

## GENERAL SCIENCE SELF-STUDY: QUESTIONS AND ANSWERS

### **A: STRATEGIC OBJECTIVES**

1. What are the strategic objectives of the unit/program
2. To what extent are the stated unit/program objectives being met? What is the evidence for these achievements?
3. How does the unit/program support the mission and objectives of the University and other programs within the University?
4. How are the efforts of the unit/program focused upon achieving the levels of excellence (provincial, national, international) to which the program aspires?

### **Strategic Objectives of the Program:**

The General Science program has its roots in the earliest planning exercises held at Grenfell, dating back to 1983, a time when Grenfell was still limited to its initial role as a 2-year ‘feeder college’ to the parent campus in St. John’s. In April 1983, the newly-constituted Academic Planning Committee recommended that Grenfell ‘investigate the feasibility of offering a four-year degree programme in Arts, Humanities, and Science’. While this initial proposal never made it past the initial planning stages, it provided an important foundational ‘liberal education’ context for the subsequent planning and program development at the Grenfell Campus whose influence can still be felt 30 years later.

In 1985, our Academic Council adopted a report on the *Phasing-in of Four Year Degree Programs at Sir Wilfred Grenfell College*; this report recommended, among a variety of other things, the creation of degree programs in the liberal arts and sciences. Encouraged by this recommendation, the Faculty of Science in 1987 developed a proposal for a degree that was to be called “B.Sc. (Natural Sciences)”, recommending the creation of a general science degree in which students would complete something close to a ‘triple minor’ in three distinct science areas. The recommendation for this development noted that such a degree would be a good preparation for future high school science teachers.

Around the same time (November 1986), the President of the University appointed a Presidential Advisory Committee, charged with investigating the ‘*Future Development of the Sir Wilfred Grenfell College*’. This Committee submitted its report in April 1989 (the *Staveley Report*). This report recommended the development of four-year degree programs in the Arts and Sciences, making specific mention of the ‘B.Sc. (Natural Sciences)’ mentioned above.

The following quote from the *Staveley Report* is particularly relevant:

*The opinion is emerging that there is a need in the province for an alternate undergraduate degree programme to the present B.A. or B. Sc. Programmes offered by Memorial. It seems that the present Memorial degrees have evolved in the direction of ever-increasing specialization. Consequently, the programmes in both arts and sciences that lead to these degrees have become geared to the student who is aiming for a subsequent graduate degree in the same discipline. This sequence of development has its value, but there are other and equally valuable roads to salvation. In particular, it was observed in the committee that a proposal for more diverse undergraduate programmes is in harmony with the recent recommendations of the Task Force on Teacher Education, and with earlier initiatives already taken by the Faculty of Education.<sup>1</sup>*

Following the adoption of the *Staveley Report*, the Grenfell community fell into an intense flurry of academic planning activities, culminating, in 1992, with the adoption of a Grenfell Core Curriculum, and the approval of the first three degree programmes in English, Psychology and Cognitive Studies. In its statement of academic purpose, Grenfell self-identified as a four-year undergraduate college offering a liberal education leading to bachelor's degrees in arts and science. 'Liberal education' was defined as 'a critical and open-minded pursuit of knowledge providing students with the intellectual tools to enable them to respond to a rapidly changing world'.

Since then, Grenfell has introduced a number of degree programs. These included B.Sc.'s in Environmental Science, with streams in Biology and Chemistry (introduced in the mid-1990's). Subsequently, a number of minor programs were approved, including minors in both Mathematics and Physics. At this point, it became feasible to pursue the planning for a broadly-based, multidisciplinary science degree, culminating, in 2002, with a proposal for the General Science Degree Program. This was accepted by Senate in 2003, and officially came on-stream in September of that year.

From its inception, this program has been aligned very directly with several of Grenfell's strategic goals. For instance, as early as 1985, Grenfell recognized the value of developing programs that were highly inter-disciplinary in nature. As well, the challenge was, from the start, to develop in areas that complemented rather than competed with programs available on the St. John's campus. By nature and design interdisciplinary, the General Science Program offers an exciting alternative to the more traditional 'majors' programs that are available in St. John's.

Secondly, a particular challenge for program development on the Grenfell campus has been the need to work within existing operational and budgetary parameters; by using course offering already on the books to support existing programs (and minors), the General Science Program was able to 'piggy-back' on existing courses with practically no additional expense.

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<sup>1</sup> Presidential Committee on the Future Development of the Sir Wilfred Grenfell College (April 1989), p.7

Third, from the start, the College community adopted a principle of balanced development. Specifically, while it was clearly understood that degree programmes would necessarily be phased in over a period of years, it was agreed that such new programmes would be introduced in a way that allowed for balanced development across the entire spectrum of disciplines within the Arts and the Sciences. As long as the science offerings at Grenfell were restricted to Environmental Science, both Mathematics and Physics were marginalized, providing nothing more than a couple of first-year service courses. However, within the context of the General Science Program, these disciplines are equal partners with both Biology and Chemistry.

It is worth noting that the College community gave its renewed support to this principle of ‘balanced development’ in 2004. In that year, the College Academic Council approved the Academic Plan brought before it by the Academic Planning Committee. Specifically, the following was approved at that time:

*Balanced Academic Development.* The Committee sees a number of challenges ahead as we attempt to ensure balanced academic growth and development at Grenfell. This is particularly true if we plan to increase the number of our degree programmes, expand our service function, and offer a wider variety of courses for the community – all within the context of a self-defined liberal arts and science institution. One such challenge will be to achieve a balance in the disciplines which define a liberal arts and science institution. The redistribution of faculty resources toward programme development and the downsizing or elimination of disciplinary areas such as second languages and Philosophy reflect an ideological shift, which if not held in check could lead to a further erosion of the liberal arts and science ideal. In a market-place where ever more emphasis must be placed on recruitment and retention, we need to be wary of any tendency to reshape academic life in terms of contemporary trends at the expense of the disciplines that form the core of our liberal arts and sciences mandate. In practical terms, Grenfell needs to ensure that the disciplinary base essential to a liberal arts and science institution is bolstered. To balance this with diverse forms of programme development is a complex challenge.<sup>2</sup>

## **B. STUDENT ENROLLMENT/PROGRAM OUTCOMES**

### **1. What are student enrollment trends (in terms of FTE) at each level (undergraduate and graduate)?**

General Science accepted its first student in September 2003. Since 2004, the number of students declared within the General Science program has ranged from a low of 20 (in 2005) to a high of 51 (in 2008). The exact numbers for each year are contained in Table 1 shown below. Over those nine years, the program has had an average of 35.2 declared majors.

The precise numbers by year are given in the table below. Several points are worth noting here. First, each year a number of students enter this program directly from high school.

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<sup>2</sup> 2003-2004 College Academic Plan

We have observed that some of these do so under the mistaken impression that the phrase “General Science” describes some sort of ‘generic’ first year program for students who might wish to pursue a science degree. The name ‘General Science’ for this degree program has proved to be problematic from the start; we shall elaborate on this point later in this report.

Second, a significant number of students ‘float’ for several years, following the program requirements without officially declaring General Science as their major. This problem has been persistent, in spite of a variety of efforts by the various program chairs to get an earlier formal commitment by students. In view of these two points, the numbers in the table below are not an exact measure of student uptake of this program.

