in 2009-10 and could be greater if a Special Topics course is being offered.

<sup>38</sup> As of 2009-10, students will have a greater choice among Biochemistry electives.

<sup>39</sup> The course outline for Biochemistry 4240 (Nutrigenetics and Nutrigenomics) is included among the Supporting Documents.

<sup>40</sup> Of 120 registered Nutrition majors in Winter 2009, 22 have taken Biochemistry 2600, and 10 are enrolled in it.

courses and one Biology course<sup>41</sup>. As with the major in Nutrition, it is a weakness of the program that there is a lack of breadth, depth and choice at the fourth year level. A special topics course, Nutrigenetics and Nutrigenomics<sup>7</sup> introduced in Winter 2009, helps address this weakness but is not (yet) a permanent offering.

### **Dietetics**

In 1974, the department proposed what was then called a “Nutrition Major Program” designed to produce qualified dietitians and nutritionists. It consisted of three years of study at Memorial University, one year of study at Acadia University, and a final term at Memorial during which an honours dissertation would be written. The program was renamed the “Honours Program for Dietetics Majors” in the 1981-82 University Calendar<sup>42</sup>. The program was restructured in 1993-94 with the formal introduction of a general degree rather than an honours degree, since an honours degree was not required for admission to the professional internship. This program continued the agreement with Acadia University in which they would admit up to a maximum of ten students.

The program in its first three years was similar to that followed by the Nutrition majors with the following additional requirements:

- Biochemistry 2010 and 2011. Introductory Foods - an introduction to the science of food and food preparation.
- A course in Microbiology (either Biochemistry 3054 or Biology 3050)
- Business 1000 and 2000
- Psychology 1000 and 1001 or two Social Sciences courses
- A course in Computer Science

Completion of a professional internship is required before students are qualified to work as professional dietitians. Admission to the internship is regulated by Dietitians of Canada through a competitive process. Approximately 60% of our students have generally been successful in obtaining professional internships<sup>43</sup>.

The 1985 department review recommended that the teaching program at Memorial be expanded to accommodate the final year of the program. That recommendation was not acted on. In 1998, a proposal was drafted that sought to both integrate the final year of the program at Memorial and to integrate the dietetic internship into the program. The 1998 review committee recommended that the department finalise a plan to do this. Dr. J. Brosnan had some preliminary discussions with the St. John's Health care Corporation in 1999 about doing this but no plan was developed.

### **Joint Honours Programs**

The Department of Biochemistry offers five honours programs jointly with other units in the Faculty of Science: one each with the Departments of Biology, Chemistry, and Physics and Physical Oceanography; and two with the Department of Psychology.

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<sup>41</sup> From 2009-10, the number of Biochemistry electives will increase by one and could be greater if a Special Topics course is offered.

<sup>42</sup> This might have happened as early as the 1979-80 Calendar

<sup>43</sup> This number might be slightly higher when second attempt internships are considered.

Joint honours programs in the Faculty of Science require that the student complete either 120 or 135 credit hours depending on the program. The department's two joint honours programs with Psychology can be completed in 120 credit hours; all of the others require 135 credit hours. This is, without doubt, a contributing factor to the few joint honours degrees awarded in those three subjects.

The structure of joint honours program requirements also mitigates against easy completion. By and large, these programs were created by simply combining the honours program requirements from the individual departments without any further rationalization, for which agreement can be difficult to reach. The resulting programs, while academically very strong, can be a nightmare for the student to schedule.

The program requirements for our five joint honours programs are given in Appendix 3.6.

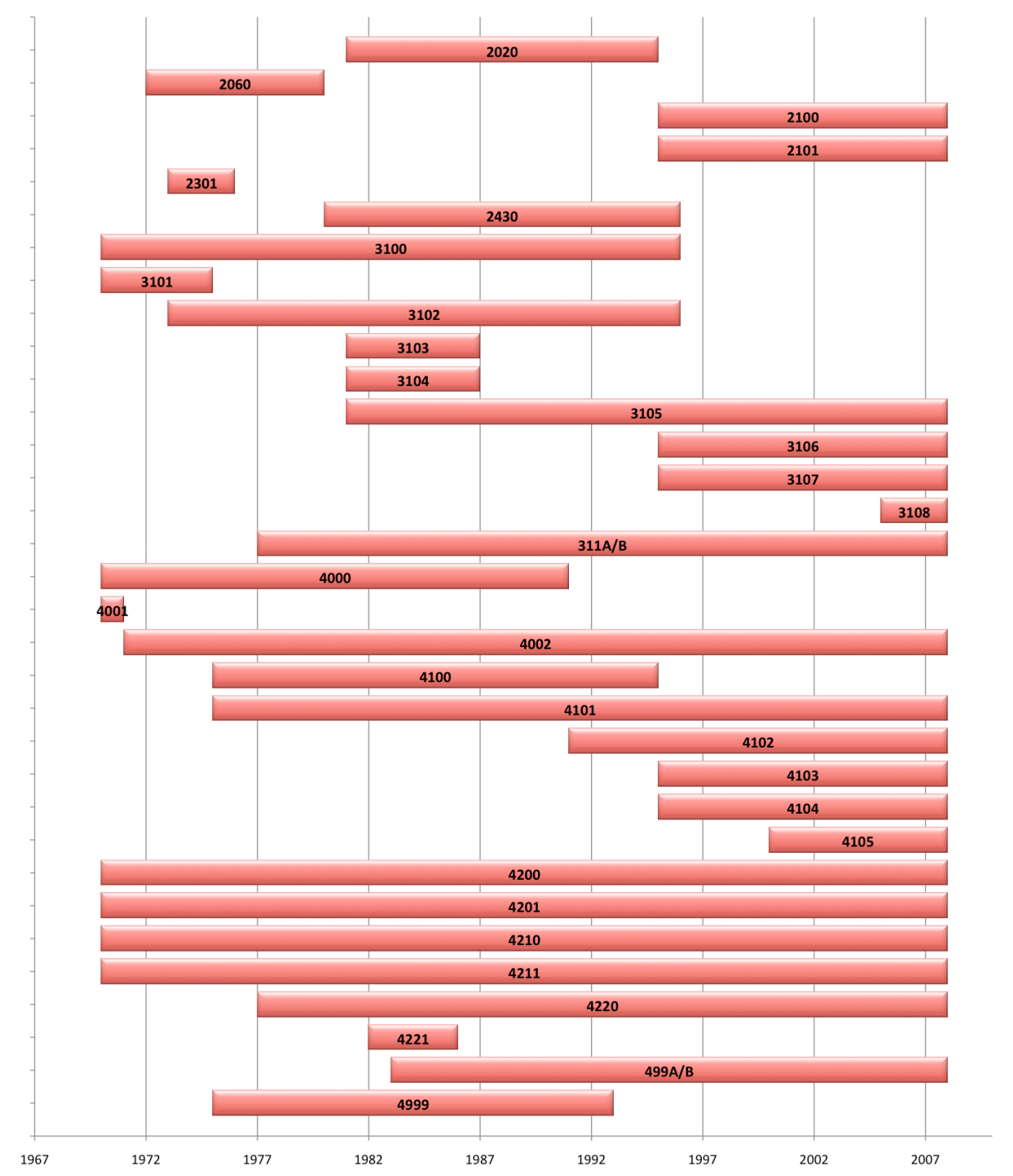
### **Programs for Minors**

The department offers two minors for students in academic programs outside the department. Faculty regulations require eight courses for a minor. The minor in Biochemistry combines courses in Biochemistry, Biology and Chemistry to permit both Biology and Chemistry majors to complete the programs. At least 4 Biochemistry courses must be completed. Up to 3 Chemistry or 2 Biology courses may, depending on the specifics of students programs, also be counted. The minor in Nutrition includes six Biochemistry courses plus Medicine 310A/B.

### **Course offerings**

The department currently offers 32 undergraduate courses, 19 of which can be considered as 'biochemistry' courses, and 13 as nutrition/foods courses. The current Calendar course descriptions are in Appendix 3.3.

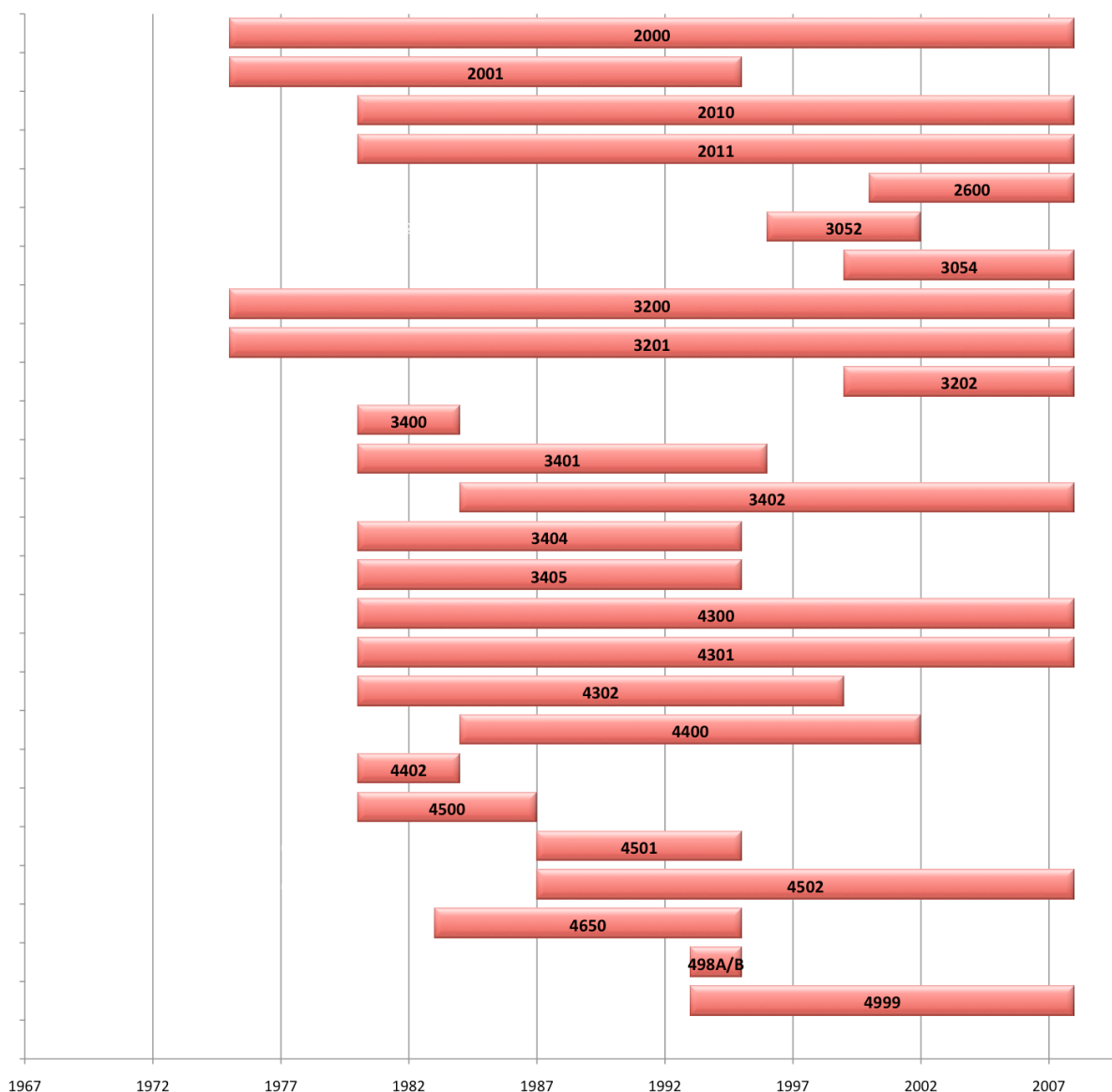
A chronology of our Biochemistry offerings is shown in Figure 3.1. As can be seen, four courses first introduced in 1972 are still on the books. In fact, Biochemistry 4200 has the identical Calendar entry now as it did when it was first introduced! Biochemistry 4210 and Biochemistry 4211 were originally laboratory project courses for fourth-year students. The format of both courses has changed. Biochemistry 4210 is now primarily a lecture course; Biochemistry 4211 is primarily now a literature-based course.

**Figure 3.1 • Timelines of Biochemistry Course Offerings**

A chronology of our nutrition/foods offerings is shown in Figure 3.2. Three of four courses initially offered in the late 1970s are still offered though course content may have changed. An expansion of offerings occurred in the early 1980s corresponding primarily to the introduction of the Food Science program. These courses continued to be offered until the mid 1990s when that program

was discontinued.

**Figure 3.2 • Timelines of Nutrition and Foods Course Offerings**



Some issues relating to our undergraduate course offerings are noted in Chapter 11. In addition to those it must be noted that the department has not much flexibility in its course offerings especially at the fourth year level. Retirement, illness, or sabbatical can mean that a particular fourth year course cannot be offered. When that happens, students find that their choices are narrowed. It can also be difficult to alert students in a timely manner when this happens.

Current plans and draft proposals of our Undergraduate Studies Committee to are briefly described in Chapter 12 and in Appendix 12.2.

## **Collaboration with other departments, schools, and faculties**

### **Teaching for other programs**

Biochemistry courses are required components of a number of other programs:

- All Biology majors must complete Biochemistry 2101 and 3106. A question the department has pondered for some time (see earlier reviews) is whether these courses should be offered without laboratory sections for Biology (and other non-biochemistry) majors.
- Starting from 2008-09, all Chemistry majors must now complete Biochemistry 2101 as part of their programs. This is an accreditation requirement of the Canadian Society for Chemistry. Students in the honours program in Chemistry are recommended to take Biochemistry 2100.
- Students enrolled in the major in Behavioural Neuroscience B.Sc. program must complete a Biochemistry course. The course is not specified but there are restrictions against the “foods”-themed courses.
- Three Biochemistry courses are required in the Bachelor of Science (Pharmacy) program: Pharmacy 2004 and Pharmacy 3111, which are cross-listed with Biochemistry 2101 and Biochemistry 3106, respectively. However, the Pharmacy courses do not include laboratories. There is provision for tutorial sections as required in both of the Pharmacy courses but these have not been held in recent years. Pharmacy students are also required to complete Biochemistry 2600.
- Biochemistry 2600 – cross listed as HKR 2600 – is required of students in the Bachelor of Kinesiology and Bachelor of Kinesiology(Cooperative) programs offered by the School of Human Kinetics and Recreation. When first introduced, teaching in this course was shared 50:50 with the School. However, since Winter 2004 the course has been taught entirely by faculty from the Department of Biochemistry. The department has recently been asked to consider developing a distance education version of this course.

### **Courses taught by others for our programs**

Three courses, taught by other units are available as integral parts of (some of) our programs.

- The Division of BioMedical Sciences teaches Medicine 310A/B, a two-semester linked course which is required of all Nutrition majors, Nutrition minors, and Biochemistry honours students, and is an option for all Biochemistry majors – one that is taken by most of them. The course is cross-listed as Biochemistry 311A/B but it has been taught only as the Medicine number since 2004-05.
- By agreement with the School of Pharmacy, five places are available to Biochemistry

students in Pharmacy 4105, which is cross-listed as Biochemistry 4105. First priority for these places is given to honours students in Biochemistry and Nutrition.

- The Division of BioMedical Sciences teaches Medicine 4300, which is cross-listed as Biochemistry 4220. There are five places available to Biochemistry students in this course.

### **Service teaching**

The department has taught a course in introductory Biochemistry and Chemistry for the School of Nursing since 1980<sup>44</sup>. Since the 2007-08 academic year, the course has been taught in two sections – one for students in the School of Nursing and taught on campus, and one for students in the Centre for Nursing Studies, which is taught at the Leonard J. Miller Centre. Prior to 2007-08, the course was taught as one section; this presented logistical problems in combining both groups of students, scheduling a time for the course, and finding a room for it. Split sections solves those problems at the cost of doubling the teaching time required. In 2007-08 and again in 2008-09, the department has also offered a section of the course in Spring semester at the request of the School of Nursing to meet the needs of their Bachelor of Nursing (Collaborative) Fast-Track program. Students in the Centre for Nursing Studies Licensed Practical Nurse (L.P.N.) bridging to Bachelor of Nursing program have also made use of this offering. The department has not committed to the Spring semester offering on a permanent basis.

### **Distance Education & Interdisciplinary programs**

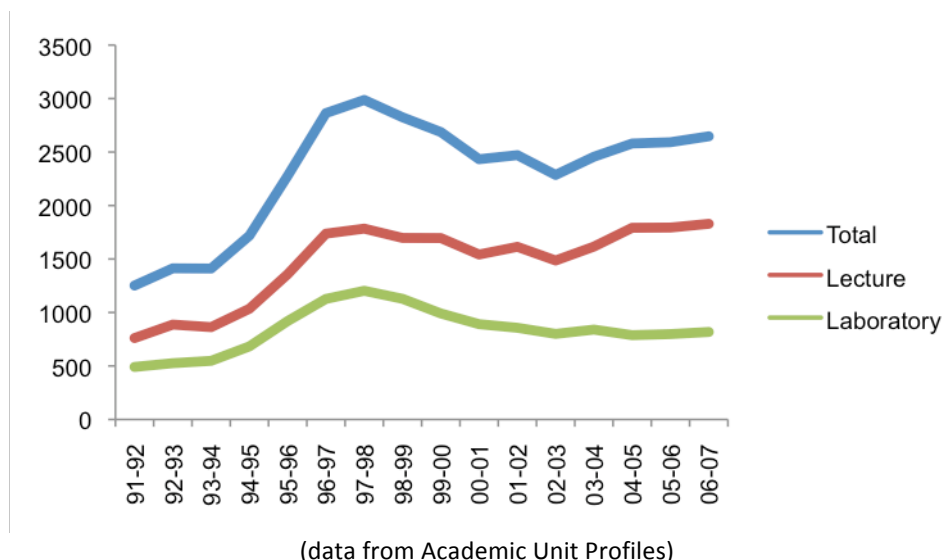
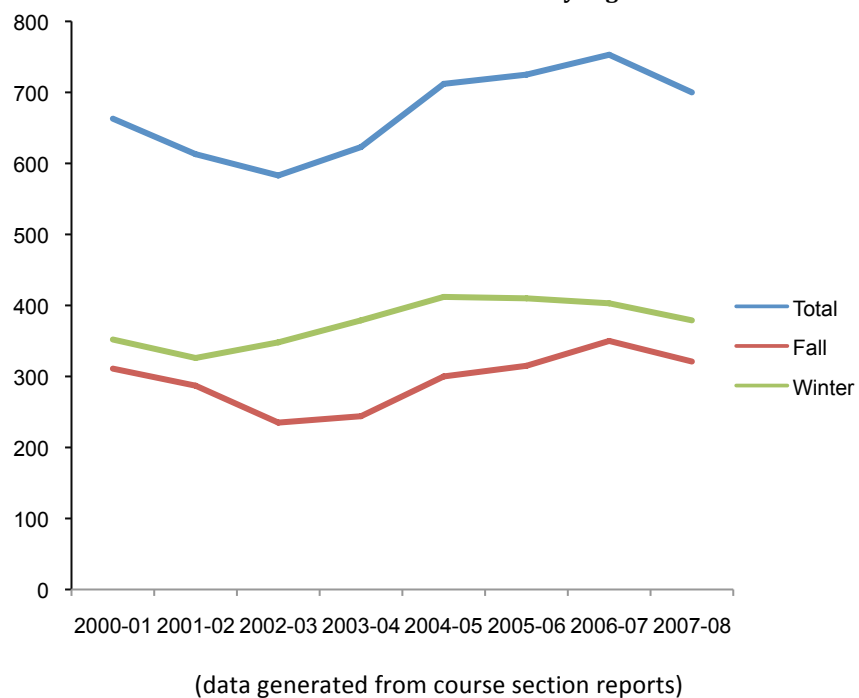
The department does not currently offer any courses by distance education nor does it participate in any Interdisciplinary programs at the undergraduate level. Drs. **McGowan** and **Nag** have participated in the Master of Philosophy in Humanities program.

### **Student demand and enrolment in courses.**

Enrolment in Biochemistry courses increased from 1252 in 1991-92 through the 1990s to an average of 2495 since 2000-01. The number of laboratory registrations has increased in concert and has remained steady over the past eight years. We have averaged 671 student laboratory registrations per year in 24 laboratory sections. Laboratory instruction is reasonably equally divided between Fall and Winter semesters.

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<sup>44</sup> The course was numbered Biochemistry 2430 from 1980-96. It was “re-jigged” and re-numbered to 1430 in 1997.

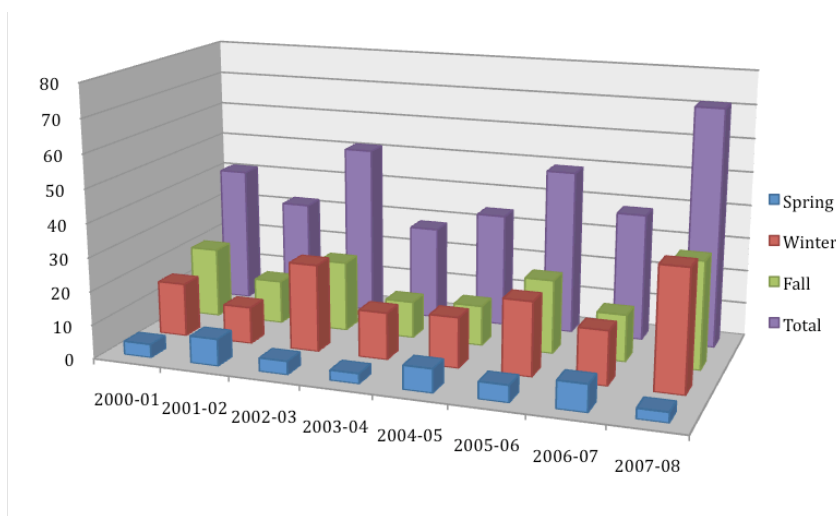
**Figure 3.3 • Registrations in Biochemistry Courses****Figure 3.4 • Number of Laboratory Registrations in Biochemistry Courses**  
number of laboratory registrations

Enrolment in some of our core courses is close to or at capacity. We are limited by the capacity of our student teaching laboratories and by our number of laboratory staff in the number of

laboratory sections that can be offered.

Our honours program is in demand, principally it is believed, because students view an honours degree as a factor in admission to postgraduate professional schools such as medicine.

**Figure 3.5 • Registration in Honours Dissertation Courses**



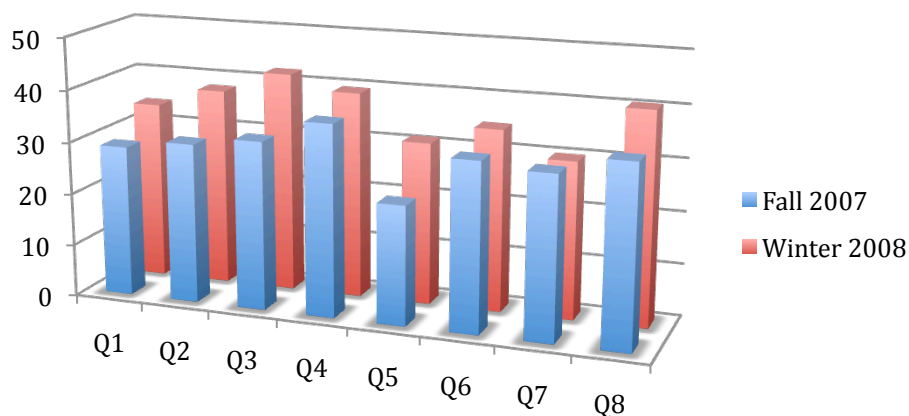
On average, there have been 20 honours students per year. The number of honour's students reached its highest number in 2007-08 when there were 36. Honour's students choose supervisors from within the department and from other units, mostly the Division of BioMedical Sciences, or occasionally the Ocean Sciences Centre.

## Indicators of Teaching and Program Quality

### (a) Course Evaluation Questionnaires

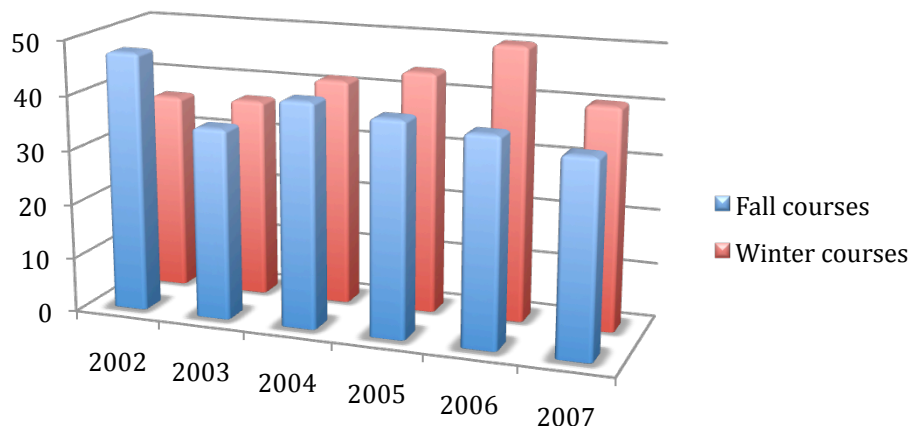
Mandatory course evaluations were introduced by the University in Fall 2001. Standard Course Evaluation questionnaires (CEQs) are distributed to students during a class period in the last two weeks of the semester. Since Winter 2004, the distribution and collection of CEQs has been handled by the department's office and instructional support staff. Faculty are not present in the classroom while CEQs are being completed by students. The results of the CEQs are provided to the course instructor early in the following semester. The Department Head receives the results for all courses taught by the department as well as a summary report with the aggregate results for all courses taught at the University.

The combined results for the Department of Biochemistry for the Fall 2007 and Winter 2008 semesters are presented below and in Appendix 3.7).

**Figure 3.6 • Aggregate Biochemistry CEQ results for 2007-08**

The results above illustrate the “average decile value” attained across all courses in each of the Fall 2007 (n=18) and Winter 2008 (n=19) semesters for each of the eight CEQ questions. The results show that the department scored in the lower third compared with the University as a whole on almost all these questions. The Faculty of Science as a whole scored mostly in the 20-30 decile range in Fall 2007 and in the 30-40 group in Winter 2008. The Department of Biochemistry generally scored one decile group lower than the Faculty in Fall 2007 and two groups lower in Winter 2008. The department scored least well on Q5, which asks students whether they were given constructive feedback on their written work (i.e. assignments and exams). The department scored best on Q8, which asks students to rate the overall quality of the instruction they received.