<b>Year</b>	<b>BSG General Science</b>	<b>BSGH General Science</b>	<b>Total</b>	<b>Number of Graduates</b>
2003	1		1	
2004	23		23	1
2005	20		20	1
2006	22	3	25	8
2007	44		44	8
2008	51		51	5
2009	43		43	7
2010	36	2	38	2
2011	35	2	37	5
2012	35	1	36	6
<b>Total</b>	310	8	318	43

**Table 1**  
**General Science Majors – Fall 2003 – 2012**  
(as of last day to add)

**2. Are the numbers of students majoring in the programs appropriate given the resources that are committed to the Unit/Program?**

Yes.

As noted before, by ‘piggy-backing’ onto existing courses (and programs/minors), the General Science Program is offered with very little commitment of dedicated resources. There are two exceptions to this observation:

- a) The Program Chair of General Science is given a 1/3<sup>rd</sup> teaching remission and is paid a stipend (currently this stipend is set at \$900/annum). It is worth noting that typically, the 1/3<sup>rd</sup> teaching remission has been absorbed by the General Science Program Unit with incurring any addition replacement costs.
- b) In common with all other programs, the General Science Program has a number of 4000-level courses specifically dedicated to the program. These are
  - a. SCIE 4000: Senior Science Seminar.

- i. When the numbers have warranted it, this course has been taught (or team-taught) as part of normal load for a particular faculty member. During the years when the student numbers were low, the course SCIE 4000 was merged with ENV5 4000, which is the corresponding seminar course for the Environmental Science students.
- b. SCIE 4950: Senior Project
  - i. In 2004 and 2005, the program graduated a single student; during those two years, the SCIE 4950 was delivered as a senior project supervised by a single faculty member. This was treated as overload, and was paid at the overload stipend of \$106 per supervision. In subsequent years, this was taught (or team-taught) as a single section, as part of the regular teaching load of the faculty member(s) responsible for its delivery.
- c. SCIE 4951/4959: Honours Project I and II
  - i. Grenfell uses the fairly standard model of one-on-one supervision for students completing an Honours degree. This takes place over the course of two semesters, and is treated as overload, paid at the rate of \$400/student/semester.

As is evident from this, delivery of the General Science program costs Grenfell somewhere between \$900 - \$3300 per year (the latter amount during the 2006-2007 Academic year, when we graduated three Honours students). From a strictly financial perspective, a graduation rate in this program of even a single student/year would make the program financially self-sustaining.

**3. Are the numbers of degrees being awarded appropriate given the resources that are committed to the program?**

Yes, for the same reasons as stated above.

**4. Are retention rates satisfactory in the program?**

This is a more difficult question to answer. How should this be measured? At what stage does attrition become problematic enough to be described as ‘unsatisfactory’? Certainly the figures provided by Table 1 do not any helpful insights. The following observations might shed light on this issue.

- a) As already noted, a number of students are ‘floaters’: in their minds, they are pursuing a degree in General Science, but they have not bothered to fill out the form which makes this official. Since its inception in 2003, General Science has had four different Program Chairs; all of these individuals have dealt with students who suddenly appear – very often in their third (or even fourth) year to indicate that they are in the Program. It is obviously impossible to know how many such ‘floaters’ there are in any given semester, and so it is equally

impossible to estimate how many of these individuals float off in some other direction.

- b) Another point already noted relates to students who declare for General Science directly out of High School. A significant number of these have not understood that the term 'General Science' describes a particular degree program. Once they declare their real major, they disappear from the tally of General Science students. This gives the false appearance of an attrition problem.
- c) Some students will drop out of General Science because they have discovered a passion for one of the science areas; hence they decide to major in that area. These students will either end up in one of the streams of the Environmental Science program offered at Grenfell or transfer to St. John's. As well, there have been a number of General Science students for whom this program was the fallback option in case they did not gain acceptance into the professional school of their choice (this has happened several times with students seeking, and finally gaining, admission into the School of Pharmacy).
- d) Generally speaking, once students have reached the 3000-level in General Science, they have tended to complete the program. This suggests that attrition out of the program happens either within the group of undeclared 'floaters' or at some time within the first two years of a student's academic program.

## **5. What is the level of satisfaction among graduates of the program?**

An attempt was made to contact all the graduates of the program. Unfortunately, some seem to have disappeared; others chose not to respond to the invitation to comment on their experiences in the program. The email sent to these individuals asked them for their impressions about the program; in addition it solicited specific information on the following points:

- (a) Was the program intellectually challenging?
- (b) Did the program prepare you for your chosen career?
- (c) Was there anything about the program that you particularly liked? Disliked?
- (d) Could you suggest any potential changes/revisions that might improve the program for future students?
- (e) If you were to do it all over again, would you choose the same program?

From the responses that were received, it is apparent that students were very satisfied with the program. All the responses are collected in a later section of this self-study; the bullets below provide a summary of the comments.

### **(a) Was the program intellectually challenging?**

- Yes, but there was a very strong core of professors to help
- Definitely challenging, but it was fair and the challenges helped me become a better student and worker

- Yes especially third-year courses in Physics and Chemistry
- Yes, very challenging. Heavy workload, at times overwhelming
- Yes – had to go “outside my comfort zone to do math”
- Yes definitely – especially the Chemistry courses
- Yes because it challenges students to adapt to different learning environments
- Yes; enjoyed the breadth
- Comparing myself to some of the graduates from our local universities, I notice that I have a broader view of issues happening in my country and internationally.

**(b) Did the program prepare you for your chosen career?**

- Yes; degree has given me a ‘broad span of knowledge in many fields of science’, a skill set that has become very important for me as a High School educator
- Since I plan to become a teacher, the program was a perfect fit for me
- Started program wanting to be High school science teacher; developed passion for mathematics and wanted to now become professor of mathematics; this meant that had to go to St. John’s after completion of General Science degree to complete more mathematics courses before admission to graduate school
- Yes very definitely; Junior High school math and science teacher for 5 years and recently completed Masters of Education program
- Yes because I always wanted to be a science teacher
- Yes – cannot imagine a better program for a future science teacher
- The fact that the General Science program had prepared me to be adaptable prepared me for the subsequent challenges of law school
- Yes, prepared for career as teacher
- Because of my studies at Grenfell, I was given the opportunity to be a member of the review panel for the physics syllabus for the Caribbean Secondary Education Certificate/Caribbean Examination Council

**(c) Was there anything about the program you particularly liked or disliked?**

- Enjoyed the diversity of the program, the ability to ‘dip my toes’ into various educational fields
- Attribute many of my skill sets, work ethic and educational interests to completing this program
- Love the fact that program grooms the student to become a teacher
- Did not like the way that SCIE 4950 was conducted
- Likes fact that has broader understanding of science than his fellow students in a PhD program in mathematics
- Disliked fact that there was a very limited choice of course offerings in each of the streams – especially wanted more choice in mathematics
- Liked small class size and helpful professors
- Disliked fact that completing the program was very challenging; “the hardest thing I ever did”

- Loved all the biology and earth systems courses; liked the fact that there was a small ‘cohort’ of students
- Liked small classes and personal connection with professors; enjoyed the seminar courses in the last year
- Program is a perfect ‘springboard’ into other professional programs; as recent graduate of Law School, feels she could not have made better choice of undergraduate program
- Having the options of different streams makes the G. S. program very appealing to students who plan on becoming science teachers
- One dislike, at the time I was enrolled physics courses were limited

**(d) Could you suggest any potential changes/revision that might improve the program for future students?**

- Would have preferred being given choice of topics for SCIE 4950
- Increase number of course choices – feels that this will happen with new majors programs in Physics and Mathematics
- The program should be marketed more effectively to high school students as a good choice for future science teachers
- Feels that the degree is not well ‘understood’ by Department of Education/School Boards – thinks there might be a bias in favour of the better-understood traditional major/minor
- Having more science programs available during intersession

**(e) If you were to do it all over again, would you choose the same program?**

- Yes; “obtaining this degree has propelled me into a successful role as Vice-Principal of a K-12 School very early in my career”
- Main love is mathematics and physics; now that Grenfell is going to be offering majors in both those areas, would probably do Math major/Physics minor instead of General Science
- In retrospect, probably not – because fell in love with mathematics during degree, and desire to pursue graduate work in mathematics required additional qualifying year at MUN before gaining admission to Master’s program at Waterloo
- Yes, most definitely
- Yes definitely
- Most definitely; has recommended the program to his students
- Yes – would highly recommend same path to others who have similar career plans [law school]
- If knew then about teaching what she knows now, might have chosen differently; would now like to do Master’s in Biology, but feels unprepared for graduate school
- Yes; I enjoyed my time at Grenfell



As is evident from this summary, the graduates of the program certainly had a very high level of satisfaction with their experience. It is worth noting that the majority of respondents are currently employed as teachers; clearly there is validity to the claim that the General Science program provides good preparation for future science and mathematics teacher. However, it is also worth noting that at least one graduate of this program found his passion in mathematics and is currently in the third year of a PhD mathematics program at the University of Western Ontario. Another one of the graduates used the General Science program as a springboard for admission into the highly-competitive Osgoode Hall Law program from which she graduated in 2011.

In view of these comments, it might be instructive to revisit the ‘Programme Rationale’ that formed part of the original programme proposal in 2002.

*“The proposed programme will meet the important societal goal of producing university graduates who are knowledgeable and literate about science and who are specifically prepared for a possible career as a Science school teacher... We see two other groups of students who might be attracted to the proposed programme. First, a student who has an interest in studying science but who is unsure of the field would be very well advised to start out in a general programme of the type we propose. If, during the first year or two of such general studies, the student develops a keen interest in a particular discipline, it will be a simple matter to declare a major in that area and complete a more traditional science programme... Second, a large number of students come to us, thinking they know exactly what they want to do with their lives... [among these] there are students for whom the completion of a suitable undergraduate degree is seen as a springboard into the graduate programme of their choice. Here we are thinking of graduate programmes in professional areas such as Law, Dentistry, Medicine, Journalism or Library Science... for these kinds of programmes, the proposed degree would be an appropriate choice”<sup>3</sup>*

It is evident that these predictions, made in 2002, were spot-on. The program has been able to deliver on its initial objectives and has been able to do so in a way that the graduates evaluate in highly positive terms.

## **6. How successfully are students gaining admission to graduate programs or finding post-graduate opportunities in or related to their field of study?**

As indicated above, the majority of graduates have applied (and gained admission) to the Faculty of Education where they have completed a B.Ed. degree. To the best of our knowledge, these individuals have been highly successful in finding placement as teachers within the Newfoundland and Labrador School system.

It is gratifying to note that of the six students who have completed an Honors degree in the General Science program, three have successfully gone on to post-graduate programs of their choice. The first developed a passion for mathematics as a consequence of doing this program; after completing an additional year of mathematics courses at the St. John’s campus of MUN, this

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<sup>3</sup> Proposal for the Degree Programme Bachelor of Science (General Science), Sir Wilfred Grenfell College, November 1, 2002, pp. 5-6

individual has since finished a Master's program in Mathematics at the University of Waterloo and is currently in the third year of a PhD program at the University of Western Ontario. A second student finished her Law Degree at the Osgoode Law School at York University in 2011, and is currently articling in Ontario. The third of these individuals was accepted into UN's Medical School after completing his Honors degree; he is currently in the second year of this program.

**7. How many non-traditional students are enrolling in courses and programs?**

It's not totally obvious what is meant by 'non-traditional' students. One of our graduates was a mature student from Belize who had been working for a number of years as a high-school science teacher. He came to Grenfell to complete the General Science program because it offered him a chance for professional advancement in Belize. He has since returned to Belize, to resume his activities as a teacher. He has been promoting the General Science program to his students; this current year, two of our first-year students in the program are from Belize. As well, we had a second mature student from China; she graduated in 2008. While she did well with the science courses and content, he struggled with the writing requirement of the Grenfell core (this requires the completion of 10 designated writing courses).

**8. How are program outcomes made known to students? How are these outcomes used to revise and strengthen the program?**

The General Science program is promoted (along with all of our other programs) in the Grenfell Viewbook; the appropriate page is included here. Our recruiters inform potential students of this program as they visit the various schools each spring.

**C. CURRICULUM AND TEACHING**

**1. Is the curriculum, as delivered, consistent with stated objectives, calendar descriptions, course requirements, degree requirements and standards for admission?**

Yes

**2. If there is curricular overlap between departments, disciplines, and/or programs, how is such overlap justified or appropriate?**

There is no such overlap.

**3. Is the curriculum relevant to the needs of students and is it sufficiently rigorous and cohesive?**

Yes. As is evident from the information provided by graduates of the program, they have all been successful in gaining admission to the post-graduation program of their choice (Education in the majority of cases, graduate school or Law School in others). This is clear evidence that the

program is sufficiently rigorous. When the program was first proposed, some individuals expressed a concern about the rigour: this was based on the fear that this program prevented student from digging deeply into a single discipline, as is required in the traditional majors programs.

The experience of the past years has shown that, while this is true, it is more than offset by the fact the students need to be flexible enough to pursue three different science streams, in each case to a senior level. This has proved to be very challenging for many of them, since it requires the ability to shift perspectives. The general consensus among the students is that the General Science Program is probably more challenging academically than programs that are built around the more traditional major/minor model.

By pursuing streams in three different areas, the cohesiveness of the program is obviously challenged. By and large, each of the streams is internally cohesive; however, there is a danger that taken separately in a student's program the three streams could be perceived as three academic solitudes. Things are pulled together in the fourth year, with the 'capstone courses' SCIE 4000 and SCIE 4950.

SCIE 4000 is a seminar course, in which students typically will present and discuss topics from a wide variety and range of scientific topics. For example, for several years the course was based on scientific papers presented in that year's *Discover Magazine*. Students were assigned particular papers from this journal, were asked to dig more deeply into the scientific content being discussed, and were then required to present this to the rest of the class. A seminar of this kind had the effect of pulling together many of the scientific and mathematical topics they had encountered in their previous studies.

SCIE 4950 is a projects course in which students work, either individually or in groups, on topics that ideally straddle more than one scientific area. The outcome of this course has varied from research papers (when the supervision was one-one-one) to poster presentations (when this was taught as a course). Once again, the requirement that the topic should straddle disciplines is intended to build cohesiveness: it is hoped that by completing such a project, students will be able to build connections between the disciplines.

#### **4. Is the curriculum being delivered effectively?**

Yes

#### **5. Is the curriculum responsive to the needs of students and employers?**

One primary objective of this program was to provide a good science degree for future high school; science teachers. All the evidence suggests that this objective continues to be met very successfully. Furthermore, there is still a continuing need for well-qualified science and mathematics teachers at all levels of the K-12 system.