The data for Q8 (Overall Quality of Instruction) were compiled for those courses evaluated from 2002-03 onward and an “average decile value” estimated as above.

**Figure 3.7 • Aggregate Quality of Instruction 2002-2007**

While a steady increase is seen for Winter semester courses from 2003-2006, on the whole, the department's performance on this indicator has been consistent for the past six years. The average for Fall courses is 39 and for Winter courses it is 42.

It must be noted that the data obtained by the CEQs and its value as a measure of objective evaluation of teaching quality is controversial.

### **(b) 2005 Exit Survey**

In Winter 2005, the department commissioned an exit survey of its graduating students. The survey was developed and administered by Dr. Maureen Dunne and personnel from the Instructional Development Office. The survey instrument was administered to two classes, in which most of that year's prospective graduands were registered: one for the Biochemistry students and one for the Nutrition students.

Each group of students were asked the same set of six questions relating to their programs. Two questions asked which courses were most or least helpful to their learning. They were asked to recommend changes to specific courses, and whether specific courses should remain in the program. They were asked about their level of satisfaction with their education. And, they were provided an opportunity for open comment.

The full report from the Winter 2005 exit survey is presented in the Supporting Documents<sup>45</sup>.

The following is excerpted from the summary section of that survey:

*A number of themes emerged in the data collected from students. Overall, the majority of students stated that they were mainly satisfied with the education they had received in completing a degree in Biochemistry or Nutrition. They were generous in their comments about their positive experiences, however, in the comments that were made over all of the questions on the survey, there appeared to be fairly widespread consensus on two areas in which they would like to see changes or improvements. These areas are as follows; the issues are not listed in any priority:*

*According to students, the following course-related issues need to be addressed:*

- *Frequent repetition of same topics among courses*
- *Relevance of course content to current workplace environments*
- *Frequency and quality of laboratory experiences in the program overall*
- *Delivery mode of teaching in particular courses*
- *Structure of course requirements for degree programs*

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<sup>45</sup> A Curriculum workshop attended by the department's faculty was held on Dec 12, 2005 to discuss the results of the Winter 2005 exit survey. The workshop was moderated by Dr. Dunne. Her report of that workshop is included as Appendix 3.7.

*According to students, the following career-related issues require attention:*

- *Opportunities for work-related experiences in the field*
- *Opportunities for career information within the discipline*

The Winter 2005 exit survey also noted that “students were very pleased to be involved in the study” and “they participated in the study seriously and enthusiastically”.

Two points in the above were reiterated by representatives of the 2009 student class to the department Head.

First, they would like to see more career preparation offered for students. The department hopes to address this issue through the hiring of a Manager of Academic Programs (see below).

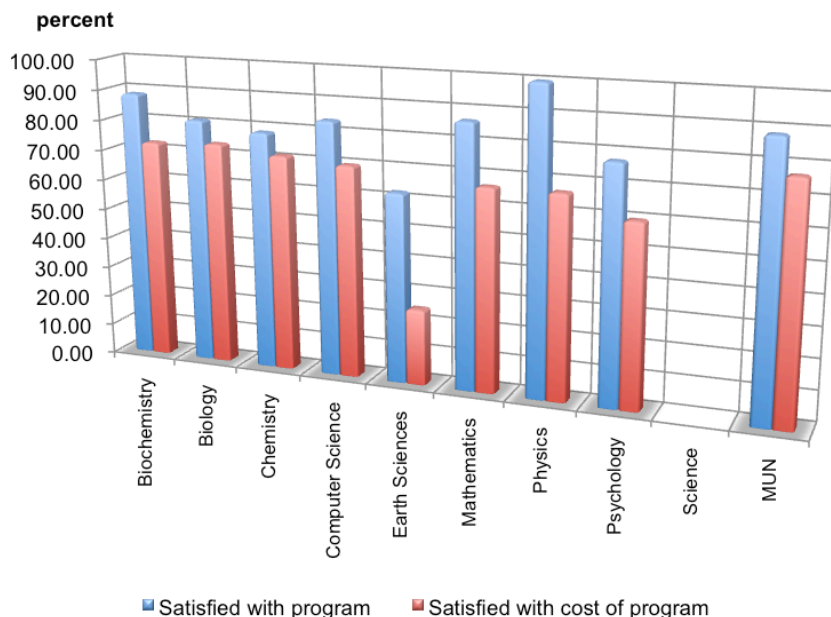
Second, they asked that the department address some issues relating to the teaching laboratories.

- Some courses have few laboratories, others have many. They viewed this as inequitable.
- Laboratories in some courses take too long to write up, do not complement the associated course material well, and are overly repetitive.
- Laboratory techniques (e.g. ion-exchange chromatography) mentioned in classes from 2<sup>nd</sup> to 4<sup>th</sup> year are not fully appreciated or understood because students never experience or get to see how they work in practice.
- For students who do not continue to professional schools, laboratory skills are an important asset for other career prospects.

The students suggested a model, not unlike the Field School model used by Earth Sciences, in which students would complete all of their laboratory exercises in the two weeks prior to the start of classes.

### **(c) 2004 CareerSearch Survey**

The 2004 CareerSearch survey asked students if their program was worth it and if the cost of the program was worth it. Overall, 89% of all Biochemistry graduates reported that they were satisfied with their programs. This is the same as the Memorial average. The breakdown among our majors was: 73% Biochemistry majors; 95% Nutrition majors; and 83% Dietetics majors. Students were less satisfied with the cost of their programs. Overall, 73% of our majors were satisfied with the cost, just a little lower than the Memorial average, 77%. The breakdown among our majors was: 82% Biochemistry majors; 65% Nutrition majors; and 50% Dietetics majors.



## Student advising

The department has a student advising office where students may seek advice on their academic programs and some (limited) guidance in career options that are available in Biochemistry and Nutrition. Two faculty members, Dr. M. Brosnan and Dr. R. McGowan, serve as undergraduate advisors. Students can book appointments with the advisors through the General Secretary in the Department Office. This model has worked well for the department since it ensures that students receive consistent and accurate advice on our programs.

In the past year, we have sought to hire a dedicated person to staff our undergraduate advising office. Filling the position, unfortunately, was stalled by ongoing labour negotiations between the University and the Lecturers Union, LUMUN. A further consequence was a need to re-define the position and its job classification. As this report is being written, those details have not yet been completely finalized but the department hopes to advertise the new position, Manager of Academic Programs (Undergraduate), in the very near future.

It is intended that the Manager of Academic Programs will both offer career-planning advice to students and arrange information presentations for our students on career options that they may wish to consider.

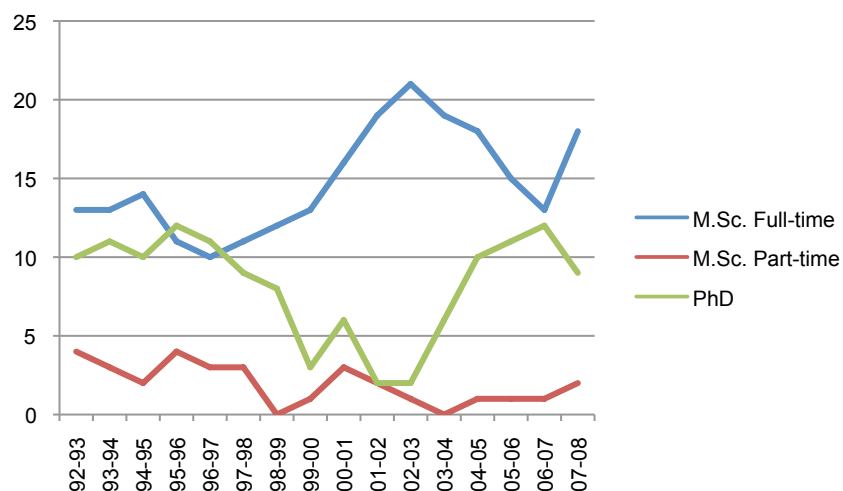


## 4 Graduate Student Information

### Number of full and part-time students in graduate programs

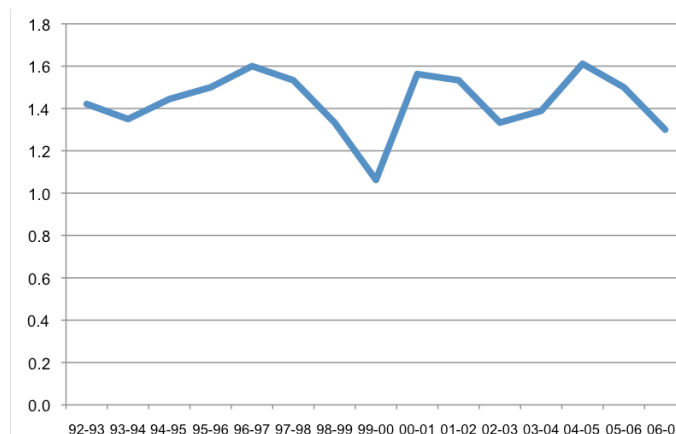
Based on data from Academic Unit Profile Reports, there were 29 graduate students registered in the department in 2007-08. Of these, 18 were full- and 2 were part-time M.Sc. students, and there were 9 PhD students. A list of our current graduate students is included as Appendix 4.1.

**Figure 4.1 • Graduate Student Registrations in the Biochemistry Department 1992-2008**



With the exception of a slight drop between 1998 and 2000, the total number of graduate students in the department has consistently been in the range: 25-30. The number of M.Sc. and PhD students has fluctuated. In general, there have been 15-20 M.Sc. students and ~10 PhD students in each academic year. Over the past fifteen years, the number of graduate students per regular full-time faculty member in the department has been consistent at 1.4.

**Figure 4.2 • Number of Graduate Students per Regular Faculty Member**



## Academic quality (academic averages) of students when accepted into programs

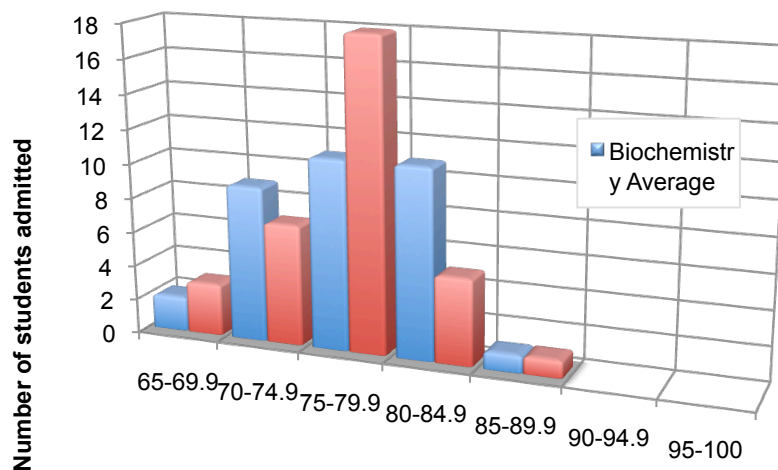
Of the 83 student admissions since Fall 1996, 35 had completed an undergraduate program at Memorial University, 9 came from Universities elsewhere in Canada, and 39 were International students. The 34 Memorial admissions represent 33 students (one student was admitted for both an M.Sc. and a PhD), four of whom were non-Biochemistry majors. (2 Biology and 2 Psychology).

TABLE 4.1 • Background of Graduate Admissions since 1996			
	BIOC	FOOD	Total
Canada	8	1	9
International	19	20	39
MUN	33	2	35
Total	60	23	83

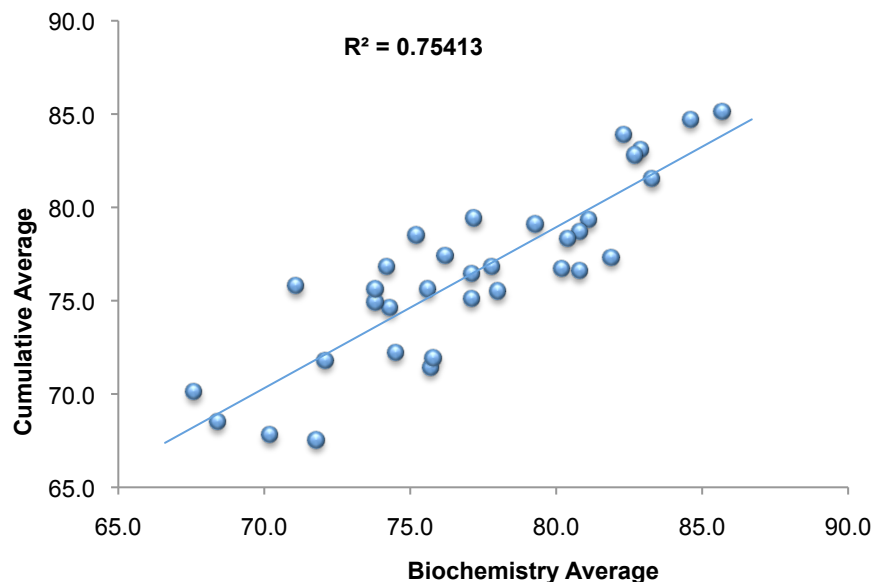
Four Biochemistry students were admitted directly into the PhD program. One had completed an M.Sc. at Memorial; two had done so elsewhere in Canada. Seven Food Science students were admitted directly into PhD programs; six had completed the M.Sc. in Food Science at Memorial, one had done so outside Canada. No student in the M.Sc. program in Food Science transferred to the PhD program. By contrast, 11 students transferred from the M.Sc. program in Biochemistry to the PhD program. On average, the time to transfer for these 11 students was 28 months (range 18-43 months).

An analysis of the undergraduate records of these 33 Memorial students indicates that this cohort had an average mark in the subject of their major of 77.2% with a cumulative undergraduate average of 76.5%. Marks ranged from 67.6% to 85.7% in the subject of the major and from 67.5% to 85.1% in cumulative average. Interestingly, the two students with the lowest marks in Biochemistry on admission have now successfully completed doctoral degrees.

Figure 4.4 • Academic Averages of Graduate Admissions since Fall 1996



**Figure 4.5 • Correlation between Cumulative and Biochemistry Averages of Graduate Admissions since Fall 1996**



Due to the difficulty of comparing marks from programs at other Canadian institutions and at International institutions, no similar analysis has been conducted for the other student admissions. In general, the department's criteria for admission as stated in the University Calendar are:

*To be considered for admission to a Master's program, the minimum requirements will normally be a second-class degree from a university of recognized standing, in an appropriate area of study. (School of Graduate Studies General Regulation 1.2.1.2)*

## Scholarships and other awards earned by students after entering program

### University Scholarships

Students are eligible to apply or be nominated for a number of scholarships administered by the School of Graduate Studies: Affinity NL (Ottawa) Scholarship; F.A. Aldrich Graduate Award; the William H. and Bertha Baird Memorial Scholarship; the Graduate Teaching Travel Award; the A.G. Hatcher Memorial Scholarship; the National Scholarship in Ocean Studies at Memorial University of Newfoundland; the Very Reverend Edward and Marjorie Rusted Harlow Travel Award; and, the J. Beryl Truscott Graduate Scholarship.

**Janice Mayne** (Supervisor: Dr. J. Robinson) was awarded the J. Beryl Truscott Graduate Scholarship in 1999-00.

We do not have complete records of our graduate student nominations for and success in receiving scholarships.

### **Biochemistry Department Scholarships & Awards**

There are no scholarships *per se* available to the department for award to graduate students.

However, the department does nominate students to receive the Barrowman Biochemistry Graduate Travel Award. This endowment provides funds for four or five awards each year so that graduate students registered in the Department of Biochemistry may attend scientific conferences. A student may receive this award only once during their program. However, students who transfer from the M.Sc. to a PhD program are eligible to receive a second award.

Since May 2007, the current Head has adopted the practice of awarding a book prize to doctoral graduands. This prize is awarded following the successful completion of the defence of thesis and is presented (when possible, in person) to the student when they submit the final corrected copy of their thesis.

*(NOTE: Graduate student support and funding is covered in Chapter 5)*

### **Faculty of Science Awards**

Students are eligible to apply or be nominated by the Dean of Science for the LGL Limited Scholarship in Marine Science.

Data was not collected for this report on whether any of our students have been nominated for one or more of these awards, or whether they have received any of these awards.

### **School of Graduate Studies Awards**

The title of ***Fellow of the School of Graduate Studies*** is awarded in recognition of outstanding academic achievement throughout a graduate program. It may be awarded only once, during the last year of a student's graduate program (though a student's last year sometimes lasts longer than expected). Recipients will have maintained a high academic standing, defined as an 'A' grade in each graduate program course or an 85 overall average in graduate program courses taken at Memorial University; and will have demonstrated performance of special merit in the graduate program which may include: an active and successful research program; publications, presentations or patents; and honours, awards or scholarships. This distinction is noted on the student's transcript.

Since 2000, fourteen graduate students have been awarded this distinction:

TABLE 4.2 • Biochemistry & Food Science Fellows of the School of Graduate Studies from 2000				
Academic Year	Student	Program		Supervisor
2006-07	Anas El-Aneed Terrence Madhujith	PhD PhD	BIOC FOOD	<i>Banoub Shahidi</i>
2005-06	Luckshman Jayakody Ying (Joy) Zhong	PhD M.Sc.	FOOD FOOD	<i>Hoover Shahidi</i>
2004-05	Homan Miraliakbari	M.Sc.	BIOC	<i>Shahidi</i>
2003-04	Michael Hayley Ahmad Khan	M.Sc. PhD	BIOC FOOD	<i>Heeley Shahidi</i>
2002-03	Fayez Haman Lavanya Ranganathan Zhou Yang	M.Sc. M.Sc. M.Sc.	BIOC BIOC FOOD	<i>Shahidi Robinson Hoover</i>
2001-02	Samudra Siriwardhana	M.Sc.	FOOD	<i>Shahidi</i>
2000-01	Anil Gunaratne Rene Jacobs Janaka Senanayake	M.Sc. PhD PhD	FOOD BIOC FOOD	<i>Hoover J. Brosnan Shahidi</i>

### Convocation Awards

**Anas El-Aneed**, who was supervised by Dr. Joe Banoub (Adjunct Professor of Biochemistry), received the 2006-07 Governor-General's Gold Medal for the best graduate thesis at the May 2007 session of Convocation for his thesis on "*Lipopolysaccharide Vaccine Candidates and Synthetic Liposomal Cholesteryl Neoglycolipids*".

### National Awards (NSERC & CIHR Fellowships)

Since 1998, six graduate students have held NSERC or CIHR graduate awards in the department:

TABLE 4.3 • NSERC & CIHR Postgraduate Fellowship Holders since 1998			
Academic Year	Student	Award	Supervisor
2006-08	Tamara Smith	NSERC PGS D	<i>McGowan</i>
2004-06	Lori Warford-Woolgar	NSERC PGS D	<i>Brunton &amp; J. Brosnan</i>
2002-04	Allyda Hansen	NSERC PGS A	<i>Herzberg</i>
2001-03	Cathy Murray	NSERC PGS A	<i>Cheema</i>
1999-00	Lori Stead	CIHR Doctoral	<i>J. Brosnan</i>
1998-00	Lori Stead	NSERC PGS A	<i>J. Brosnan</i>
1998-99	Rene Jacobs	CIHR Doctoral	<i>J. Brosnan</i>

## Attrition from and retention in programs

Starting from the Fall 1996 semester, there have been 83 admissions to graduate programs in the department: 61 to Master's programs, and 22 to Doctoral programs. By September 01, 2008, 46 students had completed their programs, 24 were in progress, and 13 withdrew or transferred elsewhere.

The following tables show students' progress in their programs:

<b>TABLE 4.4 • Progress of Biochemistry Graduate Students since 1996</b>			
	<b>M.Sc.</b>	<b>PhD</b>	<b>Total</b>
<b>Completed</b>	22	8	30
<b>In Progress</b>	13	6	19
<b>Withdrew or Terminated</b>	10	1	11
<b>Total</b>	45	15	60

<b>TABLE 4.5 • Progress of Food Science Graduate Students since 1996</b>			
	<b>M.Sc.</b>	<b>PhD</b>	<b>Total</b>
<b>Completed</b>	12	4	16
<b>In Progress</b>	3	2	5
<b>Withdrew or Terminated</b>	1	1	2
<b>Total</b>	16	7	23

Overall, 84% of admits completed their programs - 91% of Doctoral admits and 82% of Master's admits. The attrition rate in the Biochemistry programs (15.5%) is twice that of the Food Science programs (8.7%).

Of the 13 students who did not complete their programs, 3 were terminated by the School of Graduate Studies while the remainder withdrew for personal reasons (3) or changed to another program (Medicine (1), Business (1), Grad Studies in Medicine (1)). [Others unknown]

Three part-time M.Sc. students were admitted during this time period. One finished his program, one is in progress, and the third withdrew to attend the Faculty of Education.

### Average time to graduation

Of the 46 students admitted since Fall semester 1996 who have completed their programs, the average time to completion (months) was as follows:

<b>TABLE 4.6 • Time to Graduation (months)<sup>46</sup></b>		
<b>Program</b>	<b>M.Sc.</b>	<b>PhD</b>
<b>BIOC</b>	34	61
<b>FOOD</b>	31	57

Of the 13 students who did not complete their programs, the average time in program for the 10 Biochemistry M.Sc. students was 16 months. The remaining three students were in their programs for 15, 7 and 11 months.

### Student involvement in departmental governance

Historically, the department has not involved students in governance. However, the current Head of Department has made a practice of appointing graduate students to all of the department's committees (Table 4.7). This has not necessarily been universally welcomed.

<b>TABLE 4.7 • Graduate Student Membership on Department Committees</b>				
	<b>Undergraduate Studies</b>	<b>Graduate Studies<sup>47</sup></b>	<b>Safety</b>	<b>Equipment &amp; Research<sup>48</sup></b>
2004-05	Michael Hayley	Anas el-Aneed	Enoka Wijekoon	Terrence Madhujith
2005-06	Michael Hayley	Tamara Smith	Luckshman Jayakody	Kanta Chechi
2006-07	Robin da Silva	Tamara Smith	Luckshman Jayakody	–
2007-08 <sup>49</sup>	Robin da Silva	Tamara Smith	Luckshman Jayakody	–

<sup>46</sup> Includes the time for the examination process for the student's thesis.

<sup>47</sup> The Graduate Student member does not participate in the graduate student admissions process

<sup>48</sup> A Research & Equipment committee was not appointed in 2006-08.

<sup>49</sup> Committees appointed for 2006-07 continued in office through 2007-08.

The current Head's practice has been to appoint students in a PhD program to these positions rather than students in an M.Sc. program. To the extent possible, he has also appointed students who are not supervised by faculty serving on the same committee though this has not always been possible. In appointing a graduate student to the undergraduate studies committee, the Head has where possible appointed a student who graduated from one of our undergraduate programs.

### Post-graduation activities by students.

Fifty two (52) students have entered and left our programs since Fall 1996. Ten withdrew or transferred to other programs or were terminated due to failure to maintain active registration. The spectrum of career paths followed by these students is illustrated in Table 4.7:

<b>TABLE 4.8 • Graduate Student Career Paths<sup>50</sup></b>			
<b>Career</b>	<b>Total</b>	<b>Completed Programs</b>	<b>Did not complete programs</b>
Academic	8	8	
Allied Health	1	0	1
Business	1	0	1
Further Study	4	4	
Government	1	1	
Industry	4	3	1
Medicine	8	6	2
Personal	3	0	3
Research	2	2	
Research-PDF	13	12	1
Unknown	8	6	2

Eight students have pursued academic careers; four more are pursuing further studies (*i.e.* PhDs) that may lead to academic careers. Thirteen students are in postdoctoral research positions, 8 with Universities or University-affiliated institutions, 4 with industry, and 1 with Government. One of these left our program for another. Six students went on to do medical studies after completing their graduate programs (or after completing the bulk of their research); two students left their graduate programs for medicine without completing the former.

<sup>50</sup> Faculty were asked if they knew the current occupations of these 52 students. Based on their responses, the career paths were classified as indicated above.

## 5 Graduate Teaching Activity

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### Programs offered

The department currently offers the following graduate programs:

- Master of Science in Biochemistry
- Master of Science in Food Science
- Doctor of Philosophy in Biochemistry
- Doctor of Philosophy in Food Science

The Master of Science in Biochemistry has been offered since the department's founding. The Doctor of Philosophy was introduced in 1970.

The Master of Science in Food Science was introduced in 1986 and the Doctor of Philosophy followed one year later in 1987.

### Admissions

All applications for admission to graduate programs in the department are considered by the department's graduate studies committee. Following a department policy introduced in 1996 (*cf* Supporting Documents) only those files that are complete are considered. Once a month, faculty are notified of files that are available for viewing. Faculty who are looking to recruit a graduate student may review the files and indicate interest in the student. If they do, faculty are asked to provide a brief statement describing the project that the applicant would pursue.

When the viewing period is over, the files of applicants for whom no supervisor was identified are closed. The files of applicants for whom a supervisor was identified are examined for eligibility for admission. In addition, the committee examines the applicant's academic background and whether it is appropriate for the proposed project. The committee may recommend that the applicant take undergraduate courses if they believe their background is insufficient for the proposed project. Supervisors may appeal these recommendations to the Head.

Prior to recommending that a student be admitted, the Head verifies that the supervisor has funds, space and resources to support the student and that the admission of a new student will not adversely compromise the needs of other students in the laboratory.

Qualifications for admission are governed by School of Graduate Studies (SGS) Regulation 19.1 (Appendix 5.1). There are no additional departmental regulations.

### The Master of Science programs

Students admitted to the Master of Science in either Biochemistry or Food Science must follow the program of study described in sections 19.2 and 19.6 of the University Calendar (Appendix 5.2). This requires that the student complete a minimum of two graduate level courses. School of Graduate Studies regulation 19.3 requires that students obtain an A or B grade in each program

course in order to continue in the School of Graduate Studies and in order to qualify for a Master's Degree.

The program of study is formally the responsibility of the supervisory committee (SGS Regulation 19.6.3). In practice, it is largely determined by the supervisor at the time the applicant's recommendation is submitted. It is the case that, unless courses are specified at the time of admission, the student's program of study is generally not updated until they apply to graduate at which time deficiencies in their program paperwork can be problematic.

All students are expected to attend department seminars and they are required to present a seminar on their research, normally in their final semester of study. A list of all departmental seminars held in 2007-08 is in Appendix 5.3.

Masters theses are examined in accordance with the regulations described in section 1.2.10.3 of the general regulations of the School of Graduate Studies. When theses are submitted, supervisors submit the names of two external and two internal examiners. The Department Head or delegate then recommends one external and one internal examiner to the Dean of Graduate Studies.

### **Transfer to the PhD program**

The department's procedure for transfer of a Master's student to the PhD in Biochemistry is included in the Supporting Documents.

In order to transfer, a student must have completed all of their course requirements with high marks, and must be recommended for transfer by their supervisory committee. The student is required to present a seminar following which they will be examined on their work to date as well as on their proposed future research. A special examination committee is appointed by the Head (or delegate) for this purpose. The student must prepare a 10 page written report, preferably containing copies of the slides to be used during the seminar, in advance for the members of the examination committee.

Following a vote of the examination committee, the student may be recommended for transfer.

Prior to recommending that a student be transferred from the Master's to the PhD program, the Head once again verifies that the supervisor has funds, space and resources to support the student and that the continuation of the student will not adversely compromise the needs of other students in the laboratory.

The department has no separate formal procedures to govern the transfer of a Master's student to the PhD in Food Science. In the past, almost all Master's students in Food Science have completed their programs before seeking admission to the PhD program. The rare requests to transfer follow the practice used by students in the Biochemistry program.

### **The Doctor of Philosophy programs**

The regulations for our PhD programs are given in section 25.2 of the School of Graduate Studies section of the University Calendar (Appendix 5.4). The general expectations of students in the PhD

programs are broadly similar to those of the masters in science programs. The major difference is in the requirement for a comprehensive examination (described in the next section).

Admission to the PhD programs can occur through direct admission or following successful completion of the PhD transfer process. The department's admission requirements for the doctoral programs in Biochemistry and Food Science follow the General Regulations of the School of Graduate Studies which stipulate that the minimum requirements will normally be a Master's degree from a university of recognized standing. In addition, the department must be satisfied of the student's ability to pursue research at the Doctoral level.

The nature of an applicant's Master's degree and whether it must be thesis-based or whether it may be course and project-based has been controversial. The Department Head has asked the department's Graduate Studies Committee to examine this issue and to bring recommendations to the department.

The thesis examination procedure requires a public defence of thesis in front of three examiners, one external and two internal, appointed by the School of Graduate studies. When students submit their theses, supervisors submit the names of two external and three internal examiners to the Department Head. The Head or delegate then recommends examiners to the School of Graduate Studies.

### **PhD comprehensive examinations**

The general regulations for PhD comprehensive examinations are specified in section 1.2.8 of the School of Graduate Studies section of the University Calendar (Appendix 5.5). Within the department, the procedure for the comprehensive examination differs between the two PhD programs.

#### **Biochemistry**

The department introduced a new procedure for the Biochemistry comprehensive exam in 2005. So far, 7 students have been examined by the new procedure. The procedures are included in the Supporting Documents.

Where formerly students were examined on their knowledge of a textbook in general biochemistry or nutrition, they must now prepare a grant proposal on an assigned topic. The comprehensive examination committee, which is appointed by the Dean of Graduate Studies on the recommendation of the Head, suggests two topics to the student. The suggested topics are based on the student's general research area but are not directly connected to their thesis project. The student selects one of the two topics and prepares an initial draft outline proposal. Based on this, the examination committee will either approve the topic or require further clarification. Once the topic is decided, the student is allowed eight weeks to prepare their research proposal.

The comprehensive examination also includes an oral examination, which normally takes place a week after the date on which the written proposal is submitted. The student is examined on the details of the proposal as well as on the general area of the proposal.

The Department Head has asked the department's Graduate Studies Committee to review the success of the new format and to consider a couple of small modifications to it (*cf* Chapter 12).

**Food Science**

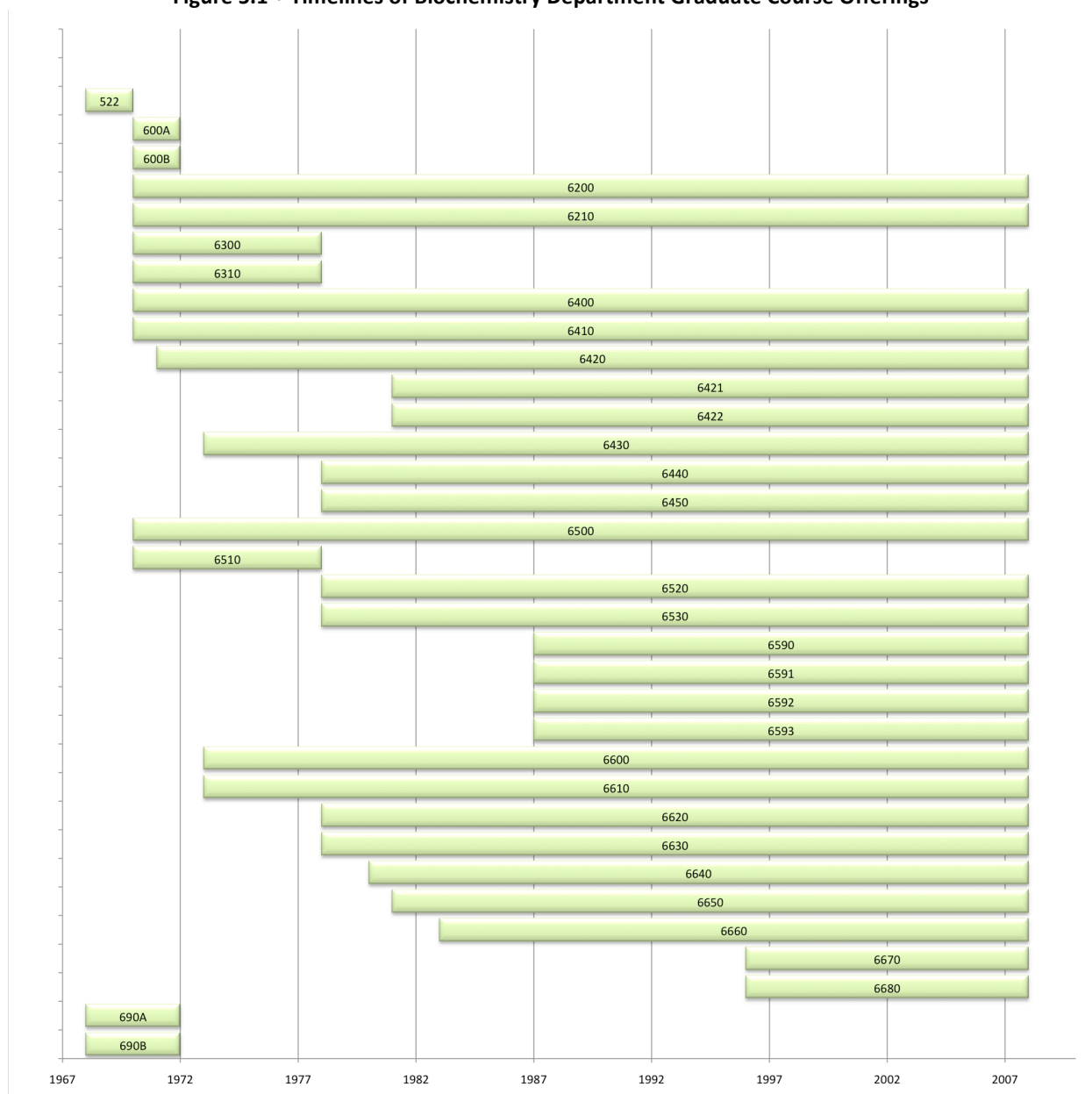
The department's regulations for the Food Science comprehensive exam are described in section 25.2.8 of the School of Graduate Studies section of the University Calendar (see Appendix 5.4).

The examination consists of a written multiple-choice examination in six specified areas of food science. This is followed by an oral presentation on an assigned research topic that may be related to the student's area of concentration. The student must then answer questions from the examination committee on this topic.

The Department Head has asked the department's Graduate Studies Committee to consider whether this examination should be changed to be the same as that for the doctoral program in Biochemistry.

**Graduate courses offered**

Twenty six graduate courses are listed in the department's graduate program entries in the University Calendar. They are listed in Appendix 5.6. A chronology of all of our graduate course offerings is shown in Figure 5.1.

**Figure 5.1 • Timelines of Biochemistry Department Graduate Course Offerings**

One thing stands out: with the exception of the eight courses introduced in its early years, the department has not dropped any graduate course once it has been introduced. Some of these courses have not been offered since the 1980's or earlier.

The Department Head has asked the department's Graduate Studies Committee to examine our current graduate course offerings to address questions of suitability, and content. He has also asked that they consider the possibility and practicality of introducing a common core course that would be taken by all of our graduate students (*cf* Chapter 12).

In 1996, the department established a principle of establishing regular graduate course offerings on a two-year cycle. Following a phase-in period, a rota of eight courses was established with four

Biochemistry and four Food Science courses. This rota, shown in Table 5.1, has formed the basis of graduate course teaching assignments since then.

<b>TABLE 5.1 • Rota of Graduate Course Offerings</b>			
<b>Biochemistry</b>			<b>Food Science</b>
<b>I</b>	Fall 1999	<b>6440</b> Membranes	<b>6650</b> Science & Technology of Seafoods
	Winter 2000	<b>6450</b> Proteins	<b>6530</b> Food Biochemistry
<b>II</b>	Fall 2000	<b>6590</b> Molecular Biology I	<b>6670</b> Biological Waste Treatment
	Winter 2001	<b>6400</b> Control of Intermediary Metabolism	<b>6680</b> Processing & Quality of Foods

Actual course offerings in the years since then have largely followed the rota except in cases where individual faculty members wish to offer a course out of sequence, or to offer a non-rota course. Doing so, however, is considered voluntary teaching by the Department Head and does not affect teaching assignments.

A comment made by the department's graduate students is that there is little to no public information available about our graduate course offerings.

The Department Head has asked the department's Graduate Studies Committee to examine two issues relating to the rota (*cf* Chapter 12):

- Is the current rotation the best one. Should we change the courses that are on the schedule and, if so, what should the new schedule be?
- How can or should the rotation of graduate course offerings be revised to ensure an equitable distribution of graduate teaching among faculty?

## **Student demand and enrolment in graduate courses**

For the most part, our graduate courses are taken only by students in our own programs. Enrolments are, therefore, low as shown in Table 5.2.

TABLE 5.2 • Graduate Course Offerings and Enrolments 1996-2008													
	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	
6400	3				12		3		5		4		BIOCHEMISTRY
6440		2				9		5		6	6		
6450		0		0		3		3				1	
6520			5					6					
6590			2		4		1		0		0		
6610								2					
6530	3		4	2	1	3	2	2		1	2	3	FOOD SCIENCE
6630			4			2		1	0				
6650							3	1		0	2	3	
6660	3	6		8	5		1						
6670		6				2			0		0		
6680	0		0		0		0		0		0	0/0*	
	<-- phase in period -->												
Note: enrollment numbers do not necessarily mean BIOC or FOOD students; other majors have enrolled on occasion, most commonly Biology and Environmental Sciences graduate students													
* Biochemistry 6680 was scheduled in both Fall and Winter 2007-08													
Shaded cells represent offerings as per the rota of course offerings													

It should also be noted that our students sometimes take graduate courses from Biology, Chemistry and Medicine, in order to fulfill their graduate program requirements.

## Support of graduate students

It is the policy of the department that all full-time graduate students must be supported financially. This support derives from several sources: external fellowships (e.g. NSERC or CIHR), supervisors' grants and School of Graduate Studies (SGS) fellowships (including special fellowships for holders of Canada Research Chairs). The level of funding was most recently revised in 2007 and became effective September 01, 2007<sup>51</sup>.

Students supported entirely from supervisors' grants must receive a minimum \$14,250 p.a. in the case of Master's students, and \$16,500 p.a. in the case of doctoral students.

<sup>51</sup> The current Department Head asked the department to review and increase graduate student support levels on appointment in 2004, and again on reappointment in 2007. If this pattern is continued, stipend support levels should be reviewed again in 2010.

Students who are awarded SGS fellowships are funded as follows:

<b>TABLE 5.3 • Support Components for Fellowship Holders</b>			
<b>Program</b>	<b>Fellowship amount</b>	<b>Supervisor Contribution</b>	<b>Total</b>
<b>M.Sc.</b>	\$6,750	\$10,500	\$17,250
<b>PhD</b>	\$7,500	\$12,000	\$19,500

Graduate fellowship monies are awarded to the department by the School of Graduate Studies using a formula based on ongoing enrollment. In 2007-08, the department received \$95,000 for fellowships. Within the department, fellowships are awarded to eligible graduate students<sup>52</sup> twice a year. Students in Master's programs are eligible to receive a maximum two years of fellowship funding support; students in doctoral programs are eligible for a maximum of four years funding. In the award of fellowships, the department makes an effort to ensure that they are broadly distributed. No Supervisor/laboratory can be considered for a third fellowship holder until each laboratory requiring two fellowships has received them; and the Graduate Studies Committee is instructed not to award a third fellowship to any laboratory until every laboratory that has two eligible students receives fellowships.

### **Demonstrating**

Graduate students in the department are also supported through demonstrating and teaching assistantships. This support is in addition to the support provided by supervisors and by fellowships. At the start of the academic year, students are asked if they wish to demonstrate, and what their general preferences for demonstrating might be. Course instructors are similarly asked if they have preferences for students. Students are assigned according to course need (first) and course preference (second). An attempt is made to ensure that all students within the department receive at least one full course assignment each semester<sup>53</sup>. A copy of the demonstrating list for 2007-08 is in Appendix 5.7.

The rate of remuneration for demonstrating is \$17.41 per hour as set by the School of Graduate Studies. The number of hours of demonstrating differs from course to course as shown in Table 5.4.

<sup>52</sup> Eligibility criteria are set by the School of Graduate Studies

<sup>53</sup> The department also employs graduate students from other academic units to help with specific courses. First preference, however, is given to students in our own programs.

<b>TABLE 5.4 • List of Demonstrating Positions in 2007-08</b>		
<b>course</b>	<b>position</b>	<b>hours</b>
1430	Teaching Assistant	160 <sup>1</sup>
2000	Teaching Assistant	80
2100	Teaching Assistant	40
2100	Demonstrator	64
2101	Teaching Assistant	104
2101	Demonstrator	96
2600	Teaching Assistant	80
3106	Teaching Assistant	40
3106	Demonstrator	80
3107	Teaching Assistant	80
3107	Demonstrator	80
3402	Demonstrator	80
4002	Teaching Assistant	112
<sup>1</sup> 2007-08 was the first year in which Biochemistry 1430 was offered in 2 sections and there was a one-time increase in hours		

Occasionally, the department has appointed a graduate student as per-course instructors. In the past, they would have received \$3800 for a full course. Such appointments are now covered by the LUMUN collective agreement and would receive \$4227 per full course.

### **Barrowman travel award**

Thanks to an endowment from **Gwyn Barrowman**, a graduate of the department, a number of awards are available annually to graduate students registered in the Department of Biochemistry, so that they may attend scientific conferences. Typically, four or five awards of \$400 are made each year.

## Collaboration with other departments, schools, faculties, universities, colleges.

Collaboration at the graduate level occurs in one of three ways:

- Through the appointment of an external member to a student's supervisory committee. In general, this would reflect an ongoing research collaboration of the student's supervisor and the fact that the student's project is part of that collaboration.
- Through a faculty member's appointment to the supervisory committee of a student in a graduate program outside the department. This may reflect a collaboration or a need for expertise.
- Through formal funded collaborative research projects. For example, **Tara Hughes**, supervised by Dr. R. Hoover, was supported by funding from the Saskatchewan Pulse Grower's Association; Dr. Qiang Liu (Agriculture and Agri-Food Canada, Guelph) was appointed to her supervisory committee and twice travelled to St. John's for supervisory committee meetings.

## Involvement with interdisciplinary programs.

**Dr. F. Shahidi** is a member of the Administrative Committee of the Master of Science in Aquaculture. The Head of Biochemistry is an *ex-officio* member of the committee.

Prior to his retirement, **Dr. A. Martin** was a participant in the Interdisciplinary program in Environmental Sciences, where he supervised a number of students.

## Supervisory committees

All graduate students in the department must have supervisory committees. This is required by the School of Graduate Studies in the case of doctoral students (SGS Regulation 1.2.9.2.2, Appendix 5.8) and by long-standing department policy in the case of Master's students. These committees are supposed to meet "at least annually" (SGS Regulation 1.2.9.3). This is a regulation that is honoured more in the breach than in the observance.

Normally, committees consist of the supervisor and two others for a total of three. The current Department Head has adopted a practice that, in the case of co-supervised students, the committees consist of both co-supervisors and two others for a total of four.

The Department Head has asked the department's Graduate Studies Committee to examine the following relating to supervisory committees:

- Introducing a requirement that students meet in the first month of a student's program
- Changing the responsibility for calling supervisory committee meetings from that of the student either to a responsibility or to a shared responsibility

- Formalising the practice of committees of four members in the case of co-supervised students.

## **Indicators of Teaching and Program Quality**

Enrolment in our graduate courses is too low to be evaluated using the Course Evaluation Questionnaires and we have not conducted an exit survey of our graduate students to assess their satisfaction with their program.

An indicator of the quality of our programs is the data found in Table 4.7 which shows that 23 of 52 former graduate students in the department are now pursuing Academic or Research-related careers.



## 6 Research and Creative Activity

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### Research Groups and Units

It is possible to organize the research activity of the department into four broad categories.

#### Metabolic Biochemistry

Broadly defined, metabolic biochemistry is the area in which the department's greatest strength lies. It is an area that sets us apart from other departments of biochemistry and in which we are unique in Canada. We have expertise in amino acid metabolism and diabetes (**J.T. Brosnan, M.E. Brosnan**), cholesterol, lipid metabolism and cardiovascular disease (**S.K. Cheema, P.J. Davis, G.R. Herzberg**). The biochemical approaches of the above complement the physiological approaches taken by **R. Bertolo** (CRC in Human Nutrition) and **J. Brunton** and valuable synergies have developed as a result.

Related work - though not with the same synergies - forms part of the research of **H. Hulan**, who has animal-focused rather than human-focused interests; **F. Shahidi** and **S. Ghazala** who have a foods-based approach; and **B. Roebathan** who is a community nutritionist.

Metabolic biochemistry is one area in which the department is currently seeking a new hire to secure existing strengths and synergies while at the same time complementing them and enabling new collaborations and directions to develop.

#### Molecular Biology

For a modern Department of Biochemistry, the department is significantly understrength in the number of faculty whose approach to research and whose area of interest falls under the broad rubric of 'molecular biology'. This is a fundamental weakness since this is the area that has been responsible for most of the conceptual and technical advances in biochemistry over the past two decades, and will certainly be a dominant research area for the foreseeable future. Currently, we have expertise in embryological development of the sea urchin (**J. Robinson**) and zebrafish (**R. McGowan** - joint with Biology), gene expression and development in cyanobacteria (**M. Mulligan**), and in neuroendocrine mechanisms regulating food intake and reproductive behavior in fish (**H. Volkoff** - joint with Biology). These areas of research are sufficiently diverse that synergies of the type that have flourished among faculty in the area of metabolic biochemistry have not developed. There is a clear need, therefore, to build capacity, to develop modern technical expertise, and to seek ways to create and develop synergies which the department hopes to do through the second new hire currently being sought by the department.

#### Structural and Macromolecular Biochemistry

For much of its history, the Department of Biochemistry has been a leader in research into areas of membrane composition and structure particularly in the area of lung surfactant, though this area

has never been represented by more than a few faculty members. Our current complement of faculty in this area is: **V. Booth** (CRC in Proteomics) who uses NMR to uncover structure-activity relationships in proteins, including those in lung surfactant, as well as molecular dynamics simulations, and other biophysical techniques; **K. Nag** also studies lung surfactant using biophysical and structural techniques to examine lung surfactant and biomembrane function and dysfunction; and **D. Heeley** investigates the structure and function of striated muscle proteins. **R. Hoover's** research interests in the structure and physicochemical properties of starches from cereals, legumes and tubers can also be considered under this rubric. While there are clearly commonalities between Dr. Booth's and Dr. Nag's research interests, Dr Heeley is our only protein biochemist. Furthermore, we have not had a faculty member with expertise in enzymology since Dr. Eric Barnsley retired in 1996. During a faculty meeting for Collegial Consultation in June 2007, the department identified structural and macromolecular biochemistry as the third priority area for a new hire.

## Food Science

The Food Science program, which was formally initiated in 1981 now consists of three faculty in with expertise in food processing methods and quality of processed foods (**S. Ghazala**), the structure and physicochemical properties of starches from cereals, legumes and tubers (**R. Hoover**) and in food components such as antioxidants and nutraceuticals and their biological activity (**F. Shahidi**).

## Awards and other recognition

Faculty in the department have, over the years, received a number of awards for their research and other accomplishments. Some examples are:

Notable awards from within the University are the University Research Professorships awarded to **J. Brosnan** (1990) and **F. Shahidi** (1998), and the Dean of Science Distinguished Scholar Medal awarded to **M. Brosnan** (1993) and **J. Brosnan** (2006). The department is home to two Canada Research Chairs (Tier II): **R. Bertolo** (Human Nutrition) and **V. Booth** (Proteomics). **W. Driedzic** who is cross-appointed to the department from the Ocean Sciences Centre holds the CRC (Tier I) in Marine Bioscience.

Career recognition awards that have been won by faculty in the department include the Borden Award (**J. Brosnan** and **G. Herzberg**) from the Canadian Society of Nutritional Sciences, the International Life Sciences Institute (ILSI) Leadership Award (**Bertolo**), the Bio-East Leadership Award (**H. Hulan**), the Distinguished Service Award from the Agricultural and Food Chemistry Division of the American Chemical Society (**F. Shahidi**) and the Stephen S. Chang Award from the Institute of Food Technologists (**F. Shahidi**).

Career support award from the granting councils have included MRC Visiting Scientist awards (**J. Brosnan** and **J. Robinson**), CIHR New Investigator Awards (**S. Cheema** and **K. Nag**), and a CIHR Senior Investigator Award (**J. Brosnan**).

**F. Shahidi** received an award from the Institute for Scientific Information in 2002 for the most published and one of the fifteen most cited in the discipline of Food, Nutrition, and Agricultural Sciences for 1991-2001.

Details of other awards received by faculty members can be found in their individual *curricula vitae*.

Graduate students in the Biochemistry and Food Science graduate programs have also been recognized for their research. Some examples are:

- **N. Senanayake** received the American Chemical Society, Agricultural and Food Chemistry Division, best paper award at the Fall meeting of the American Chemical Society in 2000.
- **T. Madhujith** received a best poster award at the Institute of Food Technologists annual conference in 2007.
- **S. Myrie** was selected as a finalist for the Nestle Graduate Student Competition at the CSNS/CSCN Joint Meeting in Toronto, 2008.
- **C. Perera** was awarded 1<sup>st</sup> place in the Carbohydrate Division, at the Institute of Food Technologists annual conference in 1998.
- **Kanta Chechi** was awarded the Matsumae International Fellowship (Japan) and spent six months on a collaborative research project at the Mukogawa Women's University, Nishinomiya, Japan.

## Postdoctoral Fellows

As of Sept 01, 2008, there were 4 postdoctoral fellows in the department. Dr. **Sarah Bourbigot** and Dr. **Tran-Chin Yang** working with Dr. **Booth**; Dr. **Jay Treberg** working with Dr. **J. Brosnan**; and, Dr. **Elaine Dodge** with Dr. **Brunton**.

These are not department-funded positions. Drs. **Dodge** and **Treberg** hold/held CIHR Postdoctoral Fellowship Awards (2008-10 and 2006-08, respectively). Dr. **Yang** is funded by Dr. Booth and Dr. **Bourbigot** is funded through Dr. Booth's research partnership with NewLab.

The presence of 3-4 postdoctoral fellows in the department in the past few years has been a welcome addition to our research strength and a valuable addition to the training of high quality personnel.

## Research Collaborations

Faculty members in the department collaborate with colleagues in the department, across the University, across the country, and Internationally. Some of the ongoing research collaborations undertaken by faculty in the department are given below. Further details about these and other collaborations may be found in individual *curricula vitae*.

- The piglet infrastructure established by Dr. **Bertolo** has been used extensively by himself and by other collaborators at Memorial University (Drs. **Brunton**, **J. Brosnan**, and **M. Brosnan** in Biochemistry; Drs. **K. Aziz** and **M. Critch** in Pediatrics). As a model system for investigating the critical role of neonatal metabolism on programming for risk of adult diseases, he has established collaborations with Drs. **J. Brosnan**, **Cheema**, and **McGowan** in Biochemistry, with Drs. **G. Martin** and **C. Walsh** in Psychology, with Drs. **J. McGuire**, **G. Sun**, and **B. VanVliet** in BioMedical Sciences, and with Dr. **L. Robinson** at the University of Guelph.
- Dr. **Booth** has a collaborative research project with NewLab Clinical Research Inc. on their AIF-funded “Psoriasis Target and Drug Development” project.
- Dr. **J. Brosnan** has current extramural collaborations with Dr. **O. Levillain**, University of Lyon, France; Dr. **M. Finegold**, Texas Children’s Hospital, USA; and, Dr. **R. Austin** at McMaster University.
- Dr. **Cheema** has collaborations with Dr. **J. McGuire**, Division of BioMedical Sciences on the regulation of vascular function by diet; and with Dr. **R. Goyal**, Baroda University, India, on the mechanisms of action of herbal extracts.
- Dr. **Davis** collaborates with Dr. **A. Salter**, University of Nottingham, UK, on the mechanisms by which n-3 polyunsaturated fatty acids influence lipid and lipoprotein metabolism.
- Dr. **Heeley** has a long-standing collaboration with Dr. **H. White**, Eastern Virginia Medical School, USA, an expert in stopped-flow myosin kinetics.
- Dr. **Herzberg** collaborates with Dr. **A. Storey**, Dept of Psychology on the use of fatty acid signatures to identify murre prey species.
- Dr. **Hoover** has formed a starch network in collaboration with Dr. **R. Chibbar** (University of Saskatchewan), Dr. **T. Vasanthan** (University of Alberta), Dr. **Q. Liu** (Agriculture Canada), Dr. **I. Altosaar** (University of Ottawa), and Dr. **K. Seetharaman** (University of Guelph).
- Dr. **Hulan** has a collaboration with Dr. **J. Zentek** at the Frei Univeristät Berlin on the use of diet to combat bovine mastitis. He also has collaborations with colleagues at the University of Veterinary Medicine, Vienna, and at the University of Ancona, Italy.
- Dr. **Shahidi** has established collaborations with colleagues in a number of countries in Asia (Korea, Japan, and Taiwan), Europe (Denmark and Poland) as well as in Canada and the USA.