## D. FACULTY CONTRIBUTIONS

The University has provided guidelines for this self-study report. Specifically, these guidelines recommend that the following questions need to be addressed:

- How effective are the faculty as teachers?
- How productive are the faculty as researchers/scholars?
- What is the quality and impact of the scholarly contributions of faculty and professional staff.
- Are the faculty appropriately engaged with relevant professional communities locally, regionally, and nationally?
- Where applicable, are the faculty effectively engaged in relationships with business, government, cultural or other relevant communities?
- Are the faculty and professional staff active, and recognized, participants in regional, national, and international professional organizations?
- Are the faculty generating a level of external grants and contracts appropriate to the discipline?
- Are the contracts and grants received by faculty consistent with the strategic goals of the unit?
- Is there a suitable balance of teaching, research or creative work, and service in the workloads of faculty and professional staff.
- How are the faculty integrating teaching, research, and service?

In the context of this Academic Program Review, it is important to keep in mind that the General Science Program differs profoundly from other degree program in one significant aspect. If, for example, one were to review the Historical Studies program, the relevant faculty contributions would come from the members of the history department. However, in the case of General Science, the Program Unit is the entire Division of Science. In view of this, it is unrealistic to attempt to establish an immediate causal link between the professional activities of the faculty and the scientific demands of the program. For this reason, rather than attempt to answer each of the questions post above, it is probably more informative to provide comments that are a bit more global and general in nature.

It is also worth noting that the academic support staff at Grenfell Campus have played an important role in the effective delivery of all academic programming, including the General Science Program. It would be remiss if their crucial contributions were not fully acknowledged. Several of these individuals have been officially recognized for their contributions; among these are Wanda Ellsworth (Lab Supervisor, Chemistry) and Wayne Muggridge (Lab Instructor, Earth Science), both of whom were recipients of the President's Exemplary Service Awards. As well, mention must be made of Kathleen Snow (Lab Instructor, Mathematics), recipient of the Grenfell Teaching Award.

The current Faculty and Staff complement in the Division of Science can be found in Appendix A of this report.

Faculty members in the General Science program were rightly hired to reflect the needs of the campus in individual disciplines rather than the needs of the program. So it is not surprising that both the teaching area and the research interest of each member of faculty within the program is that of a specialist. Therefore to assess the effectiveness of the faculty as teachers, the productivity of faculty as scholars, the impact of such scholarly activity, the engagement in the community and all other aspects that are considered in a program review one has to do this assessment with respect to a discipline rather than with respect to the program.

### **Research and Scholarship:**

A look at the appended *curriculum vitae* will address some of the specific details that are requested in the list of questions given above. Even a cursory glance through these will make it evident that the science faculty are active and productive researchers in their fields of expertise. A number have been successful in attracting external grants, and that number has been increasing over the past decade. Over the period of the past five years, the total amount of external funding support has exceeded \$1.5 million.

Such funding has allowed faculty to do collaborative research in North and South America as well as overseas. For example, this past summer (2012):

- Ian Warkentin (Biology) participated in a Boreal Forest Workshop in Northern Sweden
- Sudhir Abhyankar (Chemistry) presented at a conference in Brazil
- Geoff Rayner-Canham (Chemistry) spent the summer in Harlow (England)
- Robert Gallant (Mathematics) spent his sabbatical in Slovenia
- Yevgeniy Vasilyev (Mathematics) continued his collaborative work in Columbia
- Aleks Aleksejevs (Physics) was an invited speaker at a conference in Germany

The results of this scholarly activity have been disseminated in a variety of ways. Specifically, over the same five year period (2007-2012), this research activity has resulted in:

- More than 100 peer-reviewed papers
- More than 75 conference presentations
- More than a dozen books or chapters in books
- Numerous other publications including reviews, newspaper articles, etc

A number of the faculty members have been granted, under article 3.25 of the Collective Agreement, a course remission in support of research. One of our faculty members (Doug Forbes, Physics) has been awarded the President's Award for Outstanding Research.

## Teaching:

Grenfell Campus has always put a high premium on the quality of teaching. In science, some of our faculty and staff have received recognition in this regard by being nominated for and winning awards in teaching. For example,

- William Iams (Earth Science): Grenfell Teaching Award
- Kathleen Snow (Mathematics): Grenfell Teaching Award
- Geoff-Rayner Canham (Chemistry): Grenfell Teaching Award, President's Distinguished Teaching Award, 3M Teaching Fellow
- Georg Gunther (Mathematics): President's Distinguished Teaching Award, 3M Teaching Fellow

Science at Grenfell has enjoyed collaboration with the Western School Board and schools in general. There are regular tours of the observatory; the annual Chemistry Show (for level 2/3 students) has taken to the road and involves senior (environmental) science students; the annual Math Fair (for grade 8/9 students) also involves students at Grenfell. This type of outreach, which is incorporating teaching, research and service, is good for raising awareness in Physics, Chemistry and Mathematics in particular, and, therefore is good for raising awareness in science in general.

Grenfell Campus acts as a node for "*Let's Talk Science*", an award-winning national charitable science outreach organization that targets school children of all ages. A number of the faculty and staff have been actively promoting this program.

Given the fact that the General Science program has been such an attractive degree for future science teachers, these links with the K-12 school system are of great value in developing and maintaining these essential connections among all levels of science education.

For the students, Grenfell offers a very positive and affirming educational environment. Classes tend to be small, especially in senior-level courses. Even in the first-year introductory courses, class size rarely exceeds 50 – 60 students. Because of this, students and professors get to know each other very quickly, with the result that not too many of the students fall between the cracks.

Over the years, Grenfell has not had to rely very heavily on sessional instructors. The result is that most of the instruction from first year service courses to senior-level specialized courses has been done by faculty who are either tenured or on tenure-stream appointments. Many of these faculty have been at Grenfell for a long time, bringing years of experience into the classroom. All of these factors contribute to an engaging and engaged teaching and learning environment.

## **E. ADMINISTRATIVE SUPPORT/EFFICIENCY**

### **1. Is the unit/program receiving appropriate direct resources and support from the University?**

The Program Chair of General Science is given a 1/3<sup>rd</sup> teaching remission and is paid a stipend (currently this stipend is set at \$900/annum). It is worth noting that typically, the 1/3<sup>rd</sup> teaching remission has been absorbed by the General Science Program Unit with incurring any addition replacement costs. Beyond that, the General Science Program has been able to piggy-back onto the ongoing course offerings in the Division of Science, and consequently receives very little in the way of targeted resources from the institution.

It is regrettable that Honours supervision is treated as overload teaching.

### **2. How adequate and effective are infrastructural resources and support (e.g., library, promotion and recruitment, media, space) for achieving program goals?**

By and large, these are excellent. Space is always an issue; it would be nice to have a dedicated space that the General Science students could call their own. Experience has shown that whenever such space is available, the results in terms of morale, enthusiasm and recruitment into the program are emergent, unpredictable and positive.

### **3. How effectively do the unit and its programs promote new initiatives, plans, collegial spirit, and active community involvement?**

Not that well. As has been stated repeatedly, the program has been ‘piggy-backed’ onto the science offerings at Grenfell. For this reason, it has been difficult to establish and maintain a distinctive identity for this program, either among the faculty or the students. There is not much of the kind of ‘cohort identity’ that can be such an important ingredient to building energy and enthusiasm.