## Research revenue

Members of the department pursue a number of funding opportunities including both CIHR and NSERC, which are the primary sources of operating grant funds in the department, and in recent years, the Canada Foundation for Innovation (CFI) has provided a significant and much-needed boost to the research of some faculty with considerable funding for infrastructure. Other sources from which faculty have received funds since 2000 are: the Hospital for Sick Children Foundation

(**Bertolo, Brunton**); the Canadian Diabetes Association (**J. Brosnan, M. Brosnan**); the Canadian Heart and Stroke Foundation (**Cheema**); the Canadian Centre for Fisheries Innovation, and the National Research Council (**Davis**); the Dept. of Fisheries and Aquaculture, the Atlantic Canada Opportunities Agency (**Davis, Shahidi**); Agriculture and AgriFoods Canada, and the Saskatchewan Pulse Growers Association (**Hoover**); and AFMNet, AquaNet, and the Agricultural Bioproducts Genomics Initiative (**Shahidi**). Locally, the Janeway Research Foundation has been a source of small research grants to some faculty (**Bertolo, J. Brosnan, M. Brosnan, Brunton, Nag, Roebbothan**). Dr. **Roebbothan** received funds from numerous sources for her Nutrition Newfoundland & Labrador study; these are listed in her *curriculum vitae*. In addition, Dr. **Brunton** was the recipient of an Ajinomoto Young Investigator Research Grant.

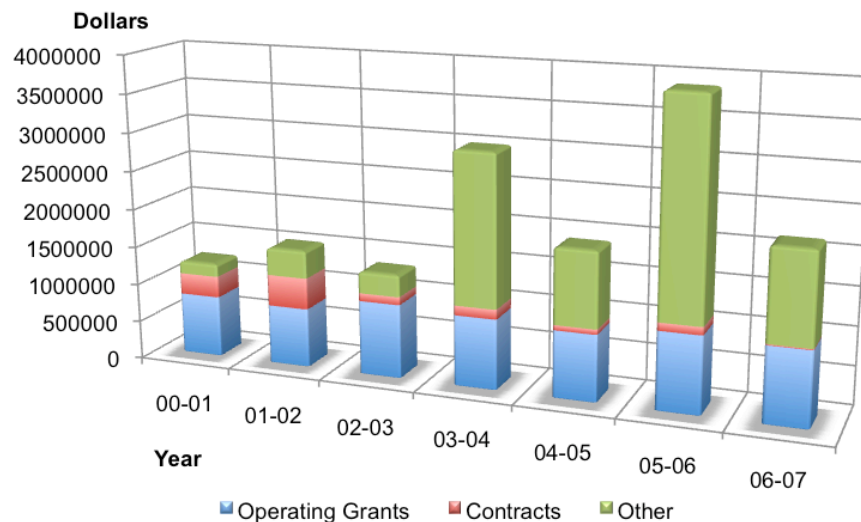
A list of the active operating grants for 2007-08 and 2008-09 can be found in Appendices 6.1 and 6.2, respectively. In 2007-08, funds awarded included \$277,184 from NSERC, \$504,548 from CIHR, \$136,187 from CFI, \$180,084 from the Atlantic Innovation Fund, and \$113,657 from other sources.

Total external research funding for the Department of Biochemistry for the period 2000-2007 is given in Table 6.3, below, together with total external funding for the Faculty and for the University<sup>54</sup> for comparison.

TABLE 6.1 • Total External Research Funding 2000-07					
Year	Total Funding \$\$ (Biochemistry)	Total Funding \$\$ (Science)	% of Science	Total Funding \$\$ (University)	% of University
2000-2001	1,245,342	17,727,177	7.03	31,813,434	3.91
2001-2002	1,543,955	18,820,662	8.20	34,044,372	4.54
2002-2003	1,352,125	22,198,308	6.09	37,611,779	3.59
2003-2004	3,012,990	26,447,833	11.39	58,492,010	5.15
2004-2005	1,912,082	28,392,162	6.73	61,850,349	3.09
2005-2006	3,884,757	29,503,721	13.17	68,809,970	5.65
2006-2007	2,171,315	30,174,134	7.20	69,117,377	3.14
(DATA from Academic Unit Profile Reports, CIAP)					

On average over this period, the department has accounted for 8.54% of external funding awarded to the Faculty of Science and 4.15% of external funding awarded to the University. A breakdown of our funding received in the past eight years reveals the major contribution played by funding other than operating grants.

<sup>54</sup> The Centre for Institutional Analysis and Planning (CIAP) does not include funding to the Faculty of Medicine in their data because “the scope of their activities and their operating formats are not consistent with other academic units” – hence the data is not included in the Academic Unit Profiles from which these numbers are drawn.

**Figure 6.1 • Total Funding received by the Biochemistry Department 2000-2008**

Over the past eight years, annual operating grant income has averaged \$899,208, which is equivalent to \$51,203 *p.a.* per full-time faculty member.

During the 1990s, research contracts provided a significant source of funds to members of the department, however, since then the amount of funds received from contracts has decreased and was \$14,474 in 2006-07.

A significant source of funds in the past eight years has been the infrastructure agencies: the Canada Foundation for Innovation (CFI) and the Atlantic Innovation Fund (AIF). In each of the years, 2003-2007, the total value of funds received from these sources exceeded that of the operating grant funds. This has arisen as a result of the large sums received from CFI for equipment. Seven members of the department have been successful in securing funds from CFI. **F. Shahidi**, together with colleagues from the Marine Institute, secured funds for an institutional project in establishing a Fishery By-Products Research Centre. **R. Bertolo** obtained funds for infrastructure on his appointment as Canada Research Chair in Human Nutrition and again on his reappointment. The five others (**Booth**, **Brunton**, **Cheema**, **Nag**, and **Volkoff**) won CFI New Opportunities awards. A list of the awards received from CFI is presented in Table 6.2.

**TABLE 6.2 • CFI Awards received 2000-08**

<b>Project</b>	<b>CFI Amount</b>	<b>Total Award</b>	<b>Program</b>	<b>Date Awarded</b>	<b>Principal Investigator</b>
Fishery By-Products Research Centre	\$890,800	\$1,628,818	Innovation Fund	Jan 2002	Shahidi
Piglet Model of Metabolism	\$113,524	\$283,811	CRC Chairs Infrastructure Fund	Oct 2002	Bertolo
Amino acid nutrition & metabolism	\$257,947	\$649,619	Leaders Opportunity Fund (CRC Chairs)	Mar 2008	Bertolo
Regulation of gene expression by nutrients	\$67,971	\$184,653	New Opportunities Fund	Dec 2000	Cheema
Laboratory for physico-chemical imaging and analysis of biomaterials	\$209,678	\$524,196	New Opportunities Fund	Oct 2003	Nag
Endocrine regulation of feeding in fish	\$82,253	\$127,260	New Opportunities Fund	Oct 2003	Volkoff
Amino acid requirements of infants and children	\$71,774	\$202,114	New Opportunities Fund	Jun 2004	Brunton
NMR Spectrometer for High Resolution Structural Studies of Membrane Protein	\$703,065	\$2,570,670	New Opportunities Fund	Mar 2005	Booth

In addition to the above awards from CFI, major infrastructure awards received by faculty in the department over the past eight years are: Dr. **V. Booth** is a partner with NewLab Clinical Research Inc. on their AIF funded "Psoriasis Target and Drug Development" Project (total project funding is \$2,247,621; her award was \$941,200), and a CFI award to Dr. G. Paterno in the Faculty of Medicine ("QStar tandem mass spectrometer for the analysis of molecular structures and interactions", \$1,329,971) on which Drs. **Bertolo**, and **J. Brosnan** were co-investigators.

### **CIHR Awards**

Over the past eight years, ten faculty members of the department have held awards from CIHR/MRC:

<b>TABLE 6.3 • CIHR Awards held 2000-present</b>			
<b>Name(s)</b>	<b>Award \$<sup>55</sup></b>	<b>Dates</b>	<b>Program</b>
<b>Individual Grants</b>			
Bertolo, R	\$149,038	2005-07	CIHR-RPP
	\$50,000	2004-05	CIHR-Pilot Project
	\$73,223	2003-04	CIHR-IHDCYH
Booth V	\$330,600	2006-09	CIHR-RPP
Brosnan, J	\$6,645	2006	CIHR-STRV
	\$716,949	2004-09	CIHR
	\$508,564	2000-04	CIHR
Brosnan, M	\$242,856	2000-03	MRC
Brunton, J	\$331,641	2007-11	CIHR check
	\$157,172	2004-07	CIHR-RPP
Cheema, S	\$190,668	2001-04	CIHR-RPP
Heeley, D	\$260,190	2003-06	CIHR-RPP
	\$150,984	2000-03	CIHR-RPP
	\$115,255	2001	Equipment
Keough, K	\$228,703	2000-02	CIHR
	\$67,500	2002-03	CIHR
Nag, K	\$165,120	2002-05	CIHR-RPP
<b>Multiuser or Team grants</b>			
<b>Bertolo, R;</b> J Brosnan; R McGowan	\$100,000	2007-08	CIHR
<b>Bertolo, R;</b> J Brosnan; R McGowan	\$205,197	2008-11	CIHR-RPP
Brosnan, J; M Brosnan; R. Bertolo; J Brunton	\$302,036	2005-08	CIHR ♣
Brosnan, J; M Brtosnan; S Cheema; D Heeley	\$70,833	2002-03	Equipment
Keough, KMW; K. Nag; V. Booth	\$504,225	2003-07	CIHR ♣
Robinson, J; P Davis	\$207,708	2000-03	MRC-RPP

Notable among our CIHR grant holders are **Dr. J. Brosnan** and **Dr. Keough** who have held MRC/CIHR funding continuously since 1972.

<sup>55</sup> The amounts listed are the total amount of the award over the period indicated.

## NSERC Awards

The Observatoire des Sciences et des Technologies (OST) at l'Université du Québec à Montréal provides a powerful search engine of NSERC awards made since 1991-92. Table 6.5 summarises all NSERC research awards<sup>56</sup> made to the Department of Biochemistry since 1991:

<b>TABLE 6.5 • NSERC Research Awards to Biochemistry 1991-2007</b>		
<b>program</b>	<b>number of awards<sup>57</sup></b>	<b>total value of awards</b>
Bilateral Exchange Program (H)	1	\$2,036
Collaborative Research and Development Grants - Government (H)	8	\$62,550
Conference Grants (H)	1	\$15,000
Discovery Grants Program - Individual	142	\$3,488,043
Research Tools and Instruments - Category 1 (<\$150,000)	6	\$180,975
Strategic Projects - Group	7	\$443,850

The department's success rate in obtaining NSERC Discovery Grants has been consistent since 2000-01 with 8 or 9 faculty members holding a grant in any given year. As of March 31, 2008 ten full-time faculty members in the department hold either NSERC (8) or CIHR operating grants:

<sup>56</sup> USRAs and postgraduate fellowships are not included in the table

<sup>57</sup> Each year that a grant is held counts as an award in this analysis.

**TABLE 6.1 • Current NSERC grant holders in the Biochemistry Dept**

NAME	GSC <sup>58</sup>	Amount	Year
Bertolo		\$39,000	4/4
Booth, V	32 (CB)	\$32,000	3/5
Brunton, J	1011 (IAB)	\$28,436	2/5
Cheema, S	1011 (IAB)	\$38,900	4/5
Hoover, R	3 (PBFS)	\$27,048	2/5
McGowan, RA	33 (MDG)	\$36,500	2/5
Nag, K	32 (CB)	\$25,000	2/3
Robinson, J	32 (CB)	\$29,300	4/4
Shahidi, F	3 (PBFS)	\$40,000	3/5

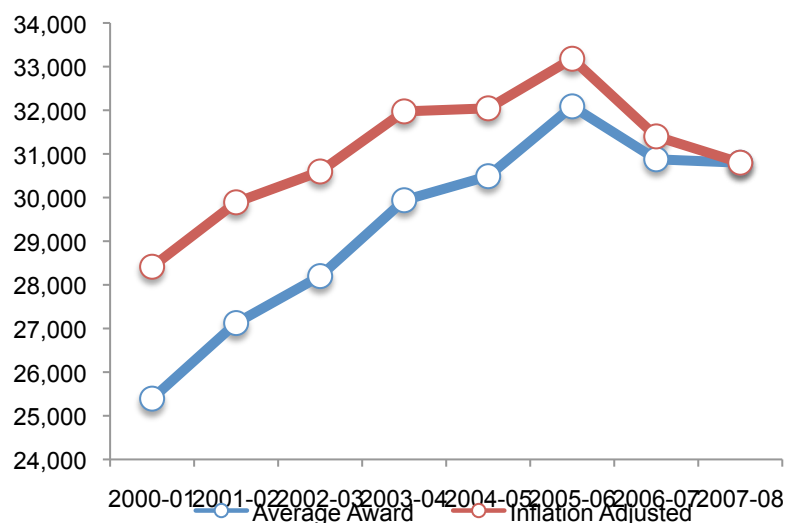
Notable among these, Drs. **Hoover** and **Shahidi** have been continuously funded by NSERC since 1985 and 1986, respectively. Dr. **McGowan** has been continuously funded since 1991 first at the University of Manitoba and, since 2003, at Memorial University. Drs. **Heeley** and **Robinson** have held Tri-Council funds for continuous periods since 1991 and 1987, respectively, with a gap of one year.

For the analysis below, data on individual discovery grants awarded from 2000-01 until 2007-08 was obtained for each of the six Biochemistry departments based in Faculties of Science that are included in the Maclean's list of Comprehensive Universities (see Chapter 1).

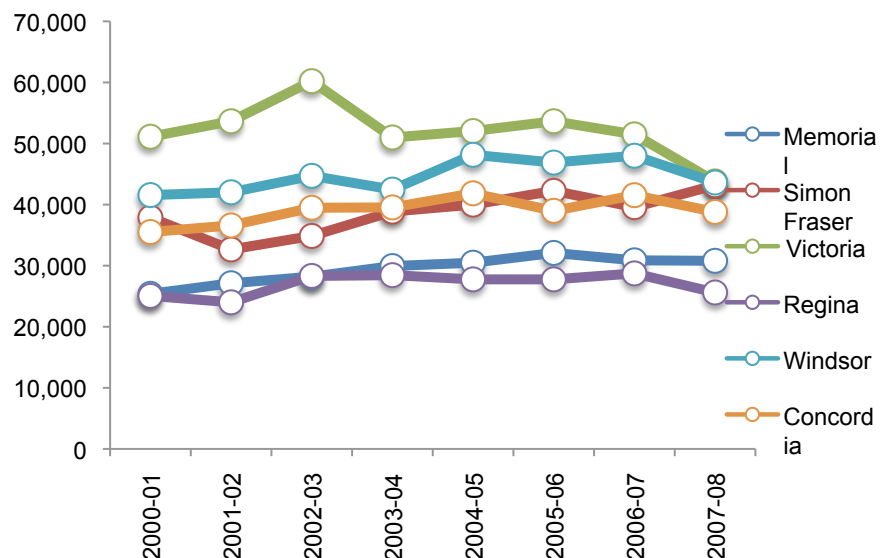
This department received ~5% of all Discovery Grants made to Biochemistry departments during this period. The value of the awards made to us is ~4% of the total. The average individual award has increased from \$25,393 to \$30,798 in the past eight grant cycles. Adjusted for inflation, this still represents a modest growth in the amount of the average award.

58

CB = Cell Biology (Average National Award \$36,972)  
 IAB = Integrative Animal Biology (Average National Award = \$35,712)  
 MDG = Molecular & Developmental Genetics (Average National Award = \$38,771)  
 PBFS = Plant Biology & Food Science (Average National Award = \$39,190)

**Figure 6.2 • Average NSERC Discovery Grants Awarded (\$) 2000-2008**

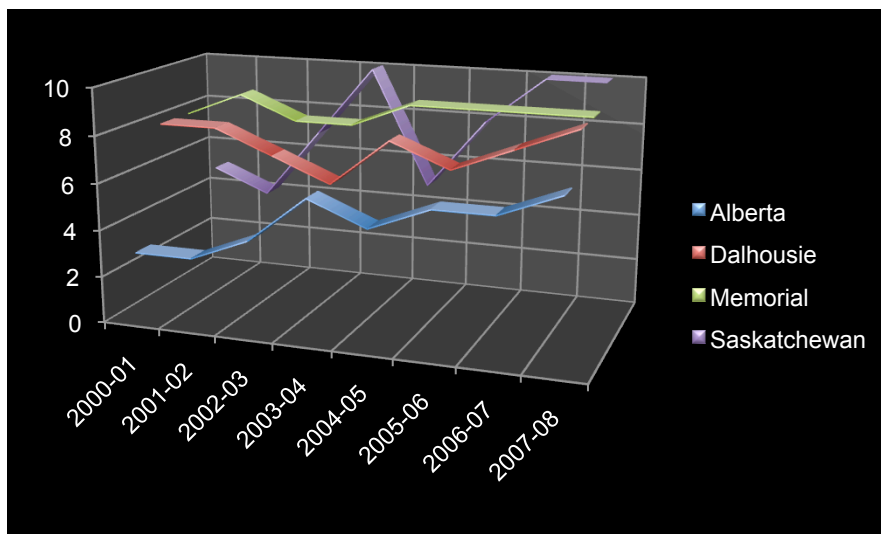
This department's level of funding is lower than that in five of the six other Biochemistry departments. The average grant received by a faculty member at Memorial exceeds only that at the University of Regina and is almost \$10,000 less than at Concordia University. Memorial and Regina each received \$260,000-\$280,000 in the most recent grant cycle, whereas the other four departments each received \$600,000-\$700,000.

**Figure 6.3 • Average NSERC Discovery Grant (\$) Awarded to Biochemistry Departments**

Among these six departments, only that at Simon Fraser can be considered as a biochemistry-only department. Victoria combines Microbiology with Biochemistry; Regina, Windsor and Concordia all combine Chemistry with Biochemistry. An alternative comparison is with Biochemistry departments based in Medical Schools. Of those listed in Table 1.3, smaller similar-sized

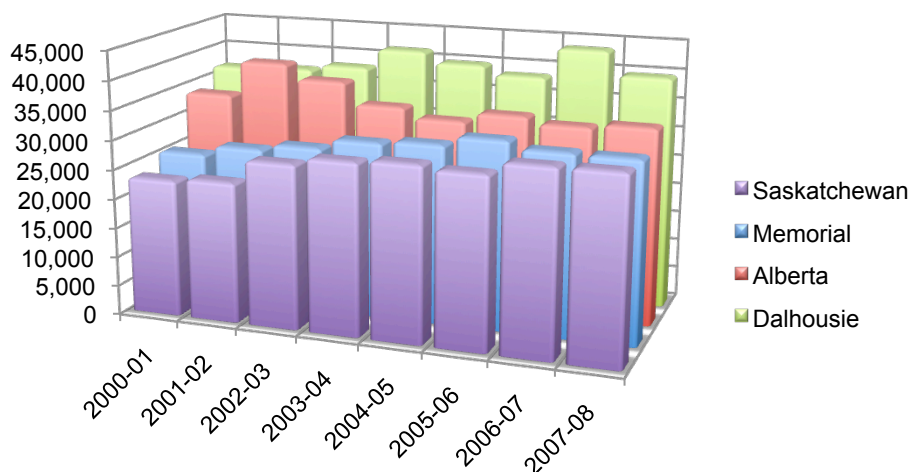
departments of Biochemistry (number of faculty < 30) with similar numbers of NSERC grant recipients are the University of Alberta, the University of Saskatchewan, and Dalhousie University.

**Figure 6.3 • Average Number of NSERC Discovery Grants Awarded**



In the past eight years, both Memorial's and Dalhousie's department of Biochemistry have on average been awarded 8.6 and 7.6 Discovery grants each cycle, respectively. Saskatchewan has a similar average (7.4) but the number has fluctuated more than the other two. The number at the University of Alberta has increased over the period. The average award at Memorial and Saskatchewan over the past eight years have grown similarly, from \$25,393 to \$30,798 at Memorial and from \$23,310 to \$32,190 at Saskatchewan. The average award at Alberta has remained more constant going from \$33,737 to \$33,429 whilst that at Dalhousie has increased from \$36,669 to \$39,630.

**Figure 6.4 • Average NSERC Discovery Grant (\$) of NSERC Discovery Grants Awarded**



In addition to Discovery grants, members of our department have been awarded two RTI equipment grants between 2000-08:

<b>TABLE 6.6 • NSERC Research Tools and Instruments &lt;\$150,000 Awards to Biochemistry 2000-2007</b>			
McGowan, Ross	Stand alone zebrafish aquatic housing unit	\$14,143	2005-2006
Shahidi, Fereidoon	High performance centrifugal partition chromatograph (HP CPC)	\$36,138	2001-2002

## Connection between research and teaching

Research and teaching are most closely linked at the graduate level where the very essence of our graduate programs is a direct reflection of the research efforts of faculty members. Less clearly defined is the connection between formal graduate instruction and research. The state of our graduate instruction is presented in Chapter 5.

Our research interests have an impact on our undergraduate programs in a number of ways: MUCEP placements; Honours students; and upper-level teaching.

The Memorial University Career Experience Program (MUCEP) is used by most faculty members to recruit students to their laboratories to assist with various aspects of research. The precise tasks will vary with laboratory and also depend on the prior experience and level of the student.

The honours degree programs that are available through the department provide the most hands-on learning experience in research. By registering in Biochemistry 499A/B students are required to complete a two-semester research project under the supervision of a faculty member whose research interests guide the project. Honours students in Biochemistry are supervised both by faculty in the department and by faculty in other units, primarily the Faculty of Medicine. (See Appendix 8.5) Students must write a thesis following guidelines not unlike those of graduate theses. Students present a 15 minute talk on their work and are then examined by an “external” examiner and by their supervisor. The department’s policy and procedure documents on the honours thesis are included in the Supporting Documents.

While all of our undergraduate course offerings include elements of scientific research, this is most prominent in our fourth year courses where, depending on the course, students read research papers as part of their classroom material, give presentations on a research topic, and prepare written assignments (term papers) on a literature-based research topic. Our two ‘Current Topics’ courses, Biochemistry 4102 and 4502, are seminar courses that incorporate all of these elements<sup>59</sup>. These courses are available only to honours students. Our two ‘Research Techniques’ courses include formal lectures in methods and techniques in either biochemistry or biochemical nutrition.

<sup>59</sup> A module from Biochemistry 4502 has now been developed into a new Special Topics course, which is being offered for the first time in Winter 2009.

Other examples of connections to scientific research in our teaching and pedagogy:

- Students in Biochemistry 2600 are required to carry out a three-day analysis of their own diet, and they must then write an evaluation of their diet, discussing its strengths and weaknesses and how they might improve it.
- Students in Biochemistry 3202 must undertake a dietary intake research assignment, which requires an interview, a research paper, and a group presentation.
- In Biochemistry 4002, students are asked to make a presentation on a case study based on a metabolic disease. Their presentations for the most part take the form of very creative videos.
- Students in Biochemistry 4103 must read 2 or 3 research papers that are integral parts of the course lecture material.
- One of the objectives of Biochemistry 4211 is to enable students to read, critically, the research literature. Students in Biochemistry 4211 must give an oral presentation on a research paper, and they must prepare a written appraisal of a research paper.
- Biochemistry 4300 is primarily based on review of recent literature and uses a discussion format. Students must also prepare a research paper and give an oral presentation.
- There is no text for Biochemistry 4301. It is based entirely on readings from the research literature.

## 7 Professional and Community Service

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Over the years, faculty in the department have given freely of their time and experience through service to a variety of national and international boards and review panels, and to the University. A number of faculty have also served the local community in a variety of roles. This chapter will highlight some of that service, with an emphasis on more recent contributions. A complete record of faculty members' professional and community service is described in their individual *curricula vitae* (Supporting Documents).

One indicator of the department's presence in the broader national arena is through the participation of department members on national grants awards committees. The presence of department members on these committees enhances the department's national profile

- Drs. **Bertolo, Booth, J. Brosnan, M. Brosnan, Heeley, Herzberg** and **Nag** have served on CIHR (or its predecessor, MRC) grants selection committees, equipment committees, or advisory boards.
- Dr. **Cheema** is currently a member of the NSERC Discovery Grants panel on Integrative Animal Biology.
- Drs. **Cheema** and **Herzberg** have served on grant review panels for the Heart and Stroke Foundation. Dr. **J. Brosnan** has served on panels for the Kidney Foundation, and the Canadian Heart Foundation. Drs **J. Brosnan** and **M. Brosnan** have served on committees for the Canadian Diabetes Foundation. Dr. **M. Brosnan** served as a member of the scientific advisory committee of the Amyotrophic Lateral Sclerosis Society of Canada.
- Dr. **J. Brosnan** has served as a member of the Study Section for Medical Biochemistry of the National Institutes of Health (USA).
- Dr. **J. Brosnan** served on the Canada Foundation for Innovation adjudication committee for New Opportunities Program in 1998 and the Multidisciplinary Assessment Committee in 1999.

In the same vein, members of the department have served on panels adjudicating the award of prestigious Scholarships and Fellowships.