One result of this is that there is really no clear sense of ‘ownership’ of this program by anyone within the Division of Science. Up until the current year (2012), neither Mathematics nor Physics offered stand-alone degree programs; hence General Science Program provided, for the faculty in these two disciplines, the only source of senior-level students. However, this situation is changing: Physics has started to offer a degree program in the fall of 2012, and it is anticipated that the same will be true for Mathematics in the Fall of 2013. Once this happens, faculty attention will predictable be focussed on the goal of making those two programs successful. It is difficult to predict who will then take over the ownership of General Science that is necessary for the dynamic promotion of any academic program.

This problem is exacerbated by the name of the program. From the start, the descriptor ‘General Science’ has been problematic: it sounds vague, unfocussed and wimpy. However, it has been

difficult to come up with anything better. This is a problem that goes deeper than mere semantics: it is conceivable that a stronger name for this degree will allow more focused and effective marketing, resulting in more uptake of the program.

**4. What major initiatives and improvements should faculty, professional staff, and administrators be taking to enhance the program or unit?**

One possible way forward will be for the program to develop a stronger self-identity. This could be done in at least two ways:

- a) At present, the only courses that are exclusive to this program are SCIE 4000 (Seminar) and the project course SCIE 4950 (or the Honours sequence SCIE 4951/4959). Would there be value in developing a central core of SCIE courses for this program? Grenfell already has on the books the courses SCIE 3000/3001: Concepts and Issues in Science; these course might well be a very valuable component of such a core. As well, one might envision a sequence SCIE 2000/2001, perhaps along the lines of History/Philosophy of science. A similar approach to curriculum reform was undertaken several years ago by the Humanities' program; all indications are that this is proving to be quite successful.
- b) It might be worth developing the case for a new faculty appointment, directly to the SCIE-program. Indeed, if something along the lines suggested in (a) above happens, such a new appointment might well be essential. It might be easy to make a case for a cross-appointment; for example, an appointment in the History of Science would serve both General Science and Humanities, and might build exciting linkages between these two programs.
- c) Given the fact that more than half of the graduates of the program plan a career as science teachers, it would be natural for Grenfell to offer the appropriate teacher training for such a career choice. Such an outcome would also be in tune with Grenfell's strategic goal of increasing our post-baccalaureate programming. In view of this, it might be worth opening discussions with the Faculty of Education to explore the feasibility of offering the appropriate B. Ed. programs on this campus.
- d) Alternatively (or in addition to) (c), it might be of value to explore the possibility of summer programming (or some form of distance delivery) targeted at currently active science teachers. Among other options, this might take the form of
  - a. Focused single courses or workshops
  - b. Diploma programs related to science education

**5. How well are administrative and professional support staff contributing to the academic and strategic goals of the unit/program?**

Very well.



## **6. COST EFFECTIVENESS**

### **1. How appropriate are the student/faculty ratios in comparison to those in similar programs elsewhere?**

There is really no meaningful way to measure this, given the fact that there is no dedicated teaching staff for this program.

### **2. How do the program's costs and ratios relate to the costs of other comparable programs at Memorial and elsewhere? If applicable, what support is the unit generating from external sources, including an appropriate share of indirect cost recovery?**

The program is run very frugally, within the budget of the Division of Science. Adding up the stipends paid out since 2002, it is estimated that the program has cost about \$16,000 in direct costs. It has graduated 43 students over the same period, for a cost of approximately \$372/graduate.

### **3. How effectively does the unit deploy its resources?**

Excellent. The program is run on a shoe-string and is more than paying for itself through the tuitions paid out by the students.

**APPENDIX A**

**FACULTY AND STAFF COMPLEMENT, DECEMBER 2012**

**Division Head:** Christine Campbell

**Division Secretary:** Phyllis Langdon

<b>DISCIPLINE</b>	<b>FACULTY</b>	<b>STAFF</b>
Biology	Christine Campbell (1996) Erin Fraser (2012) Julie Sircom (2011) Dmitry Sveshnikov ((2010) Ian Warkentin (1994) Wade Bower (cross-appointed to SRM) (2002)	Emily Brown Cheryl Butt Scott Caines Carol Gilbert Maria Howell (leave) Christine Martinez Krista Brown Sandra Rumbolt Dara Walsh
Chemistry	Sudhir Abhyankar (1984) Julian Dust (1989) Chen Liu (2010) Don-Roger Parkinson (1995) Geoff Rayner-Canham (1977)	Wanda Ellsworth Wade Goulding Maxine Hillier Bobbie Ann Parsons Wyn Rolls Glenda Rose Mary Secord Debbie Wheeler
Earth Science	William Iams (1975) (leave) Mano Krishnapillai (2005)	Wayne Muggridge
Engineering	Telex Ngatched (2012)	
Mathematics	Robert Gallant (2005) Georg Gunther (1977) (leave) Jared Howell (2012) Rebecca Milley (2012) Israel Ncube (2010) Amar Sodhi (1993) Yevgeniy Vasilyev (2007)	Jennifer Strangemore Kathleen Snow/Leigh Herman
Physics	Aleksandrs Aleksejevs (2007) Doug Forbes (1989) Pierre Rouleau (1993) (Leave)	Darlene English Mark Fitzpatrick Victor Hayden

**Notes:**

1. Bob Scott is cross-appointed from SRM to Environmental Science
2. For faculty: date in brackets = year of appointment to the Grenfell Campus

**APPENDIX B  
DEGREES CONFERRED  
2002-2012**

Graduation Year	Degree	Major	Student #	Name	Total
2004	BSG	GNSC	9462755	Andrews, Krista	
	<b>Total</b>				<b>1</b>
2005	BSG	GNSC	200101442	Downey, Michelle	
	<b>Total</b>				<b>1</b>
2006	BSG	GNSC	8861551	Reid, Linda	
			9166372	Reid, Shanna	
			9733973	Penney, Stephen	
			200110336	Lawless, Carla	
			200110344	Rose, Danny	
			200110690	Morris, Kathy	
			200121929	Park, Jennifer	
	200206746	Kelly, Jennifer			
<b>Total</b>				<b>8</b>	
2007	BSG	GNSC	8460883	Morris, Lori	
			200035095	Simms, Krista	
			200215598	Miller, Amanda	
			200218709	Wight, Julia	
			200319176	King, Megan	
	200330223	Humber, Michelle			
	Sub-total				6
	BSGH	GNSC	200208452	Decker, Vanessa	
		200224681	Davis, Tyson		
Sub-total				2	
<b>Total</b>				<b>8</b>	
2008	BSG	GNSC	200042547	Connors, Charlene	
			200263911	Zhang, Han	
			200350379	Burse, Andrew	
			200405710	Earle, Stephen	
	Sub-total				4
BSGH	GNSC	200304087	Keeping, Lisa	1	
<b>Total</b>				<b>5</b>	
2009	BSG	GNSC	200238731	Cave, Andrea	
			200300861	Hare, Paul	
			200347532	Gillam, Michael	
			200355204	Meaney, Samantha	
			200451102	Day, Steven	
			200511004	Way, Tisa	
	Sub-total				6
BSGH	GNSC	200550952	Lanza, Jason	1	
<b>Total</b>				<b>7</b>	
2010	BSG	GNSC	200504892	Hennebury, Jeffrey	
			200615862	Woodman, Shauna	
<b>Total</b>				<b>2</b>	
2011	BSG	GNSC	200542884	Gray, Tyler	
			200651123	Anstey, Kerri-Leigh	
			200706562	Mauger, Jessica	
			200713154	Flynn, Cherise	
	Sub-total				4
BSGH	GNSC	200738136	Legge, Adam	1	
<b>Total</b>				<b>5</b>	
2012	BSG	GNSC	200558211	Fequet, Janessa	
			200700490	Durnford, Lana	
			200814317	Bateman, Erica	
			200824811	Revells, Jenelle	
	200835536	Thornhill, Roger			
Sub-total				5	
BSGH	GNSC	200709103	Hiltz, Daniel	1	
<b>Total</b>				<b>6</b>	
<b>Grand Total</b>				<b>43</b>	