- Dr. **Mulligan** has served on the NSERC Scholarships and Fellowships Committee and also on the International Council for Canadian Studies Scholarships and Fellowships committee (which awarded Commonwealth Scholarships and a number of other Intergovernmental Scholarships).
- Dr. **J. Brosnan** has served on the Selection committee for the Rhodes Scholar for Newfoundland as well as on the MRC Scholarships committee.

The department's faculty have actively participated in a number of national and international scientific organizations. For example:

- Dr. **Bertolo** is the Canadian Society for Nutritional Science's Awards Councillor. Dr. **Herzberg** is a past Vice-President and President of the Society.
- Dr. **M. Brosnan** is a past Vice-President and President of the Canadian Federation of Biological Societies, and she was Chair of the Program Committee of the Canadian Society for Biochemistry, Molecular and Cellular Biology (CSBMCB) from 1994-00.
- Dr. **Brunton** is also a Governing Councillor and a member of the Executive Council (Treasurer) of the of the Canadian Society for Clinical Nutrition.
- Dr. **J. Brosnan** has served on the boards of a number of organizations including terms as Vice-President and President of the Canadian Society Biochemistry and Molecular Biology (now CSBCMB).
- Dr. **Cheema** is a member of the board of directors of the International College of Nutrition.
- Dr. **Roebathan** is a member of the Dietitians of Canada Dietetics Educators Group.
- Dr. **Shahidi** is a founder member of the recently-formed International Society for Nutraceutical and Functional Foods.

The department's faculty are also active on editorial boards of scientific journals. For example:

- Dr. **J. Brosnan** is a member of the editorial board of the *Journal of Biological Chemistry*.
- Dr. **M. Brosnan** served in the editorial boards of the *Biochemical Journal*, and the *Canadian Journal of Physiology and Pharmacology*.
- Dr. **Brunton** is an associate editor of *Applied Physiology, Nutrition and Metabolism*.
- Dr. **Cheema** is a member of the editorial boards of *Molecular and Cellular Biochemistry* and *Experimental and Clinical Cardiology*.
- Dr. **Herzberg** is a member of the editorial board of Newfoundland and Labrador Studies.
- Dr. **Hoover** is a member of the overseas editorial board of the *International Journal of Food Science, Technology and Nutrition*.
- Dr. **Shahidi** is editor-in-chief of the *Journal of Functional Foods*, and the *Journal of Food Lipids*, and North American editor for *Food Chemistry*, as well as serving on the editorial boards of seven other journals.

The department's faculty are active in reviewing manuscripts for journals and in reviewing grants for various granting councils and awards bodies. These contributions are detailed in the individual faculty member *curricula vitae*.

Members of the department have also been active in the organization of conferences and meetings:

- Dr. **J. Brosnan** organized minisymposia at a number of annual meetings of the Canadian Federation of Biological Societies. He was also a member of the steering committee for the IOBMB Congress that was planned for Toronto in 2003<sup>60</sup>.
- Dr. **Cheema** served on the organizing committee for the CIHR National Research Forums for Young Investigators in Circulatory and Respiratory Health held in 2005 and 2006.
- Dr. **Robinson** chaired a session on "Cell and Extracellular Matrix Interactions" at the Developmental Biology of the Sea Urchin XI conference, Woods Hole, 1997 and organized a symposium entitled "Gene Activity during Embryonic Development" for the 40th annual meeting of the Canadian Federation of Biological Societies in Quebec City, June 1997.
- Dr. **Shahidi** has organized numerous conference symposia and was, most recently, co-organizer of the Inaugural Conference of the International Society for Nutraceutical and Functional Foods, November 14-17, 2008 in Taiwan.

Within the University, faculty participate on committees at the departmental, faculty, school and university-wide levels. Full details can be found in individual curricula vitae. Pan-University service includes:

- Drs. **M. Brosnan, Davis, Ghazala, McGowan, Mulligan**, and **Shahidi** have served terms as members of Senate.
- A number of faculty have served on Committees of Senate: Advisory Committee on the Bookstore (**McGowan**), Advisory Committee on the University Timetable (**Mulligan, Roebathan**), Committee of Committees (**Ghazala**), Committee on Honorary Degrees and Ceremonial (**M. Brosnan, Mulligan**), Committee on Research (**M. Brosnan, Nag, Shahidi**), Committee on Undergraduate Scholarships and Bursaries (**Davis, Ghazala**), Committee on Undergraduate Studies (**Davis, Ghazala, Mulligan**), and the University Planning and Budget Committee (**M. Brosnan, Ghazala**).
- Drs. **M. Brosnan, Ghazala** and **Robinson** have served as members of the Academic Council of the School of Graduate Studies.
- Drs. **Brunton, Heeley**, and **Robinson** have served in the University Radiation Safety Committee. Dr. **Roebathan** has served on the Interdisciplinary Committee on Ethics in Human Research (ICEHR); Dr. **Bertolo** serves on the Institutional Animal Care Committee; and, Dr. **Shahidi** serves on the University Biosafety committee.
- Dr. **Nag** has served on the University Joint Equity Committee and on the MUNFA Scholarship Committee.

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<sup>60</sup> The Congress was ultimately cancelled due to the SARS outbreak.

- Dr. **Davis** recently completed a term as Special Advisor to the Vice-President(Academic) on Student Success. He is also a member of the Enrolment Planning Working Group. In the past, he has been active on several committees concerned with employee pensions and benefits.

Many faculty also contribute their time and expertise to the province and to the local community in a variety of ways, for example:

- Dr. **Hulan** served as Member of the House of Assembly (MHA) for St George's from 1993-96 and was Minister of Fisheries, Food, and Agriculture from 1994-96. He also served as Chairman of the Provincial Task Force on Agrifoods from 1989-91.
- Dr. **Roebathan** is a Trustee on the Board of Eastern Health, and a member of the Provincial Food & Nutrition Advisory Committee.
- Dr. **Shahidi** serves on the Research Committee of the Autism Society of Newfoundland and Labrador.
- Drs. **Bertolo, Cheema, Davis, Herzberg** and **Roebathan** have been interviewed or participated in radio and TV broadcasts by local and by national broadcasters.
- Drs. **Booth, Cheema, Davis, Ghazala, Hoover** and **Robinson** have assisted in judging both provincial and national Science fairs.
- Public lectures have been given by Drs. **Bertolo** (a CRC Public Lecture: New Hope for Old Foes. Do Adult Diseases begin in the Womb?" and **Roebathan** (a Sundays on Health Research lecture: "Nutrition Research in Childhood Obesity").
- Faculty have presented talks to local or community organizations such as various Dietetics groups (**Brunton, Herzberg, Roebathan**), the Newfoundland Seafood Retailers (**Herzberg**), Infant Care Networking Group (**Bertolo**), and the St. John's Prostate Cancer Support Group (**Roebathan**).

## 8 Department Organization and Human Resources

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### Administrative organization

The Head of the department is Dr. **Martin Mulligan**. He was appointed on 01 May 2004 and re-appointed to a second term as Head on 01 May 2007. His term expires on April 20, 2010.

On matters of an academic nature, the Head is assisted by two Deputy Heads. Dr. **Ross McGowan** is Deputy Head (Undergraduate) and Dr. **Robert Bertolo** is Deputy Head (Graduate Studies) and the department's Graduate Officer.

On all matters of a managerial and administrative nature, the Head is assisted by Ms. **Anne Sinnott**, who is the administrative officer of the department. Ms. Sinnott reports to Dr. Mulligan.

Dr. Mulligan is assisted by a secretary, Ms. **Betty-Ann Lewis**<sup>61</sup>. Ms. Sinnott and members of the department are assisted by a general secretary, Ms. **Christine Squire**. The Head's secretary also provides assistance to Ms. Sinnott and to members of the department.

Duties of the office staff at present are:

Administrative Assistant (Anne Sinnott)

Administrative support for a wide variety of tasks including assisting the Head with preparation of the budget; monitoring both the department accounts and individual research accounts for budget status; supervision of hiring and associated paperwork; supervising and approving payroll paperwork; liaison with the Registrar's Office on all matters pertaining to student registration; organizing building and equipment repair; advising on University policy matters; supervising the department General Office.

Head's Secretary (Betty-Ann Lewis/Christine Squire *pro tem*)

Supporting all Head's business; assistance with all matters relating to graduate studies except graduate payroll; preparing undergraduate student payroll including MUCEP; staff contract extensions, step adjustments and overtime payments; staff attendance; petty cash reimbursements; scheduling final exams and room; processing and keying all course grades; maintaining departmental bulletin boards.

General Secretary (Christine Squire/Melissa Mitchell *pro tem*)

General typing for members of the department; assistance with undergraduate studies matters including assisting with applications for admission forms, honours theses; organizing and scheduling Course Evaluation Questionnaires (CEQ's); processing travel claims, including professional development funds; cheque requisitions; ordering textbooks; scheduling seminars and distributing notices; collecting and distributing mail; Seminar Room bookings; booking

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<sup>61</sup> The Head's secretary, Ms. Betty Ann Lewis accepted a one-year secondment to the Dept of History which started on Sept 02, 2008. Ms. Squire was re-assigned to the position of Head's Secretary and her position was filled on a one year contractual basis by Ms. Melissa Mitchell

classrooms for tutorials, lab talks (but not slotbook room assignments).

Staffing levels in the department have declined over the years. In 1985, the department had an Administrative Assistant (**Betty Rodgers**), a Secretary to the Head (**Doris Hiscock**), and two general secretaries. An additional permanent secretarial position was added in 1987. From 1987 until 1998, the department office functioned with 5 people. One position was made redundant in 1998. In 2003, it became the policy of the Dean of Science that thenceforth department offices would be expected to function with three staff. Following the start of maternity leave for Ms. **Jackie Stone** in July 2003, the department office staff reached a complement of three. In November 2006, believing that the Biochemistry Office “is understaffed for the work that they are expected and required to do”, the Head wrote to the Dean:

*to request that Human Resources conduct a review of the operations and staffing levels in the Biochemistry Department General Office. ... I would specifically ask that Human Resources address whether an additional half-time person should be added and would be sufficient to address matters.*

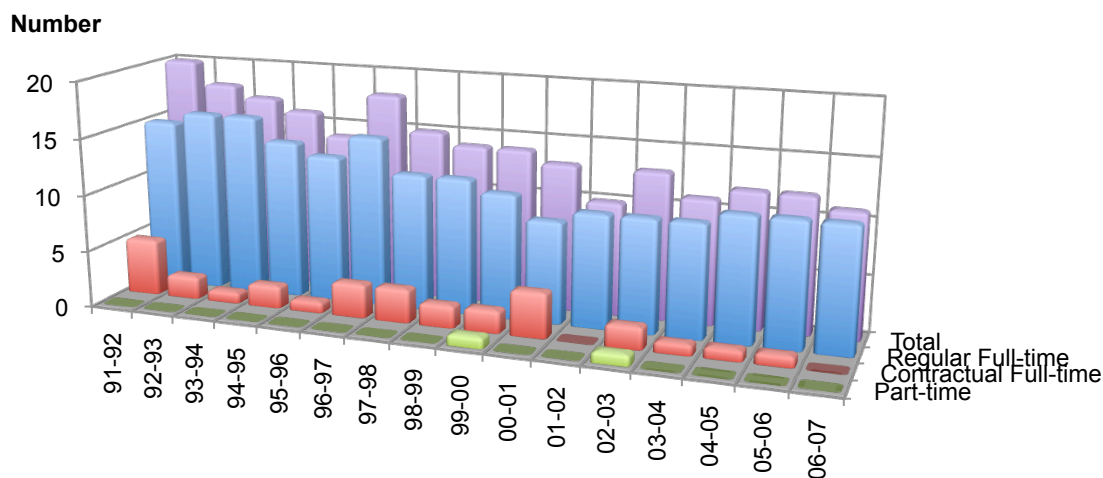
The review was initiated in May 2007 by Ms. Janet Norman, Human Resources Advisor for the Faculty of Science, at a meeting with the Office Staff. They completed updates to their Job Fact Sheets and completed a custom questionnaire, which were returned to Human Resources in November 2007. Ms. Norman is currently engaged in follow-up discussions with staff.

In addition to staffing numbers, in the past 7 years the secretarial positions have been occupied for extended periods of time by different people as a consequence of leaves of absence and reassignments. This has had an effect on the execution of departmental business. There is a particular need (and this has been noted both by staff and by faculty) for a person dedicated to managing our graduate student files.

## Support Staff Information

Support staff are employed by the department both to support research and to support teaching. The individuals and their brief job descriptions are given in the sections below. Changes in our overall staff complement with time are shown in Figure 8.1.

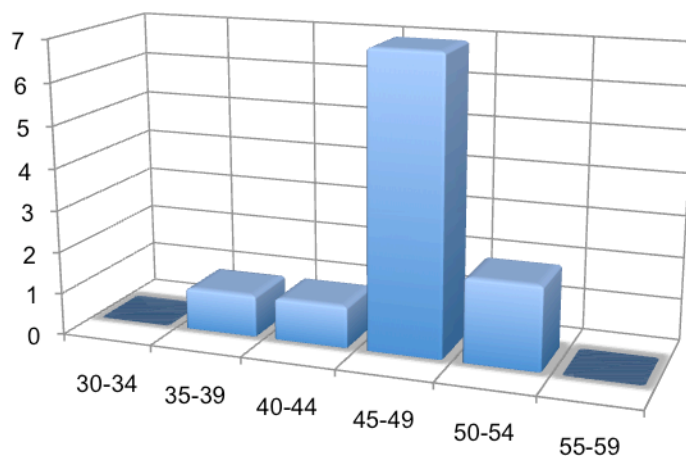
**Figure 8.1 • Staff Complement in the Biochemistry Department 1991-2008**



As can be seen, over the course of the past 20 years, the number of support staff in the department has halved from, a total of ~20 to 11. This is reflective of cut-backs across all support units in the department, and includes positions lost from the General Office. Over the past 5 years we have lost 21% of our support staff.

We are an aging department. The mean age of current permanent staff (on Sept 01, 2008) is **46.4**.

**Figure 8.2 • Age Profile of Biochemistry Department Permanent Staff**



It is not uncommon that staff retire at about age 55 to coincide with 30 to 35 years of service at the University. Given the above demographic, it is of some concern that a large number of our skilled staff might retire at the same time and leave the department with a crisis of expertise.

## Academic Support Staff

### Academic Program Officer/Manager of Academic Programs

A Manager of Academic Programs position has been approved for the department but it has not yet been filled. The person hired to this position will assume many of the administrative and advisory duties presently carried out by the Deputy Head (Undergraduate) and Dr. M. Brosnan. In the Faculty of Science, similar positions exist in the departments of Earth Sciences, Mathematics & Statistics, and Physics & Physical Oceanography.

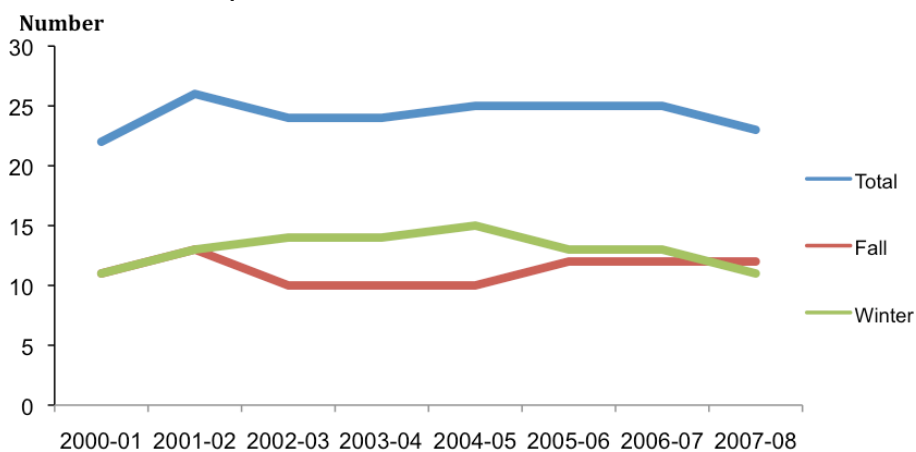
As initially conceived, the job description included a teaching component. The original job was advertised in February 2008 but that competition was cancelled as the certification of LUMUN meant that the teaching component had to be removed and the job reclassified and re-titled to Manager of Academic Programs. Advertisement of the revised job has not yet occurred.

### Student Teaching Laboratory Staff

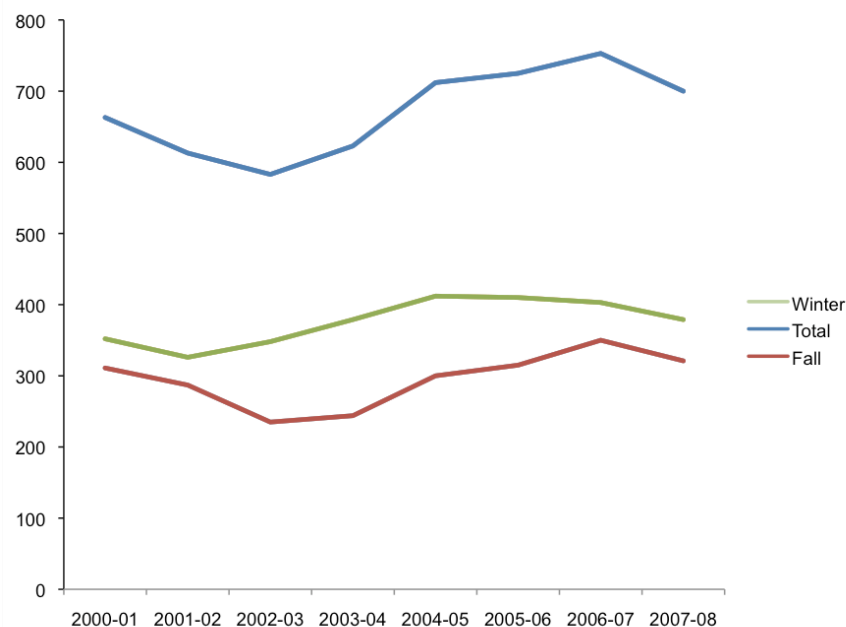
The Acting Supervisor<sup>62</sup> of the department's Student Teaching Laboratories is Ms. **Marie Codner**. She reports to the Head. Ms. Codner is assisted by Ms. **Natalie Webber**.

The Biochemistry Student Laboratories are responsible for the delivery of all undergraduate laboratory sections in the department. The staff plan, order and purchase, and prepare materials for the delivery of ~24 sections serving ~700 students each year (Figure 8.4).

**Figure 8.3 • Number of Laboratory Sections Delivered by the Biochemistry Department Student Laboratories 2000-2008**



<sup>62</sup> The supervisor of the Biochemistry Teaching Laboratories, Mr. Mike Murphy, is on a leave of absence as President of CUPE Local 1615. Ms. Codner was re-assigned to Mr. Murphy's position and her position was filled by Ms. Natalie Webber.

**Figure 8.4 • Total Registrations in Undergraduate Laboratory Sections 2000-2008**

### Instructional Support Staff

The department employs two staff members for instructional support: **Ms. Donna Hunt** (Laboratory Instructor) and **Mr. Barry Walters** (Instructional Assistant). Ms. Hunt is employed on an eight-month contract; Mr. Walters is employed year round.

Both Ms. Hunt and Mr. Walters supervise the delivery of undergraduate laboratory sections. Their duties vary somewhat from course to course in accordance with preferences of the supervising course instructor. In general, they are responsible for general supervision of students, helping with experimental technique, ensuring lab safety, supervising the work of the course demonstrators, and collating marks for the lab sections.

In 2007-08, Ms. Hunt supervised Biochemistry 2100 (2 sections), 3106 (5 sections) and 3107 (3 sections), and Mr. Walters supervised Biochemistry 2010 (1 section), 2011 (1 section), and 2101 (7 sections). They shared supervision of Biochemistry 2000 (1 section).

### Technical Support Staff

**Craig Skinner** is our Information Technology Support Person and he is responsible for departmental equipment. As our IT Support Person, Mr. Skinner advises the department Head on departmental IT purchases; he manages departmental computer systems; he assists with problems relating to personal computing. As our equipment and infrastructure manager, Mr. Skinner inspects, maintains and/or troubleshoots departmental and individual research laboratory instruments/equipment; he advises the Head and researchers on the repair, replacement or

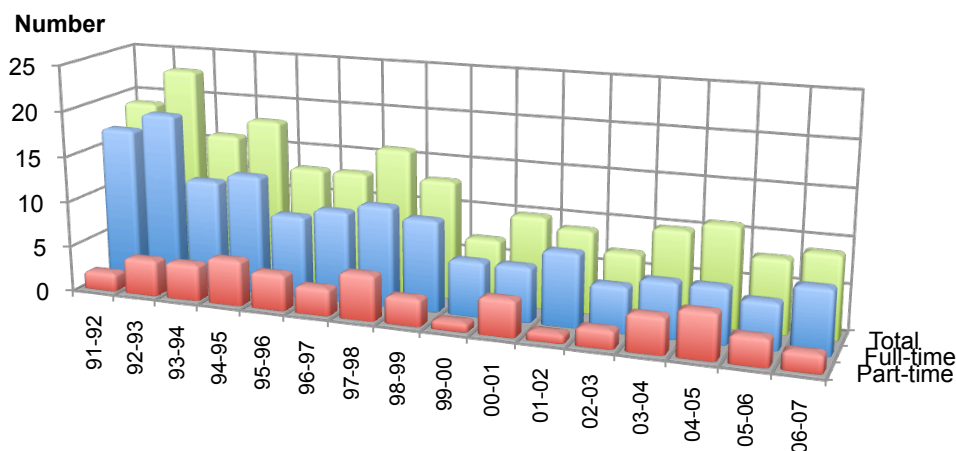
purchase of instruments/equipment; he manages the departmental storage rooms and fixed asset additions, changes and surplus disposals.

Mr. Skinner was originally hired by the department in 1997 to assist with the operation of the Amino Acid analysis facility.

### Research Support Staff

Other than Craig Skinner (above), there are no research support staff employed directly by the department. All research staff are now employed by individual faculty members through their operating grant funds. On September 01, 2008, we had 7 staff members holding positions as Sci Tech III, RA I or RA II: **Kathy Clow, Joanne Evans, Danielle Gardiner, Donna Jackman, Jenny John, Simon Lamarre, and Jennifer Rendell**. This number has remained fairly constant in the past seven years but is a big change from the early nineties when we had almost twenty such staff.

Figure 8.5 • Research Staff Complement in the Biochemistry Department 1991-2008



### Postdoctoral Fellows

As of Sept 01, 2008, there were 4 postdoctoral fellows in the department. Dr. **Sarah Bourbigot** and Dr. **Tran-Chin Yang** working with Dr. **Booth**; Dr. **Jay Treberg** working with Dr. **J. Brosnan**; and, Dr. **Elaine Dodge** with Dr. **Brunton**.

These are not department-funded positions. Drs. **Dodge** and **Treberg** held CIHR Postdoctoral Fellowship Awards (2008-10 and 2006-08, respectively). Dr. **Yang** is funded by Dr. Booth. Dr. **Bourbigot** is funded through a research partnership with NewLab.

## Life Sciences Stores

The department has responsibility for the administration of the Life Science Stores. It is managed by Mr. **Henry Murphy**, who reports to Dr. Mulligan. Mr. Murphy is assisted by **Craig Barnes** and **Jason Noseworthy**.

Mr. **Murphy** received the **Dean of Science Distinguished Service Award** in 2005-05 in recognition of his consistent excellence, his efficiency, the initiatives he has taken in performing his job and the many varied duties associated with it.

Life Sciences Stores was formed May 1, 2004, by the merger of the former Biochemistry Stores and Biology Stores (which at that time also provided service to the Department of Psychology). Prior to the merger, Biochemistry Stores was staffed by a stores supervisor (**Morley Garrett**) and a stores clerk; the Biology Stores was staffed by a stores supervisor (**Ed Oliver**) and two stores clerks. Upon the retirement of the Biology Stores Supervisor in April 2004, operations were combined into one unit under the supervision of Morley Garrett. In June 2006, the combined operation had a staff of 4: Stores Supervisor (Morley Garrett) and 3 Stores Clerks (Henry Murphy, Craig Barnes, and Jason Noseworthy).

When Morley Garrett retired on July 14, 2006, his position was filled by Henry Murphy following an open competition. In Fall 2006, the department requested approval to hire a replacement for Mr. Murphy's position from the then Dean of Science, Dr. Robert Lucas. The Dean declined to approve a replacement. He believed that Life Science Stores should first implement efficiencies in the way they conducted business.

Life Science Stores has responsibility for supplies and purchasing for the departments of Biochemistry, Biology and Psychology. It also provides small amounts of stock supplies to the Dean of Science Office and various other University departments.

The budget for Life Science Stores is managed by the Biochemistry Department. Staff salaries are included in the biochemistry salary budget and supply inventory is also managed as a line item in the biochemistry budget.

A complete list of department staff is presented in Table 8.1.

**TABLE 8.1 • Biochemistry Department Staff****Administrative & General Office Staff**

Sinnott, Anne	Administrative Assistant
Squire, Christine	Secretary to the Head
Mitchell, Melissa	General Secretary

**Instructional Support Staff**

Hunt, Donna	Laboratory Instructor
Walters, Barry	Instructional Assistant

**Biochemistry Student Laboratories**

Codner, Marie	Acting Science Laboratory Supervisor II
Webber, Natalie	Science Technician III

**Technical Support Staff**

Skinner, Craig	Research Assistant II
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**Life Science Stores Staff**

Murphy, Henry	Supply Supervisor
Barnes, Craig	Stores Clerk III
Noseworthy, Jason	Stores Clerk III

**Research Grant Supported Staff**

Kathy Clow	(Supervisor: Dr. John T. Brosnan)
Joanne Evans	(Supervisor: Dr. Valerie Booth)
Danielle Gardiner	(Supervisor: Dr. John Robinson)
Donna Jackman	(Supervisor: Dr. Valerie Booth)
Jenny John	(Supervisor: Dr. Fereidoon Shahidi)
Simon Lamarre	(Supervisor: Dr. John T. Brosnan)
Jennifer Rendell	(Supervisor: Dr. Valerie Booth)

**Postdoctoral Fellows**

Dr. Sarah Bourbigot	Laboratory of Dr. Valerie Booth
Dr. Elaine Dodge	Laboratory of Dr. Janet Brunton
Dr. Jason Treberg	Laboratory of Dr. John T. Brosnan
Dr. Tran-Chin Yang	Laboratory of Dr. Valerie Booth

## Faculty

The department started with 2 full-time faculty members in 1967. That number grew steadily over the following twenty-five years to reach a complement of 22-23 in 1993. The number of faculty fell in the late nineties to 17 but has recovered somewhat with hirings in 2002-2004.

Twenty faculty hold full-time appointments in the department as of September 01, 2008. However, three of these are joint appointments<sup>63</sup>. Dr. **McGowan** and Dr. **Volkoff** are jointly appointed with the Department of Biology. Dr. McGowan's appointment is 60:40 (Biochemistry/Biology) while Dr. Volkoff's is 40:60 (Biochemistry/Biology). Dr. **Roebathan's** appointment is joint with the Division of Community Health & Humanities in the Faculty of Medicine and is 20:80 (Biochemistry/Medicine). Her appointment will transfer permanently to the Faculty of Medicine on September 01, 2009. Of the 20 faculty, 11 are appointed as Professor, 8 as Associate Professor and 1 as Assistant Professor. There are two Professors Emeritus in the department: Dr. **Keough**, and Dr. **Mookerjee**.

Two faculty members hold Tier 2 Canada Research Chairs; Dr. **Bertolo** is the Canada Research Chair in Human Nutrition; and, Dr. **Booth** is Canada Research Chair in Proteomics. Two faculty have been named University Research Professor: Dr. **J. Brosnan** in 1990-95; and, Dr. **F. Shahidi** in 1998-2003. Dr. **Mulligan** received the President's Award for Distinguished Teaching in 1999-2000.

Four current full-time faculty have held administrative office within the University: Dr. **Herzberg**, Dr. **J. Brosnan**, and Dr. **Davis** have served as Department Head in addition to the incumbent. Dr. Davis recently served as a Special Advisor to the Associate Vice-President (Academic). Emeritus Professor Dr. **Keough** served as Department Head prior to his appointment as Vice-President (Research).

Two faculty from other units hold cross-appointments to the department. A third has applied for re-appointment. Dr. **W. Driedzic** (Ocean Sciences Centre) and Dr. **D. MacPhee** (BioMedical Sciences, Medicine) hold cross-appointments in good standing. Dr. **E. Randell** (Clinical Sciences, Medicine) has applied for re-appointment; he was previously appointed from 1997-2006.

At the present time, five faculty have cross-appointments to other units in the University: Drs. **J. Brosnan**, **M. Brosnan** and **Cheema** (to BioMedical Sciences, Faculty of Medicine); Dr. **Booth** (to the Dept. of Physics and Physical Oceanography); and, Dr. **Shahidi** (to the Dept. of Biology, and to the Ocean Sciences Centre).

There is currently one Adjunct Professor in the department: Dr. **J. Banoub**, Northwest Atlantic Fisheries, Science Branch, Fisheries and Oceans Canada). In the past, Adjunct Professorships have also been held by: Dr. **J. Payne** (1996-2007) and Dr. **D. Hamoutène** (2005-2008), also at Fisheries and Oceans Canada. The department recently adopted a policy document on the appointment of Adjunct Professors, which clarifies our expectations of those holding such appointment in this department. (*cf* Supporting Documents)

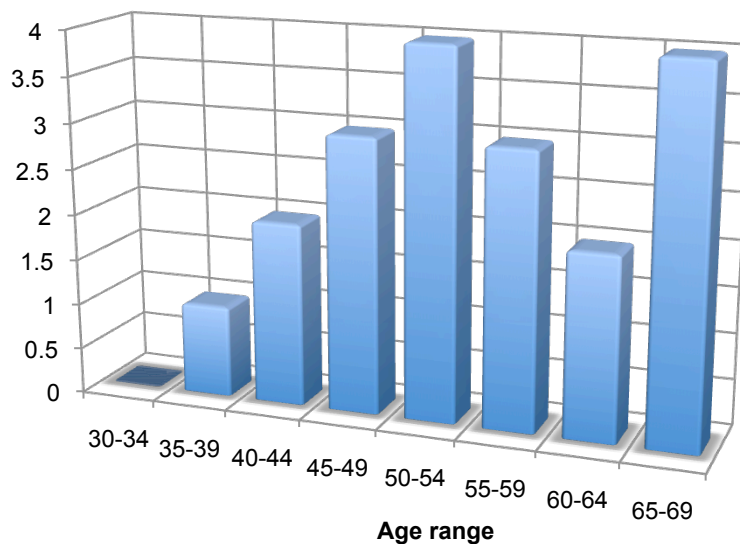
We are an aging department. A histogram of current faculty age distribution is shown below (Figure 8.6). The mean age of current faculty (on September 01, 2008) was **54.3**. Four faculty members are

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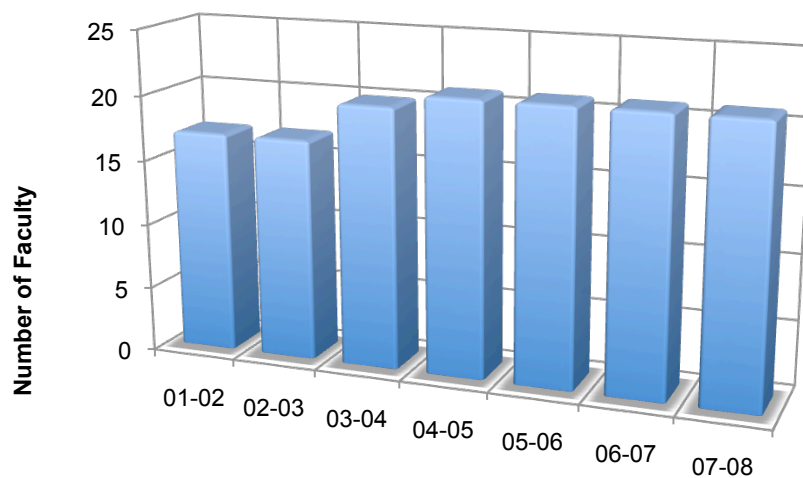
<sup>63</sup> Thus, we had the equivalent of 18.2 faculty on September 01, 2008. With Dr. Martin's retirement, it is now 17.2.

now above the “traditional” retirement age of 65. While our recent hires may have restored the department’s complement to its old equilibrium number (Figure 8.7), the imminence of upcoming retirements means that the recruitment of new, younger faculty is a pressing need. Two new hires were recently approved for the department by the Vice-President(Academic). Both have been advertised with a closing date for applications of May 15, 2009 (Appendix 8.1). These new hires are expected to join the department early in 2010.

**Figure 8.6 • Age Profile of Biochemistry Department Faculty**



**Figure 8.7 • Biochemistry Department Faculty Complement 2001-08**



A complete list of faculty is presented in Table 8.2.

## Visiting faculty

Faculty in the department give presentations at conferences and are invited to present seminars nationally, and internationally. Details can be found in individual *curricula vitae*.

Drs. **J. Brosnan** and **M. Brosnan** were Visiting Professors of Pediatrics-Nutrition at Baylor College of Medicine in 2004 and held Adjunct Professorships there from 2006-08.

Dr. **Cheema** was selected by NSERC to receive a short-term fellowship from the Japan Society for the Promotion of Science. She was a Visiting Scientist at Mukogawa Women's University, Nishinomiya, Japan, during August-September 2007.

Dr. **Heeley** was a Visiting Scientist at Eastern Virginia Medical School in 1998-99 and again in 2004.

Dr. **McGowan** has served as Visiting Professor at St. George's University, Northumbria campus in 2007 and at the Grenada campus in 2008, where he taught a course in Medical Genetics.

Dr. **Shahidi** was Visiting Professor at Århus University and at the National University of Singapore during sabbatical leaves in 1996 and 2000, respectively.

Dr. **Matthias Mack**, Department of Biotechnology, Mannheim University of Applied Sciences, Germany, visited the department during September-October 2007 on a short sabbatical leave.

Dr Shahidi has hosted Professor **Se-Kwon Kim** (Pukyong National University, Korea), Professor **Min-Su Heu** (Gyeongsang National University, Korea) and Dr. **Nadia Mahfouz** (Tanta University, Egypt) as Visiting Professors in his laboratory.

**TABLE 8.2 • Biochemistry Department Faculty****Head**

Mulligan, M.E., B.Sc.(Hons.) *National University of Ireland*, Ph.D. *Harvard*; Winner of the President's Award for Distinguished Teaching, 1999; Professor

**Professores Emeriti**

Keough, K.M.W., B.Sc.(Hons.), M.Sc., Ph.D. *Toronto*  
Mookerjee, S.S., B.Sc., M.Sc., Ph.D. *Calcutta*

**Professors**

Brosnan, J.T., B.Sc.(Hons.), M.Sc., D.Sc. *National University of Ireland*, D.Phil. *Oxford*; University Research Professor, Awarded 1990  
Brosnan, M.E., B.A.(Hons.), M.Sc., Ph.D. *Toronto*; Cross appointment with Faculty of Medicine  
Davis, P.J., B.Sc., Ph.D. *Memorial*; Special Advisor to Associate Vice-President (Academic)  
Heeley, D.H., B.Sc.(Hons.), Ph.D. *Birmingham*  
Herzberg, G.R., B.S., Ph.D. *Maine*  
Hoover, R., B.Sc.(Hons.) *Ceylon*, M.Sc. *Leeds*, Ph.D. *Alberta*  
Hulan, H.W., B.Sc.(Hons.), M.Sc. *McGill*, Ph.D. *Maine*  
Martin, A.M., B.E., D.Ch.E. *Havana*, M.C.I.C.  
Robinson, J.J., B.Sc.(Hons.) *University College Dublin*, M.Sc. *Trinity College Dublin*, Ph.D. *Alberta*  
Shahidi, F., B.Sc. *Shiraz*, Ph.D. *McGill*, University Research Professor, Awarded 1998; Cross appointments with Ocean Sciences Centre and the Department of Biology

**Associate Professors**

Bertolo, R.F.P., B.A.Sc., (Hons.) *McMaster*, M.Sc., Ph.D., *Guelph*; Canada Research Chair in Human Nutrition  
Brunton, J.A., B.A.Sc. *Guelph*, Ph.D. *McMaster*  
Cheema, S.K., B.Sc. *Punjab*, M.Sc. *Punjab Agricultural*, Ph.D. *Post Graduate Institute of Medical Education and Research*; Cross appointment with Faculty of Medicine  
Ghazala, S., B.Sc. *Baghdad*, Dip.Mech.Eng., M.Sc. *Mech. Eng. University of Technology, Baghdad*, Ph.D. *McGill*  
McGowan, R.A., B.Sc.(Hons.) *Brock*, Ph.D. *SUNY, Buffalo*; Joint appointment with Department of Biology; Deputy Head (Undergraduate)  
Nag, K., B.Sc.(Hons.), M.Sc. (Part I) *Calcutta*, M.Sc., Ph.D. *Memorial*  
Roebathan, B., B.Sc.(Hons.) *Memorial*, M.Sc. *Saskatchewan*, Ph.D. *Memorial*; Joint appointment with Faculty of Medicine  
Volkoff, H., B.Sc. *Pierre and Marie Curie University*, M.Sc. *University of Aix-Marseille III*, Ph.D. *Clemson University*; Joint appointment with Department of Biology

**Assistant Professors**

Booth, V.K., B.Sc.(Hons.) *Victoria*, M.Sc. *Waterloo*, Ph.D. *Toronto*; Canada Research Chair in Proteomics; Cross appointment with Department of Physics and Physical Oceanography

**Adjunct Professors**

Hamoutene, D.H., B.Sc. *Hourari Boumediene*, M.Sc., Ph.D. *Aix-Marseille II* (expired Aug 2008)  
Payne, J.F., B.Sc., M.Sc., Ph.D. *Memorial* (expired Aug 2007)

**Cross-Appointees**

Driedzic, W.R., B.Sc. *York*, M.Sc. *Toronto*, Ph.D. *British Columbia*; Professor; Tier I Canada Research Chair in Marine Bioscience; Cross appointment from the Ocean Sciences Centre  
Liu, H., B.Sc.(Pharm.), M.Sc.Pharm. *Beijing Medical*, Ph.D. *Alberta*; Cross appointment from School of Pharmacy (expired 2007?)  
MacPhee, D.J., B.Sc.(Hons.) *Prince Edward Island*, Ph.D. *Western Ontario*; Cross appointment from Faculty of Medicine  
Randell, E.W., B.Sc.(Hons.), Ph.D. *Memorial*; Cross appointment from Faculty of Medicine (expired 2007; has applied for renewal)

**Recent Retirees**

Rahimtula, A.D., M.Sc. *Bombay*, Ph.D. *Southampton* (January 2008)

*Note: Dr. A. Martin retired at the end of December 2008.*

## Faculty Workloads

The workload of faculty members at Memorial University is governed by the Collective Agreement between Memorial University and the Memorial University of Newfoundland Faculty Association. It consists of approximately equal proportions of undergraduate and graduate teaching, and research, scholarship and creative activities. In addition, some academic service is expected of each faculty member.

The determination of course offerings is the responsibility of the Department Head who must take into account "the resources of the Academic Unit and scholarly competence of the Faculty Members as well as the needs of the students" (*cf* Appendix 8.2).

The assignment of teaching for an academic year follows a three-step process mandated by the Collective Agreement. First, the Head indicates to faculty which courses ought to be offered in the upcoming academic year and consults with faculty concerning which of these courses they wish to teach. Second, the Head makes preliminary assignments and circulates these to all faculty for comment. Finally, after giving consideration to comments, the Head notifies the faculty of their teaching assignments.

The normal amount of teaching assigned for an Academic Year for Faculty Members in each Academic Unit is the "teaching norm" which for the Department of Biochemistry is **four** tasks. How this specification translates into the workload of a typical faculty member is specified in the department's "Course Equivalency Plan", a copy of which is attached as Appendix 8.3.

The workload devoted to teaching by a faculty member can be increased by voluntary agreement between the Head and the faculty member with a consequent reduction in the expectation for research and scholarly activity, or where a faculty member's record of research and scholarly activity is significantly below expectations. There are no agreements to increase teaching currently in place in the department.

The workload devoted to teaching can be reduced:

- If a faculty member receives an appointment that carries a reduced teaching load such as University Professor, CIHR Investigator, or Canada Research Chair.
- In the case of a new faculty member
- Through the award of a teaching remission upon application to the Dean of Science.

In the past five years, faculty members in the department have received teaching remissions under each of the above provisions.

In 2007-08, the department delivered 31 undergraduate and 3 graduate courses. These equate to 38.11 and 3 undergraduate and graduate teaching task equivalents, respectively, a total of 41.11.

The number of faculty available for teaching during 2007-08 was as follows: we had 19.2 faculty equivalents; from this must be subtracted 1.83 in teaching remissions (the Head, Dr. Davis and the

two Canada Research Chairs), 0.67 to take account of Dr. Rahimtula's retirement, and 0.67 to take account of Dr Ghazala's leave during Winter and Spring, for a total of 16.03.

Each graduate student supervised counts as 0.25 units of teaching per semester. There were a total of 83 semesters of graduate registrations during 2007-08, which is 20.75 course equivalents. In addition, each honour's student supervised counts as 0.25 per semester. There were a total of 71 semesters of honour's registrations during 2007-08, which is 17.75 course equivalents. Thus, the department accounted for a total of 38.5 course equivalents in student supervision.

In total, the department delivered the equivalent of 79.61 courses in 2007-08, which is 4.97 per faculty member ( $79.61/16.03$ )<sup>64</sup>. However, not all of the honours students were supervised by biochemistry faculty (Appendix 8.4). The actual number of course equivalents supervised by biochemistry faculty was 7.5. Using this value, faculty in the department accounted for 69.36 course equivalents which is 4.33 per faculty member.

The teaching assignment rosters for 2007-08 and 2008-09 are included as Appendices 8.5 and 8.6, respectively.

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<sup>64</sup> Strictly speaking, the maximum permitted equivalency in supervision in 2007-08 was 19.2. Using this value gives a teaching output of 3.76 ( $60.31/16.03$ ) per faculty member.

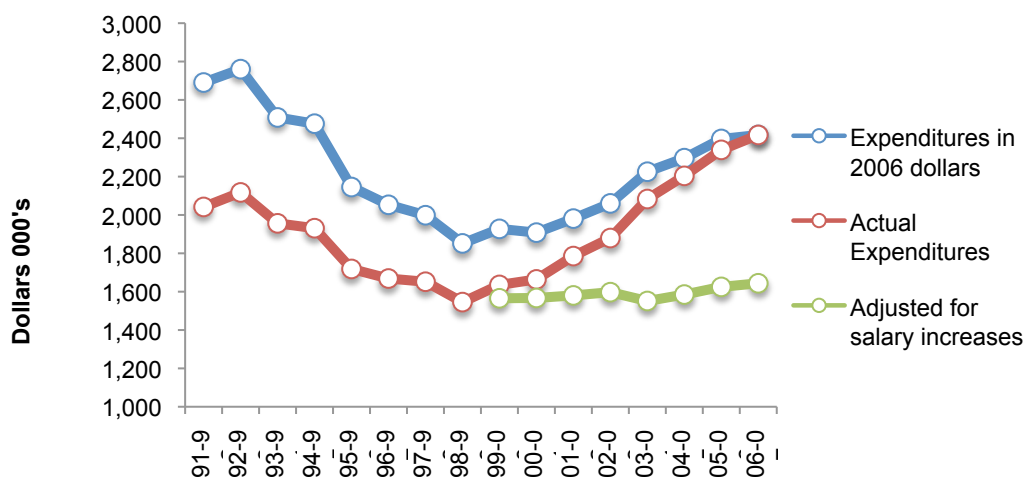
## 9 Financial Support

### Operating funds

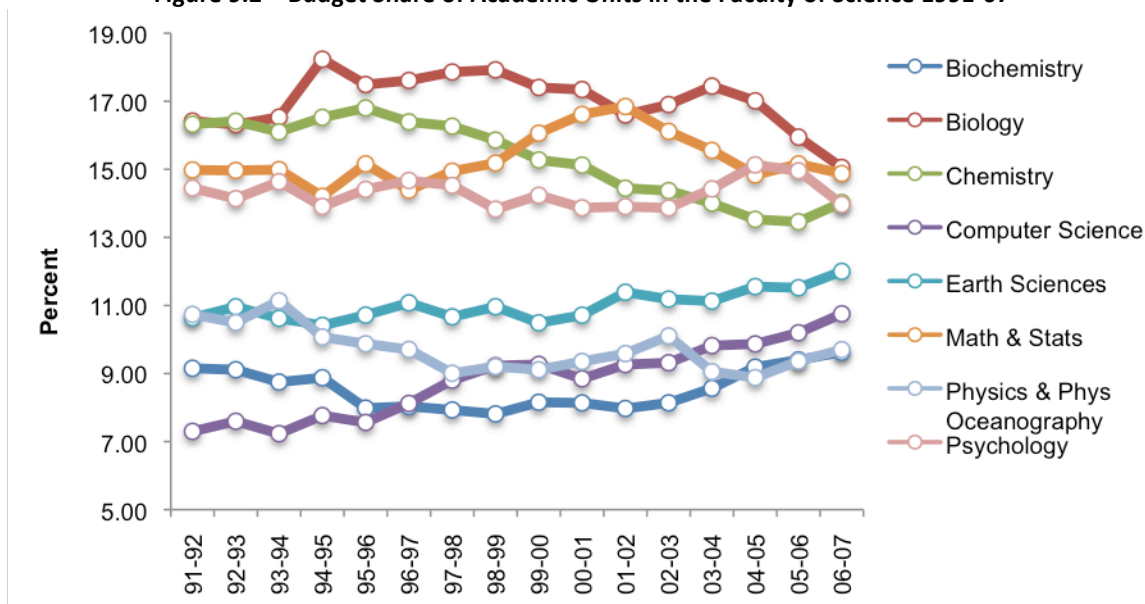
The total cost for running the Department of Biochemistry in 2006-07 was \$2,417, 080.

After a series of steady declines in the budget during the 1990s, the budget has grown by an apparent average of 5.8% since 1999-2000. However, the increase since 1998-99 can be attributed entirely to obligatory increases in salaries paid to employees under the terms of their collective agreements. Adjusted for inflation, this still leaves the department with a smaller overall budget than it had in the early 1990s. However, it masks the reality that we are also a smaller department as a result of staff layoffs and non-replacement of faculty and staff who left the department.

Figure 9.1 • Biochemistry Department Expenditures 1991-07

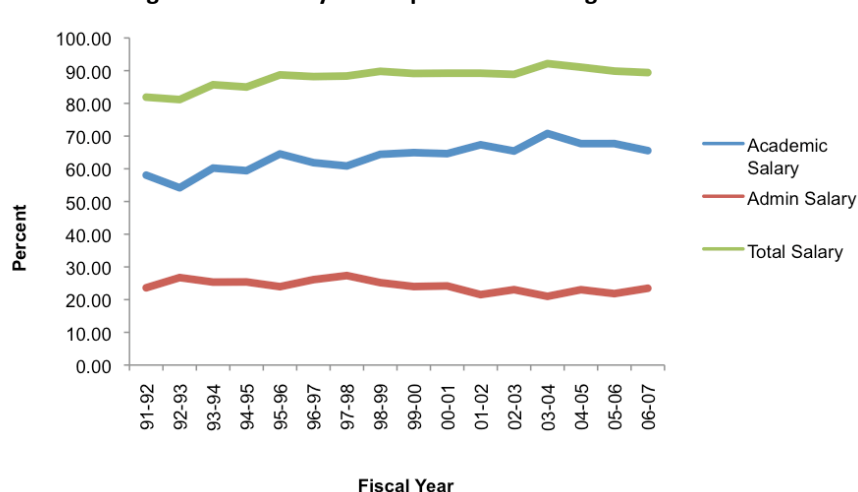


The department has one of the lowest budgets among academic units in the faculty of science; indeed, over the entire period for which data were reviewed, the department's budget was always one of the two lowest. Much of this can be attributed to the fact that we do not teach first year students and do not have any of the consequent financial obligations. We currently account for 9.6% of expenditures by academic units in the Faculty.

**Figure 9.2 • Budget Share of Academic Units in the Faculty of Science 1991-07**

By far the largest component of our budget is salary costs. As a percentage of the total, these have increased from 81.9% in 1991-92 to 89.4% in 2006-07. Most of that increase occurred in the early 1990s when the salary envelope went from 81.9% to 88.7% in the span of five years (1991-96).

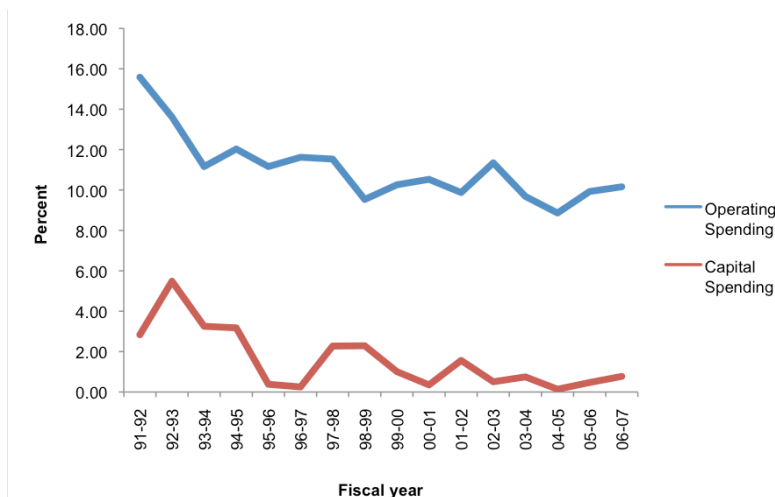
Within the salary envelope, salaries for staff have decreased slightly. The rolling five year average was 25% in 1995-96. This has dropped now to 22.5%. Over the past ten years, this component has been a consistent 24% of total department salary costs.

**Figure 9.3 • Salary Envelope Share of Budget 1991-07**

The department's apparent operating funds declined from \$318,184 in 1991-92 (15.6% of total running costs) to \$245,529 (10.2%). However, these numbers include salaries for teaching assistants. Our real operating costs declined from \$285,741 to \$174,885.

Adjusting for inflation, this represents a 54% decrease in real operating funds over the past 16 years.