**APPENDIX C**  
**GENERAL SCIENCE MAJORS**  
**FALL 2003 to 2012**  
(as of last day to add)

<b>Fall</b>	<b>BSG General Science</b>	<b>BSGH General Science</b>	<b>Total</b>
2003	1		1
2004	23		23
2005	20		20
2006	22	3	25
2007	44		44
2008	51		51
2009	43		43
2010	36	2	38
2011	35	2	37
2012	35	1	36
<b>Total</b>	<b>310</b>	<b>8</b>	<b>318</b>

**APPENDIX D  
CALENDAR CHANGES  
GENERAL SCIENCE MAJOR**

**September 2003:** new program approved, General Science Major and Honours

**January 2006:** revised Calendar language for all streams

**February 2009:** added BIOL 3053, ENVS 2639, PHYS 2553 to streams

**February 2011:** added ENVS 2430 to Earth Systems stream

**APPENDIX E**  
**WAIVERS APPROVED BY ACADEMIC STUDIES COMMITTEE**

**2005-06**

**January 2006:**

- ENVS 3072 for Earth Systems stream
- ENVS 4240 for Chemistry stream

**March 2006:**

- Use ENGI courses for 2 courses in Physics stream
- 2 students: - waiver of one of Math 2320/2000/2051

**Total: 5**

**2006-07**

**September 2006:**

- GEOG 2102 for Earth Systems stream
- EASC 2150 for Earth Systems stream
- BIOL 3053 for Biology stream

**November 2006:**

- EASC 2502 & 2702 for Earth Systems stream

**February 2007:**

- ENVS 2430 for Earth Systems stream
- Math 3330 in lieu of Math 3260 for Mathematics stream
- 4 students: - Math 2051 in lieu of Math 2320
- 4 students: use BIOL 3053 for Biology stream

**Total: 14**

**2007-2008**

**January 2008:**

- ENVS 3070 and BIOL 2040 in lieu of 3 credit hours for Biology stream
- BIOL 3053 for Biology stream

**February 2008:**

- ENVS 3072 for Earth Stems stream

**Total: 3**

**2008-2009**

**September 2008:**

- ENVS 3072 for Earth Systems stream

**January 2009:**

- PHYS 2553 for Honours

**March 2009:**

- PHYS 3820 for Mathematics stream

**Total: 3**

**2009-2010**

**September 2009:**

- Use BIOL 2040 as Writing course
- Use BIOL 2040 for Biology stream
- Use PHYS 2320 in lieu of PHYS 2065 for Physics stream
- Use ESAC 2916 in lieu of EASC 2316 for Earth Systems stream
- Use HIST 2320 (St. John's) as Writing course

**Total: 5**

**2010-2011**

**September 2010:**

- BIOC 3106 for Chemistry stream
- BIOC 2100 in lieu of BIOL 2250 for Biology stream
- BIOC 3103, MED 310 A/B for Biology stream
- SEN 3002 for 3 Credit Hours in Earth Systems stream

**November 2010:**

- Use ENV5 4249 for Honours stream
- Use SEN 3002 for Honours stream

**April 2011:**

- Use PHYS 2151 for Earth Systems stream

**June 2011:**

- Use ENV5 4910 for Earth Systems stream (General waiver)

**Total: 8**

**APPENDIX F  
BREAKDOWN OF STUDENTS BY CHOSEN STREAMS**

<b>Student</b>	<b>Year</b>	<b>B</b>	<b>C</b>	<b>E</b>	<b>M</b>	<b>P</b>
Krista Andrews	2004	x	x		x	
Michelle Downey	2005	x	x		x	
Linda Reid	2006		x	x	x	
Shanna Reid	2006		x	x	x	
Stephen Penney	2006			x	x	x
Carla Lawless	2006	x	x	x		
Danny Rose	2006	x	x	x		
Kathy Morris	2006		x		x	x
Jennifer Park	2006		x	x	x	
Jennifer Kelly	2006		x	x	x	
Lori Morris	2007	x	x		x	
Krista Simms	2007	x	x		x	
Amanda Miller	2007	x	x		x	
Juliah Wight	2007	x		x	x	
Megan King	2007	x		x	x	
Michelle Humber	2007	x		x	x	
Vanessa Decker	2007		x	x	x	
Tyson Davis	2007		x		x	x
Charlene Connors	2008	x	x		x	
Han Zhang	2008		x		x	x
Andrew Bursey	2008		x		x	x
Stephen Earle	2008		x	x	x	
Lisa Keeping	2008	x	x		x	
Andrea Cave	2009		x	x	x	
Paul Hare	2009			x	x	x
Michael Gillam	2009	x		x	x	
Samantha Meaney	2009	x		x	x	
Steven Day	2009		x	x		x
Tisa Way	2009	x	x		x	
Jason Lanza	2009			x	x	x
Jeffrey Hennebury	2010	x			x	x
Shauna Woodman	2010	x	x		x	
Tyler Gray	2011	x	x		x	
Kerri-Leigh Anstey	2011	x		x	x	
Jessica Mauger	2011	x		x	x	
Cherise Flynn	2011		x	x	x	
Adam Legge	2011	x	x		x	
Janessa Fequet	2012	x	x	x		
Lana Durnford	2012	x		x	x	
Erica Bateman	2012	x		x	x	
Jenelle Revells	2012	x	x		x	
Roger Thornhill	2012		x		x	x
Daniel Hiltz	2012			x	x	x
<b>TOTALS</b>	43	25	29	25	39	11
<b>% OF TOTAL</b>		53.1%	67.4%	53.1%	90.7%	25.6%



## **APPENDIX G STUDENT FEEDBACK**

### **Response from MUN # 2005xxxxx**

I am still teaching physics and mathematics at the high school in my home town (Corozal Community College). Also, because of my studies at Grenfell, I was given the opportunity to be a member of the review panel for the physics syllabus for the Caribbean Secondary Education Certificate/Caribbean Examination Council (I guess that this answers (b) of your question). As a member of the review panel, I traveled to Barbados and Trinidad and Tobago to attend the review sessions during this past summer. I will now be in charge of dispersing the syllabus to the Western Zone of Caribbean next year. I am also hoping to complete my degree/training in education within the next two years.

About the General Science program at Grenfell,

(a) I found the program intellectually challenging, the combination of the liberal arts and science managed to accomplish that. At the end of the program, I agree that I was able to understand and view the world better. In comparing myself to some of the graduates from our local universities, I notice that I have a broader view of issues happening in my country and internationally. This is as a result of the courses in the General Science program.

(b) As I have stated previously, the G.S. program has prepared me for my chosen career: science teacher. Even though my areas of interest are physics and mathematics, I am capable of teaching chemistry and earth science. This versatility made me a good candidate for the CSEC/CXC review panel.

(c) Having the options of different streams makes the G. S. program very appealing to students who plan on becoming science teachers. This option is one characteristic that I liked. It enabled me to pursue those fields that are inter-related (physics and earth science) and I managed to get more out of the program. One dislike, at the time I was enrolled physics courses were limited. With the new physics program available at Grenfell, I would expect that this is set back no longer exists.

(d) Having more science programs available during intercession would shorten the time span of the program.

(e) I would do the G.S. program all over again! I enjoyed my time at Grenfell.

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### **Response from MUN # 2001xxxxx**

Background:

XXXXX (#2001xxxxx). I am a former student and graduate of the General Science degree program. I finished the program in August 2006 (Graduation October 2006). I did the General Science Major with a triple minor in Math, Physics, and Chemistry. I first came to Grenfell in Sept.

2001, and I was enrolled in pre-pharmacy (2 year program). That didn't really work out as it was highly competitive and my grades were mediocre.

During the 2003-2004 school year I changed my program to the brand NEW General Science major. I found this degree to be well suited to me because I already had a variety of math, physics and chemistry courses completed. At this time I decided I wanted to go into education. I have always been a social person, an athlete, team player, good communicator, leader amongst my friends, down to earth, and a very well-organized and well-planned person, so, I felt that Teaching was a good career choice for me – and I was right.

I went on to complete a Bachelor of Intermediate/Secondary Education (math/science area) and graduated from that in October 2007. I began teaching in September 2007, and at the end of this school year I will have 5.7 years taught in total. I recently completed my Masters in Education (August 2012).

(a) Was the program intellectually challenging? Yes, the program was very intellectually challenging. I would say that many of the math, physics and chemistry courses that I took were very intellectually challenging with a heavy workload that certainly keep me busy (I would say overwhelmed).

(b) Did the program prepare you for your chosen career?

Yes, the program REALLY prepared me for my chosen career. I am a junior high math and science teacher. I am also qualified to teach high school math and science, as well as physics and chemistry.

(c) Was there anything about the program that you particularly liked?

Yes. I really liked the class sizes. They were small compared to the larger University campuses and I really feel that this was a key component to my success in the program. Some of my instructors were very likeable, understanding and supportive. I could tell that they got to know me and were there to help me through. Those professors include: Dr. Gunther, Dr. Forbes, Dr. Rouleau, and Dr. Parkinson.

(d) Disliked?

I did find some of the courses very challenging. I would say that the completion of this science degree was the hardest thing I ever did. I am sure that being young and more immature was a factor in my stresses (aged 18-22). I am sure that if I had to go back and complete the program today as a more mature student it would be more pleasing to me. Also, certain professors were condescending if you were not getting A's (in my opinion)

(e) Could you suggest any potential changes/revisions that might improve the program for future students?

No, I can't think of any suggestions.

(f) If you were to do it all over again, would you choose the same program? Do you have any contact emails for other graduates of the program? I would like to contact as many former students as possible to get the widest possible cross-section of opinion.

Yes, if I were to do it all over again, I would complete the same program – most definitely.

I hope this has been helpful.

Take care and best wishes :)

XXXXX B.Sc., B.Ed., M.Ed.

4-9 Science, 8-9 Math Teacher

LeGallais Memorial

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**Response from MUN # 2007xxxxx**

(a) was the program intellectually challenging?

The program was intellectually challenging. I found there was a good balance of courses that were very challenging and those that were less challenging but still interesting and informative.

(b) did the program prepare you for your chosen career?

My intention when I chose to complete the general science program was to go on to be a science teacher or apply to pharmacy school. I feel the program would have more than prepared me for either of those careers. However, as I somehow ended up in nursing school, the program did not specifically prepare me for that program. I do find myself putting to use the information from the chemistry courses I took at Grenfell as we do assessments on patients

in the community. For example, one of my patients was having brutal headaches and I was able to find the cause because I knew about some of the chemicals she had laying around. So the program has helped in that I am able to make linkages that other students are not able to make. And the program definitely taught me how to study, the right way, which is reflective in my current place on the directors list.

(c) was there anything about the program that you particularly liked? (d)disliked?

What I liked most about the program is that it gives you the chance to study three different streams, giving you a wide range of knowledge which is much more useful in the "real world." I also loved the lab component, very helpful. As much as students hate writing papers and profs hate grading them, more research papers should be incorporated into the program and a research course should be a requirement in my opinion. Students should have the most up to date information and know about what is currently going on in the world, especially since it is a science program and everything is always changing. Also, the one thing that I did not like about the program was the name of it and I know many students have had the same issue. General Science. It makes it sound so basic and unimportant. I always have to clarify that it is actually a degree and I did do more than just first year. just a thought :)

(d) could you suggest any potential changes/revisions that might improve the program for future students? more research papers, as stated above.

(e) if you were to do it all over again, would you chose the same program

If I had to do it all over again, I would choose to do the same program. I loved the program and if I could go back there right now I would!

Also, I've facebooked some people so if I get their emails I will send them along  
Hope this was helpful!

XXXXX

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#### **Response from XXXXX MUN # 2003xxxxx**

I enjoyed the program a lot. I felt it was very intellectually challenging. I enjoyed not having to limit my focus on two streams – I felt like I was getting a great understanding of three subjects rather than just two. And I am the type of person who likes knowing a bit about everything, rather than knowing everything about one thing.

The program did prepare me for my career – teaching. However, I felt, as I was applying for teaching positions, like the Department of Education/Western School District did not ‘understand’ my degree. I blamed it on the newness of the degree and hoped that it would diminish as time progressed. I am now in my fourth year of teaching and I still feel like my degree is misunderstood. I feel like principals feel that I am more qualified to be a chemistry teacher rather than a math teacher despite having completed 10 math courses and only 8 chemistry courses.

The reason for this is because on job applications, there are only two spaces to fill in your teaching qualifications – your major and your minor. I am forced to say that my ‘major’ is general science and my minor is math. This suggests two things: one, that I have more chemistry or biology training/knowledge than math and two, that I have much less knowledge about science than someone with an actual science major (simply because the word ‘general’ is used makes people think that I simply have a ‘focus area’ like a primary/elementary teacher).

I feel like this degree may not help any graduate that does not want to be in an academic career, such as a teacher/tutor/lab assistant etc. It is like you have no specialty in a particular area like many careers want.

Also, I think it’s hard to continue to a masters-level after graduating from this program. I would love to go back to school and complete my masters in biology. But I feel like I would be starting in the same position as a second or third-year student without a degree.

Looking back at my last year of this program, I feel like the seminar course in the first term could have been more challenging. (Having said that, I do remember just how busy I was during that time, so perhaps that wouldn't be such a good change). But I think that course could have been more stimulating.

If I knew then what I know now (about teaching), I probably wouldn't have chosen teaching as a career and therefore wouldn't have chosen the general science degree. But I did enjoy the program very much.

---

**Response from MUN # 2003xxxxx**

(a) was the program intellectually challenging?

- yes the program was challenging, I had to go outside my comfort zone to do math to get three of the streams completed and I was really only comfortable with Biology and Earth Science.

(b) did the program prepare you for your chosen career?

Yes, originally I was doing environmental science biology because I wanted to be a high school Biology teacher. When I found out about this program I immediately switched so that I could gain more teachable courses to enter into the education program.