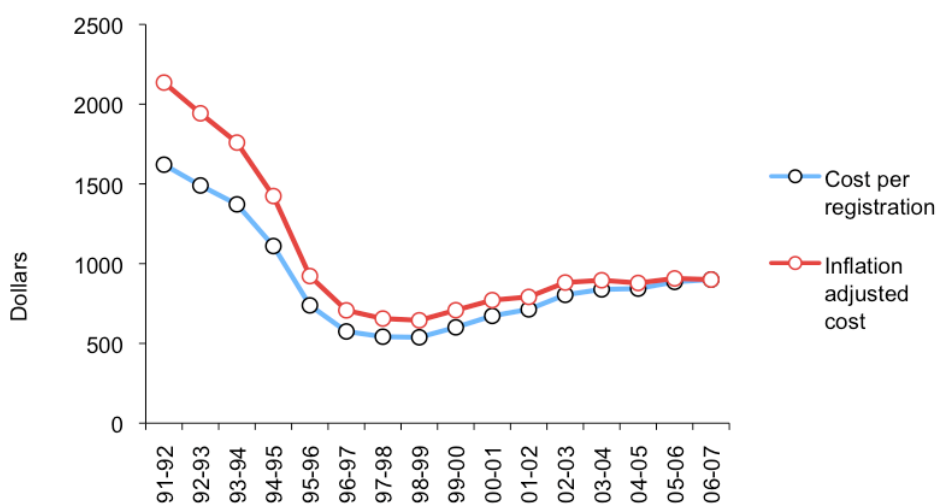
**Figure 9.4 • Operating and Capital Expenditures in the Department of Biochemistry 1991-07**



Funds for maintenance of the department's capital equipment have fared even worse and have dwindled from ~3% of the budget in the early 1990's (\$57,889) to something less than 1% and were \$18,708 in 2006-07. (However, some of this decrease is due to accounting changes that have moved items from the capital budget to the operating budget)

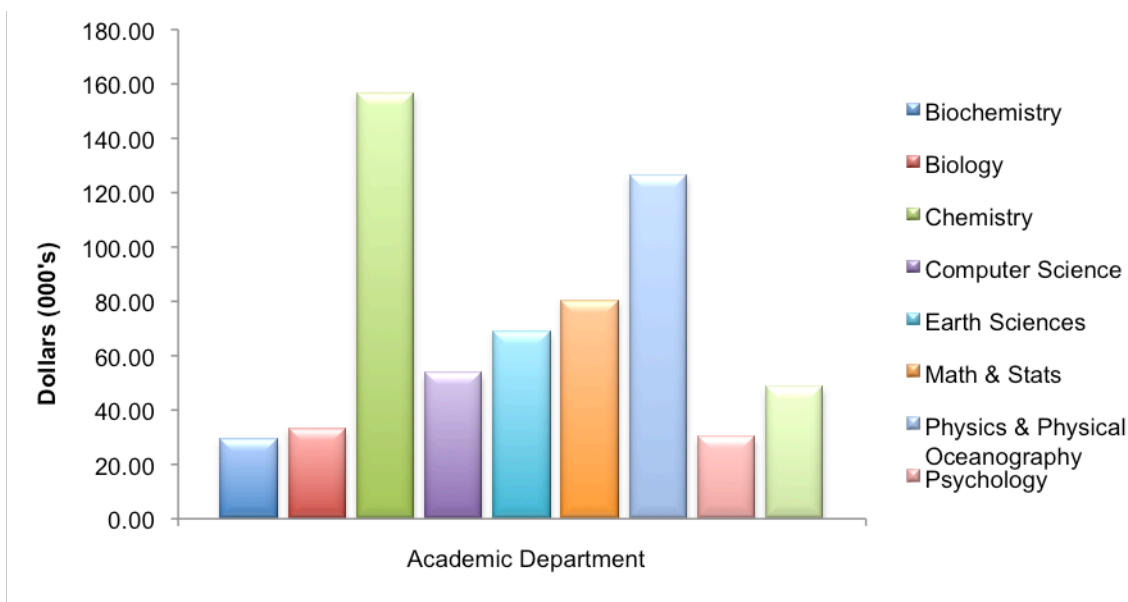
Viewed from the perspective of the department's mission to educate undergraduate students, the cost per student registration dropped dramatically in the early 1990's and has been a reasonably consistent ~\$900 for the past five years.

**Figure 9.5 • Cost per Student Registration 1991-07**



A measure of the department's effectiveness can be found by examining the expenditure per degree awarded. By this measure, the department has the lowest expenditure per degree awarded in the Faculty over the period 1996-2006, and when average expenditures per degree awarded are viewed, the Department of Biochemistry's cost was \$29,280, closely followed by the departments of Psychology (\$30,041) and Biology (\$33,109)

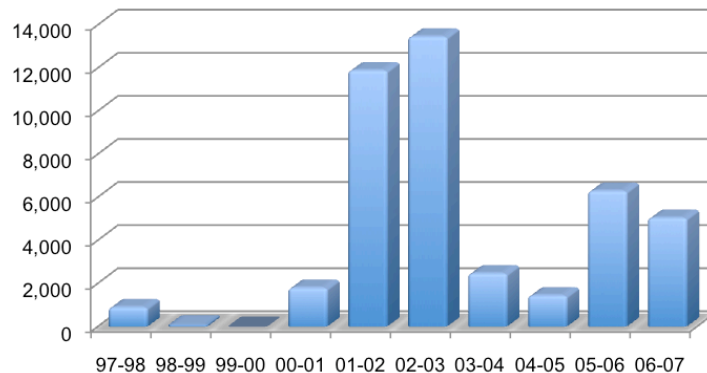
**Figure 9.6 • Cost per Degree Awarded across Academic Units in the Faculty of Science 1991-07**



## External sources of income

The department receives little income from external sources. Over the past ten years, the amount received has averaged \$4,343. Sources of external revenue have included the Amino Acid Analysis Facility, the Fisher/Promega freezer (located in Life Science Stores), and revenue derived from charges to Nova Lipids for handling purchase orders.

**Figure 9.7 • External Revenue received by the Department of Biochemistry 1997-07**



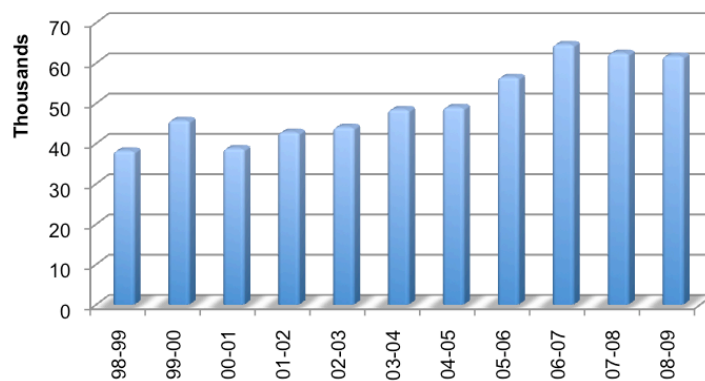
### Scholarships, and assistantships provided to students

The department does not provide scholarships directly to any undergraduate or graduate students. The department administers career awards provided to undergraduate students through the Memorial University Career Experience Program (MUCEP). These, however, are cost neutral. Similarly the department manages NSERC USRA awards, Women in Science and Engineering (WISE) Awards, the Student Work and Services Program (SWASP) and Canada Summer Job (CSJ) awards.

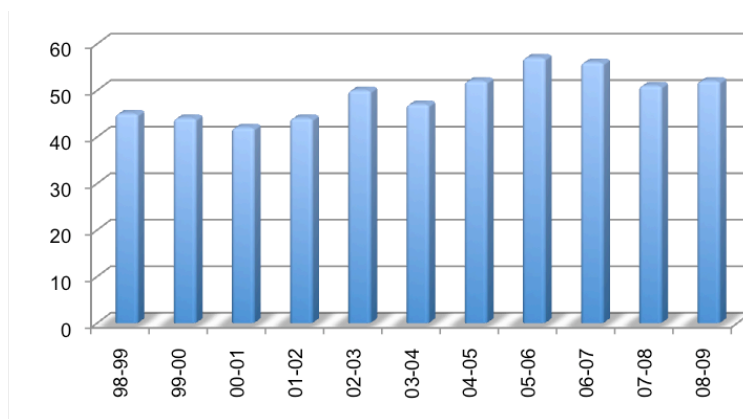
The department nominates undergraduate and graduate students for University Scholarships awarded by the Senate Committee on Scholarships and Financial Aid and by the School of Graduate Studies. These have been described in Chapters 2 and 4, respectively.

The department does support graduate students by means of teaching assistantships and laboratory demonstrator positions. These are described in Chapter 5. The following charts show the number of positions provided in the past 10 years and the total cost per year. The salary for these positions is centrally mandated and currently is \$17.41 per hour.

**Figure 9.8 • Demonstrating Budget 1998-09**



**Figure 9.9 • Number of Demonstrator Positions 1998-09**



## 10 Infrastructure & Other Resources

### Space

The department is primarily located in two buildings on the south campus: the Science building (81.5% of our space) and the Biotechnology building (16.3%). We also have small amounts of space in the Earth Sciences building (1.3%), the Mt Scio Research Labs Building (0.4%), and the Facilities Management Warehouse (0.5%). The following table summarizes our use of space by function and location.

TABLE 10.1 • Space (sq. ft.) Occupied by the Department of Biochemistry							
Category	Biotechnology building	Earth Sciences (CERR)	Mt Scio Rd Research Labs	Science building	Facilities Management Warehouse	Total Area	%
Darkroom				106.62		106.62	0.36
Lab/Computer				330.84		330.84	1.13
Lab/Research	3,768.05			10,952.22		14,818.72	50.42
Lab/Teaching				3,290.75		3,290.75	11.20
Lab/Technical				807.87		807.87	2.75
Office	564.3	385.32		3699		4,476.20	15.23
Open Office				424.77		424.77	1.45
Preparation Room				1,126.16		1,126.16	3.83
Reading/Study Room	285.08					285.08	0.97
Seminar Room				852.58		852.58	2.90
Storage Room	92.16		105.79	759.37	157.07	1,114.39	3.79
Stores/Warehouse				1,367.93		1,367.93	4.65
Student Room	89.16			228.06		317.22	1.08
Grand Total	4,798.75	385.32	105.79	23,946.17	157.07	29,393.1	100.00

For purposes of describing our use of space, in what follows some rooms have been classified to a category different than above.

## Darkroom

Located in SN3014, the darkroom contains a photographic developing tank and an enlarger both of which see limited use. The department has explored the possibility of installing an automated developer instead but decided that the limited usage would not justify the acquisition and monthly maintenance costs. Three of our four identified darkroom users have switched to a method that utilizes the gel documentation system instead of the darkroom, the fourth user will look into switching as well. If we no longer need a darkroom then this space would be available for other use, possibly as a storage room. The small size of the inside door to the darkroom limits the nature of what might be stored.

## Lab/Computer

The department maintains a small computer facility in SN3000. It consists of 11 computers, a scanner, and a printer. The PC's were replaced in March 2005, the printer was replaced in March 2007, and the CRT monitors were replaced with LCD monitors in March 2008. The scanner is the original one put into service in 2000. The computers are connected to LabNet through a local server that is maintained by the Department of Computer Science and by Computing and Communications. User data is stored on a central server that is also maintained by the Department of Computer Science and by Computing and Communications. This architecture permits users to log into their accounts and access their data from any LabNet computer on campus. They can also access their data remotely via ftp.

Faculty, staff, postdoctoral fellows and graduate students have unlimited access to the room; summer and honours students are given unlimited access upon request; other undergraduate students can access the facility during scheduled undergraduate access times. MUCEP students are hired for the Fall and Winter semesters to supervise undergraduate access hours.

Faculty, staff and graduate students are exempt from printing charges. Undergraduate (including honours) students are charged a nominal fee for printing. Accounting for printer usage is managed by the Department of Computer Science. We receive a monthly statement from Computer Science outlining printer usage and funds recovered.

Several undergraduate courses use the facility for instruction:

<b>TABLE 10.3 • Courses that use SN3030</b>	
<b>Course</b>	<b>Software used</b>
Biochemistry 2000	Virtual Experiments in Food Processing, Experimental Food Science
Biochemistry 2600	Diet Analysis Plus
Biochemistry 3107	ChemImager 4400
Biochemistry 3201	Diet Analysis Plus

Software available for general use includes:

Gentoo Linux: A collection of open source graphics, office, development and internet applications.

Windows XP: MS-Office, Open Office, Prism GraphPad, Corel Draw, Adobe Photoshop, Diet Analysis Plus, ChemImager 4400, Optiquant, MDL ISIS Draw, and Internet applications.

## Lab/Research

The department occupies 37 rooms designated as research laboratory space, a total of 14,720 sq. ft. This space is located in the Science and Biotechnology buildings and accounts for almost 50% of our space usage. Of this, 13,343.7 sq. ft. are assigned to 17 faculty members for their individual research programs; and 1,302.6 sq. ft. is designated for departmental use which includes 3 centrifuge rooms (SN3023A, SN4010 & BT3006), 2 equipment rooms (SN3011 & BT3004) and a cell culture room (BT1025).

**TABLE 10.3 • Research Laboratory Space of Biochemistry Faculty**

Faculty Member	Room(s)	Area (sq. ft.)
Bertolo & Brunton	SN3030 <sup>65</sup>	1,132.28
Booth <sup>66</sup>	SN4000, SN4000A, SN4000B <sup>67</sup> , SN4000D	1,222.65
Brosnan, J	BT3005	830.09
Brosnan, M	BT3008	654.98
Cheema	BT3010	696.07
Davis	SN4017, SN4019	809.58
Ghazala	SN1063, SN1069, SN1069B, SN1069C	1,039.53
Heeley	SN4011	519.22
Herzberg	BT3014	651.46
Hoover	SN4020	664.52

<sup>65</sup> Dr Bertolo and Dr Brunton share research space in SN3030; a 50:50 split has been assumed for the purposes of calculating an average space per faculty member.

<sup>66</sup> Dr Booth shares her lab space with Dr Kevin Keough, Emeritus Professor; 10% of her space is counted as his and has not been used in calculating an average space per faculty member.

<sup>67</sup> Office space designated for research use.

Martin <sup>68</sup>	SN1049	266.34
McGowan	SN4018, SN4018A <sup>69</sup>	788.01
Mulligan	SN3023	680.92
Nag	SN1045, SN1045A, SN1045B, SN1045C	974.80
Robinson	SN3016	502.75
Shahidi	SN1048, SN1048A <sup>70</sup> , SN1074, SN1074B, SN1074C, SN1077, SN1077A	2,102.27

The average research space per faculty member is **778.3** sq.ft.; the median space is **680.9** sq. ft.

In general, the buildings we occupy are unsuitable and inadequate for modern biochemistry. Our newest research laboratories are already almost twenty years old; the others are from twenty to forty years old. Leaks in the roof of the Science building seem to have been contained; leaks in the roof of the Biotechnology building have not. Dr. Cheema's laboratory, as well as her office, have serious leaks that have resulted in furniture rot and that have restricted her use of part of her space. Both the Science and the Biotechnology buildings lack climate and temperature controls and can be subject to wide temperature variations depending on the amount of sunlight, the time of day, and whether it is a weekday or a weekend. The ventilation system is not filtered. Concerns reported by Dr. Ghazala about ventilation in her laboratory are currently being examined by Facilities Management

### Lab/Teaching & Preparation Rooms

The department has three student teaching laboratories:

TABLE 10.4 • Biochemistry Department Teaching Laboratories		
Laboratory	Courses <sup>71</sup>	Area (sq.ft.)
SN1050	Fall: 2010 Winter: 2000, 2011	515.31
SN1039	Fall: 2101, 3402 Winter: 2100	1255.54
SN4012	Fall: 3106, 3107 Winter: 2101, 3106	1519.9

<sup>68</sup> Dr. Martin retired Dec 31, 2008; his lab has been assigned to Dr. Davis; SN4017 & SN4019 will be used for new hires.

<sup>69</sup> Office space designated for research use.

<sup>70</sup> Office space designated for research use.

<sup>71</sup> The courses taught in 2007-08 are listed.

These rooms have not been renovated since at least 1986. SN1039 and SN1050 are in reasonable repair; SN4012 is not. The Dean of Science is currently reviewing safety conditions in all student laboratories and has requested funds for improving teaching infrastructure. SN4012 is our top priority for renovation.

All of the experimental materials for our undergraduate student laboratories are prepared by our two Student Teaching Laboratory staff (Marie Codner and Natalie Webber) who work principally from SN4009. There are two smaller rooms attached to SN1039 and SN1050 that are designated as Preparation Rooms but are not used much in that capacity. SN1035 serves as an office for Ms. Donna Hunt, Laboratory Instructor. SN1050A was equipped as a taste-testing room but now serves as equipment space and/or as extra teaching laboratory space. SN1050B is an office, used in the past by sessional instructors in Dietetics. SN1050C is a small storage room.

### Lab/Technical

<b>TABLE 10.5 • Technical Space in the Biochemistry Department</b>		
<b>Room</b>	<b>Purpose</b>	<b>Area (sq. ft.)</b>
SN1109	Water Room	235.92
SN4014	Amino Acid Facility	523.41
SN4014A	Amino Acid Facility Office	48.54
SN4014B	Craig Skinner's Office	77.38

### Water Room

The Water Room contains a Barnstead Ultrapure water purification system, a Barnstead Nanopure water purification system, and an Amsco Gravity 3021 autoclave. The water systems were purchased and installed in May 1990, the current autoclave was purchased and installed in November 1997. The Ultrapure water purification system generates type I “reagent grade” quality 16 mOhm-cm water which is stored in 4 x 50 litre glass storage containers. A 2004 user survey estimated our purified water usage to be ~ 600 litres per week, the capacity of our water purification system is ~ 1800 litres/day.

The Nanopure system, pumps water from the glass containers through a series of filters to produce HPLC grade/organic free, ultra pure, or pyrogen free water. This unit produces ~ 10 litres per hour.

The presence of the autoclave in the same room as the water facility was identified as a problem before the systems were set up and continues to be a problem. There is a limited supply of water to SN1109 and the autoclave directly taxes this supply. In addition, the heat generated by the autoclaves requires an Air Conditioner which further taxes the water supply. More importantly

exhaust from the autoclave provides a source of contamination that can degrade the quality of the purified water stored in the 4 x 50 litre glass reservoirs.

We have 4 pans (2 each of large and small) for use in the autoclave. In the event of a liquid spill or overflow while autoclaving the pans will contain the liquid and prevent a real mess in the autoclave. When this happens the pans need to be emptied and cleaned and currently there is no sink available in SN1109 to do this. We are awaiting a reply from facilities management for pricing on the installation of a garborator equipped deep sink for this purpose. A garborator is required to prevent blockage of the drain when disposing of sludge created by an agar spill or overflow.

### The Amino Acid Analysis Facility

The Amino Acid facility was set up in 1971 by Mr. Douglas Hall as a service laboratory to researchers at Memorial University, notably the Departments of Biochemistry and Biology, the Ocean Sciences Centre and the Faculty of Medicine. Since its inception the facility has performed 60,522 analysis' contributing to more than 180 scientific publications. At least 3000 analyses per year were performed from 1977 through 1989 with at least 4000 analyses per year performed from 1980 through 1985. The number of analyses per year dropped below 1000 for the first time in 1995 and from 1995 through 2004 the facility averaged 571 analyses per year. At its peak the facility had 5 Amino Acid analyzers running 24/7: 3 Beckman 121 analyzers (purchased in 1968, 1976, 1982) a Beckman 6300 analyzer (purchased used in 1993) and a LKB 4151 Alpha Plus analyzer (purchased in 1987).

There are two analyzers remaining in the facility: a Beckman 121 (1982) and a Beckman 6300 (1993). Neither is functional and parts can no longer be obtained. The last request for analysis from outside the department was performed in 2004 and the last internal analysis was performed in 2005. In Mr. Hall's 1993 annual facility report he stated that "age and unavailability of parts will eventually cause them (the instruments) to be non functional" and that they needed a daily dose of "tender loving care and many prayers" to remain operative. Only the ingenuity, experience, and skill of Mr. Hall, his staff, and the university's technical services department kept these instruments running as well as they did for as long as they did. The facility is *de facto* non-operational.

### Office Space

The department's office space consists primarily of nineteen faculty offices and four rooms used for departmental administration. The faculty offices range in size from 102 to 252 sq.ft. with an average of 145.2 sq. ft. The median office size is 139.64 sq. ft. Offices are located in the Science building (three different wings), the Biotechnology building (3<sup>rd</sup> floor), and the Earth Sciences building (3<sup>rd</sup> floor).

TABLE 10.6 • Office Space in the Dept. of Biochemistry		
Room	Faculty Member	Area (sq. ft.)
SN1036	Bertolo	139.64
SN4016	Booth	130.51

BT3011	Brosnan, J	141.89
BT3009	Brosnan, M	141.90
SN3024	Brunton	157.99
BT3012	Cheema	141.90
SN1037	Davis	137.00
SN1069A	Ghazala	136.10
SN4013	Heeley	159.68
BT3013	Herzberg	138.61
ER3011	Hoover	203.44
ER3012	Hulan	181.88
SN1049A	Martin	107.89
SN3026	McGowan	127.76
SN3022	Mulligan	127.70
SN1040	Nag	131.68
SN3027	Robinson	214.99
SN3013	Roebbothan <sup>72</sup>	102.05
SN1038	Shahidi	141.78

The current Collective Agreement sets a goal for new office space at 11 m<sup>2</sup> (118.4 sq. ft.). All except two faculty offices exceed this amount.

The administrative offices of the department consist of three rooms and a small storage room:

**TABLE 10.7 • Administrative Offices in the Dept. of Biochemistry**

Head's Office	SN4008	157.18
Storage Room	SN4008A	50.30
General Office	SN4006	424.77
Administrative Officer	SN4001A	193.46
		825.71

<sup>72</sup> Dr. Roebbothan also has an office in the Faculty of Medicine

In addition, the department maintains an office for undergraduate student advising: SN4005.

Four research labs contain space that is designated as office space:

<b>TABLE 10.8 • Office Space in Research Labs</b>			
SN1069A	Ghazala	Students	252.21
SN1074A	Shahidi		139.78
SN4000C	Booth	Postdocs	141.35
SN4020A	Hoover	Students	179.57

Two other small rooms, originally recorded as office space have been designated for research use and have therefore been included under Lab/Research (above).

### Common Research & Equipment rooms

As noted above, 1302.6 sq.ft. of our Lab/Research space is for departmental use and includes 3 centrifuge rooms, 2 equipment rooms (SN3011 & BT3004), 5 cold rooms and a cell culture room (BT1025).

<b>TABLE 10.9 • Common Research &amp; Equipment Rooms in the Dept. of Biochemistry</b>			
Biotechnology	BT1025	Cell Culture Room	202.73
Science	SN3023A	Centrifuge Room II	73.97
Science	SN4010	Centrifuge Room I	155.16
Biotechnology	BT3006	Centrifuge Room	192.76
Science	SN4018B	Cold Storage Room - Research/Teach	36.31
Science	SN4010A	Cold Storage Room - Research/Teach	39.86
Science	SN4008B	Cold Storage Room	72.87
Biotechnology	BT3007	Freezer/Research Cold Storage	92.16
Science	SN3028	Cold Storage Room - Research/Teach	147.74
Science	SN3011	Research Equipment Room	212.01
Biotechnology	BT3004	Equipment Room – Shared Use	539.96

The cell culture room<sup>73</sup> contains 3 CO<sub>2</sub> incubators and two Biological Cabinets. One of the CO<sub>2</sub> incubators (purchased in 1999) and one of the Cabinets are departmental equipment; the others are the property of Dr. Cheema. The policy for the use of this facility is included with the Supporting Documents.

The table below identifies the cold rooms available in the department and the researcher that has been designated as their primary user:

<b>TABLE 10.10 • Biochemistry Department Cold Rooms</b>	
<b>Cold Room</b>	<b>Primary User</b>
SN4018B	Dr. Ross McGowan
SN4010A	Dr. Dave Heeley
SN4008B	Dr. Valerie Booth
SN3028	Dr. John Robinson
BT3007	Dr. Sean Brosnan
SN1077C	Dr. Fereidoon Shahidi

SN4018B is the most recently renovated with new stainless steel floor cladding installed and the walls painted in 2007, SN4010A has had a new stainless steel floor cladding installed and SN4008B has had stainless steel cladding installed on the walls and ceiling.

Equipment in the centrifuge and shared use equipment rooms is described in section 10.2.

### Reading/Study & Seminar Room

<b>TABLE 10.11 • Biochemistry Reading/Study &amp; Seminar Rooms</b>				
Biotechnology	BT3015	Reading/Study Room	Resource Room	285.08
Science	SN4015	Seminar Room	L.A.W. Feltham Room	852.58

A small reading room is maintained in the Biotechnology building. It is used mainly by members of the four research groups in that building. The room contains a collection of journals donated by individual researchers, and a small kitchenette.

The L.A.W. Feltham Room, named after the founding Head of Biochemistry, is a multipurpose room used for departmental seminars, pre-laboratory talks, class tutorials, faculty meetings, and graduate

<sup>73</sup> The culture of bacterial or fungal cells is not permitted in this room.

student supervisory committee meetings. The room also serves as the principal social room in the department. It is reserved for staff coffee breaks and for lunches every day. Potluck lunches and other social gatherings are held here from time to time. The undergraduate student society also hold their mixers in this room several times a semester.

The room contains a small kitchen area with seating for coffee and lunches, a large board table for meetings, and is well equipped with chairs for seminars.

### Storage Rooms

TABLE 10.12 • Biochemistry Storage Rooms			
Science	SN3032	Storage Room - Departmental	205.25
Mt. Scio Road Research Labs	MS1010	Miscellaneous Storage	105.79
Warehouse, Facilities Management	HX2000E	Storage Room	157.07

We have consolidated our storage needs essentially into one room in the Science building (SN3032). SN3032 storage consists of items stored by Craig Skinner. SN3032 is also home to a wiki server set up for the Booth Lab by Craig Skinner.

The Mt. Scio storage consists of items belonging to Dr. Ghazala.

The Facilities Management Warehouse storage consists of everything from spare parts for the amino acid analyzer, to spare instruments kept for parts to repair instruments still in use, to old instruments that will probably never be used again, and some items best described as “just plain junk”.

### Student Rooms

TABLE 10.13 • Rooms for Student Use			
BT3000B	Student Room	Graduate Students' Office	89.16
SN4001	Student Room	Society Room	228.06

Two rooms have been provided for student use. The undergraduate Biochemistry Society have a “Club” room that is located adjacent to the department’s main offices and labs. This room was provided by a previous Head, Dr. J. Brosnan, to foster a closer interaction between students and the department and to give them a sense of belonging to the department. The room is controlled by the students who have decorated and furnished it themselves. The department has provided a PC and computing network node for student use.

A small room for graduate students was created in the third floor entrance foyer of the Biotechnology building. It contains a single desk with PC and a couch. It is open to all graduate students but is used primarily by students whose supervisor's research labs are in the Biotechnology building. Graduate students in the department noted that this room provides 3.7 sq. ft. per graduate student. Obtaining a more suitable room for our graduate students is a necessity.

## Life Sciences Stores

<b>TABLE 10.14 • Rooms used by Life Sciences Stores</b>			
SN1107	Stores/Warehouse	Life Science Stores - Biochemistry	1,367.93
SN1107A	Office	Life Science Stores	178.17
SN3032A	Tiny Storage Room	Life Science Stores	
SN1104C	Solvent Storage Room	Life Science Stores	

The Life Sciences Stores occupies a suite of two rooms from which the purchasing and receiving needs of the departments of Biochemistry, Biology and Psychology are coordinated. They also maintain a stockroom from which items of common use can be purchased.

SN1104C is shared by the departments of Biochemistry and Biology and is used by Life Sciences Stores as a Solvent Storage Room. A storage shed for gas cylinders is located in the Science building quadrangle.

## Equipment

There are a number of departmentally managed shared equipment rooms with various pieces of major equipment available for everyone's use. These are listed in Appendix 10.1.

The state of our communal research equipment is mixed. While most of our equipment functions well, some of it is ten years old, and much of it is twenty years old. The department has had little to no budget for capital equipment for most of the past 15 years.

With one exception, all of our centrifuges are between 15 and 20 years old. These appear to be satisfactory to meet our needs at present. While problems have recently surfaced with our ultracentrifuge rotors (see below), the instruments themselves do not see heavy use. On average, one ultracentrifuge is used just under once a day. We have recently replaced three of our Ultra-Low temperature freezers. We now have sufficient freezer space to accommodate our needs with some 'swing' space available should an emergency arise. Our analytical equipment is ten years old and starting to show signs of age. A microplate reader was replaced last year. Other instruments such as the companion microplate spectrofluorometer, and the Gel Documentation system are probably nearing the end of their useful lives. Our liquid scintillation counters are both twenty years old but a replacement for one of them will soon be in place. Both of our departmental floor model Freeze

Dryers are at least 18 years old, and are now considered obsolete by the manufacturer with parts no longer available for their repair.

In 2006 a computer replacement plan was implemented for departmentally owned and maintained computers. This plan affects approximately 18 computers with 12 being directly replaced at a rate of 3 per year and the others being handed down. This four-year cycle ensures all our users have functional, recent model computers with which to work. Our previous model of “replace only when absolutely necessary” left no residual value in the computers being replaced and didn’t allow for the directing of the newest technology to the users who most required it. As a bonus our current model allows for the redeployment of even our handed down computers when they get replaced by newer hand me downs.

Following an inspection of our departmental centrifuge rotors by a Beckman technician on Sept 16, 2008, it was evident that we had not been taking proper care of our rotors. In the most egregious case, one of the newest rotors in the department was declared unsafe and removed from use. In total, we removed five rotors from use for safety reasons. All departmental rotors are now kept by Craig Skinner and must be returned, cleaned, to him after each use. In addition, we implemented an online booking system for all of our remaining rotors. There haven't been any issues with rotor care since this was implemented; preventative maintenance is done each time a rotor returns or whenever a rotor is signed out after an extended period.

The following table summarizes usage from 27 Oct 2008 through 14 Feb 2009:

Total Users:	10
Total Resources:	8
Total Reservations:	61
Max Reservation:	48 hours 30 minutes
Min Reservation:	1 hours
Average Reservation:	9 hours 25 minutes
Most Active Resource:	70Ti - 01u3157 : 32 Reservations

## **Library resources**

### **Biochemistry Programme Review**

#### **Report on Library Holdings**

Erin Alcock – Science Research Liaison Librarian

October 17, 2008

### **Introduction**

The library has been requested by the Department of Biochemistry to provide a statement on library holdings in support of an Academic Programme Review. The assessment which follows has been prepared in response to that request.

### **Overall Strength of the Biochemistry Collection**

An assessment of a portion of the biochemistry collection, to support graduate programmes in biochemical and clinical nutrition was completed in fall 2003. This assessment indicated that the collection was more than adequate to support the proposed graduate programs, mainly due to an expected reliance on journal literature, the access to which would be well supported through a broad range of electronic indexes and article delivery through CISTI Source (Milne, 2003). The biochemistry monograph collection has been built over several decades, primarily by Dorothy Milne, along with individuals from the Health Sciences and Marine Institute and it was in Dr. Milne's judgment that the monograph collection would meet the needs of undergraduate students and beginning graduate students, though there would be some potential for reliance on interlibrary loan for advanced graduate work (Milne, 2003).

Since the late 1990s, the subject allocation for biochemistry has been improved and we are able to purchase about 190 books per year. In addition to this, our subscriptions and access to electronic journals and indexes has vastly improved. In my estimation, the biochemistry collection is more than sufficient to support the study and research of students and faculty in this department with reduced reliance on interlibrary loan.

### **Monographs**

In book purchasing, priority is divided between books relevant to undergraduate students in biochemistry and nutrition, as indicated by both current and recent course offerings, as well as the subject specialties of faculty members. Books on food and nutrition are the largest component of the collection, numbering well over 10000 titles, followed by works on genetics and molecular biology (over 4000 titles) and then metabolism (near 2500). There are some smaller general research areas in membranes and pharmacology consisting of close to 1000 titles each, as well as a growing collection on biophysics and bioenergetics. The increasing emphasis on interdisciplinary research is reflected in faculty and graduate student research in many areas and as such, the biochemistry department also benefits from purchasing in other subject areas including Biology, Chemistry, Environmental Sciences, and Marine Biotechnology.

In the last few years, significant packages of electronic books have been purchased by MUN Libraries. For example, more than 2100 electronic books on the subject of Biomedical and Life Science as published by Springer are available through library, 90% of which have been published since 2000. Within this e-book collection, nearly 400 titles are classified as included in the subject of biochemistry, though there is significant appropriate information in books classified elsewhere in the collection. This trend is expected to continue, particularly as space in the physical libraries becomes less available.

Collection Development on Demand is an additional service of MUN Libraries whereby books requested by Interlibrary Loan are purchased when easily obtained. Under the majority of circumstances, a book deemed important enough to be brought here from elsewhere for the purposes of research and teaching, is important enough for us to own and it is hoped that such a policy picks up on gaps in subject collections or heavily used items signed out on long term loans.

### Journals

In the assessment of the collection prepared in 2003, an appended list was attached to the document indicating 24 periodical titles whose subscriptions had been cancelled since 1996. Since that time MUN Libraries have re-subscribed to 22 of the 24 cancelled titles.

Our electronic journal subscriptions appropriate for the subject of biochemistry number 247 titles. In the 2003 assessment, 85 titles were listed.

MUN Library's Document Delivery service has been vastly improved in the last year, delivering articles directly to the requestor's desktop in PDF format when possible.

Journal rankings, while somewhat controversial, are becoming an increasingly popular method of assessing the periodical portion of the library collection. SCImago Research Group (<http://www.scimagojr.com/index.php>) compiles a SCImago Journal Indicator from the Scopus database that can be used for this purpose. The ranking divides citations to a journal by articles of the journal, during a specific time period. Additionally, the indicator attributes different weight to citations depending on the "prestige" of the citing journal within a subject network of publications, without the influence of journal self-citations and includes only the most commonly cited articles, i.e., original research and reviews (Falagas *et.al.*, 2008). Table 1 indicates our subscriptions to the top ten ranked journals for 2007.

<b>Table 1: SCImago Journal rankings, 2007.</b>	
<b>Journal Title and Ranking in Subject area: Biochemistry, Genetics and Molecular Biology</b>	<b>Subscription</b>
1. Cell	Online: 1974 – Present Print: 1974 - 2005
2. Annual Review of Biochemistry	Online: 1932 – Present
3. Annual Review of Cell and Developmental Biology	Online: 1985 – Present Print: 1995 - 2007
4. Nature Reviews Molecular Cell Biology	Online: 2000 – 1 year embargo

5. Nature Genetics	Online: 1998 - Present
6. Genes and Development	Online: 1987 - Present
7. Cancer Cell	Online: 2002 – 1 year embargo
8. Molecular Cell	Online: 1997 - Present
9. Physiological Reviews	Online: 1921 – Present Print: 1921 - 2001
10. Nature Cell Biology	Online: 1999 - Present

### Article Indexes

The Library has numerous comprehensive article indexes useful to students and researchers in biochemistry. All of these are available online and many have considerably better back file coverage than had been available in the 2003 assessment.

AGRICOLA	Coverage: 1970 –
Applied Science and Technology Index	Coverage: 1983 –
ASFA: Aquatic Science and Fisheries Abstracts	Coverage: 1971 –
Biological and Agricultural Index Plus	Coverage: 1983 –
Biological Abstracts	Coverage: 1926 –
CAB Abstracts	Coverage: 1990 –
Food Science and Technology Abstracts	Coverage: 1969 –
IBIDS Database	Coverage: 1986 –
PubMed	Coverage: 1951 –
SciFinder Scholar (Chem Abstracts)	Coverage: 1907 –
Scopus	Coverage: 1960 –
Web of Science Citation Database	Coverage: 1900 –

### CISTI

While MUN staff, students and faculty still have access to CISTI, the library has ceased supporting using CISTI as a document delivery service. With improved journal subscription coverage and an improved local document delivery service, CISTI is no longer necessary to users.

**Conclusion**

Access to electronic resources at MUN Libraries is of equivalent value to any major university library in North America. Graduate students and faculty should have little difficulty locating and accessing appropriate periodical research and find reduced need for interlibrary loans. Undergraduate students will find their study and research well supported by books, journal articles and article indexes. Biochemistry is supported well by MUN Libraries.

**References**

- Falagas, M. E., V.D. Kouranos, R. Arencibia-Jorge and D.E. Karageorgoplous. 2008. Comparison of SCImago journal rank indicator with journal impact factor. *The FASEB Journal*, doi: 10.1096/fj.08-107938
- Milne, D. 2003. *Nutrition Programme Review*. Queen Elizabeth II Library.

## 11 Additional Issues

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### Issues for which the department or school desires advice

#### Undergraduate studies

- Are the two programs within the department, (Nutrition & Biochemistry), meeting their objectives? Do they adequately complement each other or should a multidisciplinary approach involving other units be considered? Does the department need to take any steps to increase demand in one or both of its undergraduate programs?
- How do we best go about making the undergraduate course offerings more coherent? This includes: how do we best achieve a consistent level of difficulty in all courses at a particular level (e.g. 2000 level, 3000 level, 4000 level), as well as how do we ensure there is a logical progression of material from the lower level courses to the higher level courses (to avoid repeating introductory material in upper level courses or presenting material that some or all students don't have sufficient introductory knowledge to understand); and, how do we achieve a good balance between learning material and developing critical thinking using knowledge of this material as the students progress from semester to semester?
- Should the department establish a co-operative program in biochemistry? Would an Applied Biochemistry program be more suitable to our students, university and the province?

The department's Undergraduate Studies Committee is currently reviewing our undergraduate programs; a status report on their deliberations including tentative proposals is presented in Chapter 12.

#### Dietetics

The availability of Dietetics internships has always been a somewhat problematic aspect of our undergraduate program. Students were admitted with no guarantee that they would ever get an internship placement. A solution to this was the integration of internship placements into the Dietetics program but a limitation of proposals to integrate internship placements into the Dietetics program has always been the small number (four) of placements available in the province. In 2002/2003, the Health Care Corporation of St. John's signaled that they might no longer be able to continue supporting the internships in the traditional way. That led to a new proposal, developed by Dr. B. Roebathan, to establish a Master's program in Dietetics within the Division of Community Health incorporating as a practicum component, the postgraduate dietetic internships. It was anticipated that the last students to the undergraduate dietetics program would be admitted in Fall 2003 (to graduate in 2006), and that the first students for the proposed Master's program would be admitted in Fall 2007. The Department gave notice in the 2003-04 University Calendar that the program would be terminated. However, admissions continued for another four years until 2007 when the last class was admitted. They will attend Acadia University in 2009-10. A more detailed chronology of events relating to Dietetics can be found in Appendix 11.1.

There are three avenues to resumption of a program towards the education of Dietitians at Memorial University. Each has its own advocates.

- The Department of Health and the Provincial Health Boards would like the Department of Biochemistry to return to the *status quo ante*. The department, however, no longer has qualified personnel and the former program is no longer accredited.
- The department Head, with support from the Dean of Science and the Vice-President(Academic) has had discussions with Acadia University to establish a modified undergraduate program in which students would complete two years of study at Memorial and two years of study at Acadia. Students would then get an Acadia degree. An advantage of this avenue is that our students would be *bona fide* students of the Acadia program and would receive dedicated career guidance there. Furthermore, Acadia University is in the process of developing an integrated program, and students would, potentially, graduate as fully licensed Dietitians. A disadvantage of this avenue is the cost to the student.
- The Masters of Public Health proposed Dietetics and Nutrition option would deliver licensed professionals. As things currently stand, however, graduates of Memorial would not be eligible for admission.

A related question is the future status of the Provincial internship placements: which avenue would get them, an undergraduate program or the MPH program?

The department voted to discontinue its undergraduate program in 2003. Should the Department continue the development of a 2+2 model in partnership with Acadia University? Or, should the Department ask the University to support the MPH program as the best way to train Dietitians for the province? How should past criticisms of a lack of focus (*cf* Chapter 12), factor into a decision?

## Graduate Studies

- Is it time to discontinue admissions to the graduate programs in Food Science? Should all graduate applicants be admitted to the department under the umbrella of the graduate programs in Biochemistry? With three remaining faculty members in the area of Food Science, is there sufficient academic breadth and depth to maintain separate Food Science programs any longer?
- Should the department seek to establish a graduate program (M.Sc. and PhD) in Nutrition (or take the lead in establishing a university-wide, *i.e.* interdisciplinary, graduate program in Nutrition)?
- How can the department best address meeting the University's strategic goal of doubling its number of graduate students?
- Can the department provide money for conference travel or for training travel expenses?
- How do Graduate seminars and/or journal clubs operate in other departments? Can the department learn from and benefit from the success of others in this regard?
- How can the department best foster a sense of community among its graduate students?

- Should the department consider merging our Honours programs (which are successful in attracting top students) with a Master's program (which is less successful at recruiting)?

The idea would be to allow honours students to use their honours research data towards a Master's thesis. The M.Sc. thesis would have the same expectations but the student would have a "head start" due to their honours research. This might help retain our honours students by recruiting them directly into a M.Sc. program. It might also be an attractive option for students who are unsuccessful with Medical School applications. It might also be attractive for Principle Investigators who could retain their honours students and expand their research into more publishable results.

The department's Graduate Studies Committee is reviewing our graduate programs; a status report on their deliberations including tentative proposals is presented in Chapter 12.

### Infrastructure

- Are the department's research facilities adequate for modern or cutting-edge biochemical research? Most of the department is housed in the Science building, which was built in 1961. Over the years, individual rooms and laboratories have been renovated but no significant renovations have occurred in the past ten years. Four laboratories are housed in the Biotechnology building, which was opened in 1992.
- Is it time to formally close the Amino Acid analysis facility? The Amino-Acid analysis equipment is obsolete and non-functional. It has been non-operational since 2005. Spare parts can no longer be obtained. Craig Skinner has assumed other tasks within the department that keep him fully occupied. Should there be a need for a new up-to-date facility, then it could be established under the umbrella of the pan-university Core Research Equipment and Instrument Training Network (CREAIT) (*cf* Supporting Documents).

### Future directions

- Should the department change its name? (Some possibilities might be: Biochemistry & Molecular Biology; Nutritional Biochemistry & Molecular Biology. There are undoubtedly others.) Would a change in name help the department with its focus?
- Should the department change the name of the biochemistry(nutrition) program (to nutritional biochemistry, for example)? Does reference to a "Nutrition" program mislead students and others about the nature of our program?
- Should the department seek to establish a graduate program (M.Sc. and PhD) in Nutrition (or take the lead in establishing a university-wide graduate program in nutrition)?
- Would the Department of Biochemistry, or any part of it, be better sited in the Faculty of Medicine?

**Personnel**

- Should the hiring of a faculty member with a strong background in enzymology and/or analytical biochemistry be a priority for the department<sup>74</sup>?
- Should the University seek an external Head for the department when Dr. Mulligan's term expires in May 2010? Would an external Head be better able to set a direction for the department than an internal Head?
- Is there a need to hire additional Office staff to manage the department? In particular, if the department aims to double its graduate enrolment, will we need to hire a dedicated staff person to manage graduate studies paperwork?

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<sup>74</sup> At a meeting held on 20 June 2007 for Collegial Consultation on new hires in the department, the nature of three potential new hires was identified in order of preference: biochemical metabolism, gene regulation, and enzymology or macromolecular biochemistry. Subsequently, the department was given permission to proceed with searches for two of these, which are now under way.

## 12 Conclusions

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### Strengths and Achievements

The department can be proud of its undergraduate programs. We teach 20% of majors in the Faculty; our majors take the heaviest course loads and have the highest cumulative averages in the Faculty. We accounted for 28% of students named to the Dean's List in 2007-08.

The department can be proud of its areas of research strength. We have had strength in metabolism and nutritional biochemistry for most of our existence as a department. We have secured two Canada Research Chairs (Tier II) who have established active research programs in the department, and who have attracted significant funds for infrastructure. Dr. Shahidi has a prolific publication record and is a highly cited author with an *h*-index<sup>75</sup> score of 34.

The department can be proud of its success in grant competitions. Six faculty have close to twenty years (or more) of continuous Tri-Council funding. Faculty in the department accounted for 7.2% of all operating grant revenue received by the University in 2006-07.

The department can be proud of its staff, who carry out their work with a positive attitude which does much to ensure the successful operation of the department, and who are in many ways the life and soul of our department.

### Challenges

*"In prehistoric times, fearsome creatures called sabre-tooth tigers often perished, not in combat with other animals, but by stepping into tar pits from which they could not escape."*<sup>76</sup>

The principal challenges facing the department are much the same as they always have been.

As noted in Chapter 1, there have been three previous reviews of the Department of Biochemistry. Two consistent themes run through those review reports:

- A lack of focus in the Department of Biochemistry
- Internal divisions, particularly relating to food science

The very first review committee noted that, while the department was strong, research interests were based on individual research interests. By implication, at least, the department had not set itself goals or priorities in which to build the department and they said that the department should

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<sup>75</sup> Hirsch, J.E. "An index to quantify an individual's scientific research output." Department of Physics, University of California, San Diego.

<sup>76</sup> J.L. Badaracco, Jr., *Leading Quietly: an unorthodox guide to doing the right thing*. Harvard Business School Publishing, Boston (2002).

give consideration to the development of concerted effort in specific fields. This was articulated much more strongly by the second review committee with their concern about the lack of a distinct focus in the department, and when they noted serious strains in the structural integrity of the department and morale problems relating to the heterogeneity of interests that led to conflicts of goals and priorities. The third review committee also reported that the department must focus on core strengths.

A decision to establish a research thrust in food sciences was noted by the 1979 committee. Six years later, the 1985 review committee recommended that the faculty with research/teaching interests in food science should be granted a separate administrative and academic structure. The 1998 review committee noted the division between the food science group and the rest of the department, and that old problems had been prolonged and had festered.

In 2006, the current Head established an *ad hoc* committee to draft a vision statement for the department. The committee members, Drs. Booth, Bertolo, and McGowan, were all recent arrivals to the department who had fresh perspectives that were unburdened by our past, and knowledgeable about the modern biological sciences.

In a letter to the department establishing the committee the Head said that the committee's task was "to look ahead not backwards; to see where we should and might go, not where we have been. ... What should this biochemistry department look like ten years from now? Where is modern biochemistry going and what part should this department, the faculty and this university play?".

As a result of the committee's work, the department adopted a Vision Statement on 14 June 2007 (Appendix 12.1) in which two general themes were enunciated:

- Development and Health
- Membranes and Molecular Interactions

These themes emerged from and were intended to build on and to capitalize on our existing expertise with an emphasis on the areas where our current research strengths intersect. However, as the department struggled to define the two themes, the overriding concern seemed to be whether the themes were broad enough to encompass all of our present faculty and their research interests. There was not so much evidence of a collective vision looking ahead and how our department should be part of the future of biochemistry.

The biggest challenge, indeed the key challenge, facing the department is making a firm decision about what it is **NOT** going to be.

The history of this department, as indicated by the previous reviews and as articulated most succinctly by the 1985 review, has been one of a "heterogeneity of interests" and consequent conflicts of goals and priorities. There are several possible paths forward for the department. Some suggestions have been presented in Chapter 11 (and hints of our present heterogeneity can be discerned among them). However, any path forward is difficult to follow if there are a multitude of side-tracks along the way. The department needs to define its path forward but it must also know that it will not wander the side-tracks. The latter is the bigger challenge.

The second biggest challenge is making a decision about what its future will be. Once again, there are several possible paths forward for the department. Suggestions that have been presented in Chapter 11 also hint at the heterogeneity of views about the path that should be taken.

Once these challenges are met, once these decisions are taken, then the department will be in a position to grow with the addition of new faculty and to develop the synergies that are so essential for a modern department to succeed not only in the mechanics of research (*e.g.* collaborative research grants, major equipment grants *etc.*) but also in building a collective reputation for excellence in research.

Meeting these challenges would then allow the department to address other related shortcomings that are apparent from this study. We would be able to increase the number and percentage of faculty in the department with Tri-Council funding. We would be able to assemble the collaborative teams necessary to succeed in winning equipment and infrastructure grants. We would be able to accommodate an increase in the number of graduate students in the department. Building a critical mass in graduate students with shared interests, especially at the PhD level, would greatly stimulate the intellectual vigour of the department.

## Opportunities

The department is currently seeking to fill two new positions, who should arrive in time to bridge the way to several upcoming retirements. They will reinforce our existing strength in metabolic biochemistry and help us to address the shortcoming in the number of faculty in areas of molecular biology. Together with our CRC Chairs, they will provide the department with a new, younger, core of expertise and ideas. They bring new technical expertise to the department that can be to the benefit the research programs of existing faculty; they bring modern instrumentation in the form of new CFI grants.

The department will soon advertise to hire a Manager of Academic Programs who will assume responsibility for much of the paperwork relating to the administration of undergraduate business. More importantly, the person hired will be dedicated full-time to our undergraduates and will not only guide their academic decision making but will also help to guide their career decision making by acting as a resource person and by arranging appropriate information sessions within the department.

## Looking Forward

The department's undergraduate and graduate studies have been tasked with reviewing (aspects of) our undergraduate and graduate programs, respectively. The following updates on the committees' activities have been prepared by Drs. McGowan (Deputy Head(Undergraduate)) and Bertolo (Deputy Head(Graduate)), respectively.

## **Undergraduate Studies**

The undergraduate studies committee is considering a number of issues related to our programs that are relevant to an overall program review. They are as follows:

- **Curriculum review**

The major issue being examined by the committee is a review of the course offerings in our programs. This has been going on for some time and we anticipate finishing these reviews in the next few months so that Calendar changes can be submitted in time for the 2010-11 University Calendar. Please see the report on the Undergraduate Curriculum Review in Appendix 12.2.

- **Course Prerequisites**

Updating and modernising our course offerings is just one step in upgrading our programs. Perhaps even more important to having a coherent and viable program is ensuring that courses feed into and build upon each other appropriately. The committee does not feel that this is true at present primarily because courses have evolved quite a bit since the prerequisites were originally put in place. Therefore, the committee will acquire detailed course outlines and work with the faculty to align courses and prerequisites in the most coherent way possible.

- **Joint programs**

The joint programs will need to be reviewed in light of the changes that are being made to our regular programs. However, these programs also need to be re-examined for other reasons as well. Many of our joint programs require more than 120 credit hours to complete meaning that they cannot be completed in 8 semesters. The reason for this is simply that essentially all of the requirements of both departments involved are required in the joint programs. This is contrary to the point of having joint programs and so these need to be re-evaluated in consultation with the appropriate UGSC in the other departments involved.

- **Honours theses**

Although we believe that our Honours thesis program is very good overall, there are some ongoing problems that need to be addressed. The problems exist because of the wide range of supervisors that are involved with the program including units with undergraduate programs (such as Biochemistry, Biology, Chemistry) as well as some without (Medicine, Ocean Sciences Centre). This means that the evaluation criteria and the grades awarded can vary widely. Changes were made a few years ago in order to address this issue including changes to allocation of marks, distributing marking criteria to supervisors, and including two observers from Biochemistry at all defences. Now that it has been running in this way for several years the success of these changes needs to be examined.

## Graduate Studies

The key issues in front of the department's Graduate Studies Committee that regard overall program review include:

- **Refinement of PhD Comprehensive process**

The Biochemistry candidacy/comprehensive exam process was radically changed three years ago from a textbook-based written and oral examination of detailed knowledge in biochemistry to an oral and written grant proposal design. The student crafts a research grant proposal in an assigned area and the written component is evaluated and defended in an oral exam. This new process emphasizes skills evaluation. The process has been deemed generally successful after seven exams. However, in some cases students were unclear about aspects of the approach which led to unnecessary problems and delays. The procedures are being re-evaluated and will likely include more interim contact between the student and examination committee to ensure proper course and direction of the student's proposal.

- **Overhaul of graduate course offerings**

The Department has over 20 graduate courses listed in the calendar of which less than half are typically offered and only eight of those have had students enrolled in the past 5 years. The rota for these offerings is outdated and has presented some difficulties. The Graduate Studies Committee will propose a complete overhaul deleting almost all courses and creating (or maintaining) only six: two alternating courses within three streams in the department (Food, Nutrition, Biochemistry). These courses could be team-taught and will be offered in alternating years; a third 'open' course could be listed to allow flexibility. This proposal has not yet reached the department's faculty for discussion.

- **Proposal for single mandatory graduate course for all graduate students**

Currently M.Sc. students require a minimum of two graduate courses for their degree. We have discussed the option of crafting a mandatory skills-based graduate course to be required by all incoming students. This course would ensure various skills (*i.e.* literature review, writing, presenting) are developed in all students while generating a stronger community amongst the graduate students, which we feel is lacking. Ideas thus far have included: a team-taught one-semester course with general topics in several sections; converting the seminar program to a student-driven course with various assignments; or instead of creating an extra course to make mandatory the above skills in the previously proposed graduate courses. This issue has not been discussed at the department faculty level yet.

- **Refinement of graduate student application approval process**

Currently there are several contrasting philosophies on acceptability of graduate applicants and this has led to inconsistent 'standards' more reflective of the Graduate Studies Committee composition, rather than department policies. An upcoming task is to codify such policies especially as it relates to potential applicants with non-standard backgrounds as well as international students who have different evaluation standards.

- **Initiatives to increase graduate enrolment**

Consistent with the University's push to expand graduate enrolment, the department needs to participate in various initiatives to increase graduate student numbers in the department. Even for those faculty not interested in expanding enrolment, these initiatives are necessary to expand the number of applicants if only to have a larger pool from which to choose stronger applicants. Some of these initiatives begin at the School of Graduate Studies, but we will need our own to compete with other departments.