(c) was there anything about the program that you particularly liked? (d)disliked?

- I loved all the of Bio courses that you could choose from and the Earth systems as well. However, my favorite was the Paleontology course but it was only offered the one year from what I understand because of low interest.

(d) could you suggest any potential changes/revisions that might improve the program for future students?

- Im not sure how this is being aimed at high school students right now (I think there is a large focus on teachers) and there should be more of that. I did not now know of the program when I was in high school and would have chosen it right away instead of environmental science biology to become a teacher. Right now I think Newfoundland has to be producing many more teachers than ever before so really broadcasting this to teachers would be a great. As for revisions, maybe make psychology mandatory with it. The psychology courses will help with the Biology courses and will also prepare students to do courses in the Faculty of Education.

(e) if you were to do it all over again, would you chose the same program

- Yes I would definitely choose the same program. I think a big part of it was that there was a small group of us going it at the time and we were in all the same classes so we built relationships that we still have today. Right now I know that 4 of out of 6 that I did the program with are teachers.

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**Response from MUN # 2003xxxxx**

Name: XXXXX

Graduate B.Sc. General Science (Math, Physics, and Earth Systems) May 2009.

The General Science Program I completed at SWGC has given me a diverse skill and knowledge set. The beauty about the program is each student can tailor it to his or her specific areas of strength and interest. For me personally, my ultimate passion was Mathematics. But, because I also had very strong interest in the area of science it allowed me to couple these areas together in a challenging and unique way. No other single degree program around did I know of where I could obtain three teachable areas (pertaining to the Education System).

The Program as a whole was challenging; each course brought its own set of challenges but there was a very strong core of Professors set up to help us through those obstacles as they came up. The degree has given me a broad span of knowledge in many fields of science and in the mathematics field. Such a skill set has become very important for me as a High School Educator – the more well-rounded an educator is the better they can prepare and develop their students for the world. Only teaching a few years but so far I have taught various science and math courses, all of which would not have been possible if not for the General Science Degree. I would also like to note the program's research and independent studies help taught me a great deal about educational literature, research, and scientific presentations.

Personally, I enjoyed the diversity of the program. As I already stated being able to “dip my toes” into various educational fields was exactly what I was looking for. If I had time back I wish I focused on a fourth area as well, Chemistry.

As for improvements or modifications, I feel the program was effectively run while I completed my degree some years ago. I understand SWGC has had major improvements to the Science department, so that is good to hear. I have not regretted my decision; obtaining that degree has propelled me into a successful role as Vice Principal of a K-12 School very early in my career. I can honestly attribute many of my skill sets, work ethic, and educational interest to completing the program at SWGC.

I hope to hear that the program is continued for some time. If you need any more information please feel free to contact me.

---

**Response from MUN # 2008xxxxx**

a) Was the program intellectually challenging?

The program was definitely a challenge. Especially in the later years, where I was involved in third level courses in all three disciplines. While it was a challenging program, it was a fair program. I believe that the challenges with which I was presented during the four years helped me become a better student and worker.

b) Did the program prepare you for your chosen career?

Well, since my career choice was to become a teacher, the General Science program was a perfect fit for me. I believe that it will improve my chances of getting a full-time job for the next school year, since I have built up knowledge on three subject areas.

c) Was there anything you particularly liked about the program? Disliked?

I love the fact that the program grooms the student to be a teacher of science. The fact that the program covers three streams is extremely valuable when it comes to teaching, as the student has acquired a little bit of knowledge in three areas, as opposed to a lot of knowledge in one area and a little in another.

There was only one thing that I disliked about the program, and that is the way that SC 4950 is conducted. I did not like the fact that we were given a general topic to research, and were told to choose something from one of our disciplines that we could discuss. I understand that the topic that we were given (nanotechnology) is incredibly broad, however I would have liked to research something in which I had a little more interest. Now, I do understand that the instructors give the students a broad topic to narrow things down, so that all of the posters do not seem disjoint in the poster session at the end of the semester. I just would have preferred to research something else.

I know that sometimes students choose to do other things besides the main topic for 4950. However, I felt that I did not have time to do that. We were given one week to choose our topic and write up an outline. I felt that I could not

do research on other things, choose a topic, and do some more background research to make an outline, in one week. Perhaps the instructors could e-mail the students that they know will be enrolled in the course when registration is done in November, and let them know what the general topic will be for the project. This may not be practical, though, as I know the professors are extremely busy.

d) Could you suggest any potential changes/revisions?

At this time, I cannot think of any way to improve the program, besides what I mentioned above.

e) If you were to do it all over again, would you choose the same program?

That's a bit of a tough question for me. I realized about half way through the program that my love for chemistry had dwindled a little. I just wasn't enjoyed the courses as much. I thoroughly loved organic chemistry, as it really challenged me to do my best. However, the other courses just didn't "do it" for me. Unfortunately, the lack of interest affect my chemistry grades later on, which I shouldn't have let happen. Another point to add is that addition of a mathematics and physics program at the school. Math is my first love, and I've always wanted to do a math degree. However, I did not want to spend two years in St. John's to complete the degree, as that would have been costly. Physics also is of great interest to me, it's my favorite science. With that said, if I were 18 again and decided on a program, I would *probably* do a Math degree with a Physics minor. However, the fact that General Science prepares students so well to become teachers would play a role in my decision. At this moment, I would be leaning towards the Math/Physics idea, at a ratio of about 60/40. However, that choice really wouldn't be a result of the program itself, just my lack of interest in chemistry, biology and earth science.

Unfortunately I did not get to know many students that completed the program before me. Those that I did know, I do not have an e-mail to use to contact them.

Feel free to respond to ask further questions or comment on anything.

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### Response from MUN # 2004xxxxx

(a) was the program intellectually challenging?

Most definitely. I had to constantly be on top of my work in order to keep my grades up. I especially thought the chemistry stream was challenging, which is good. I did some chemistry courses at MUN in St. John's as well and there were certainly no differences from one campus to the next in terms of being intellectually challenging.

(b) did the program prepare you for your chosen career?

I am a high school science teacher and I cannot imagine any other program that would have better prepared me for this job. By doing a focus area in 3 sciences (chemistry, earth science, and math), I feel as if I am prepared to teach all 3 of those, instead of just the traditional 2 that would come with the standard major and minor teachable areas.

(c) was there anything about the program that you particularly liked? disliked?

I particularly liked the small class sizes and personal relationship I was able to create with my professors. I also really enjoyed the seminar courses near the end of the program - it was really a nice way to culminate everything we had learned throughout the program. There was honestly nothing I disliked about the program.

(d) could you suggest any potential changes/revisions that might improve the program for future students?

See the question above. I loved my time during the general science program. I would not change anything.

(e) if you were to do it all over again, would you chose the same program.  
Most definitely. I have already recommended it to many of my students who may have plans to be a science teacher, along with anyone else who wanted to attend Grenfell and pursue a career in the sciences.

Do you have any contact emails for other graduates of the program?  
None other than the one's Lisa Keeping provided you with.

XXXXX  
Valmont Academy  
Senior High Science & Technology

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### **Response from MUN # 2002xxxxx**

As a science enthusiast, I loved the General Science program. As I was undecided in my career path, I thought my best option would be to take a program offering many options, while still taking something that focused on my love of science. I took the Physics, Chemistry and Mathematics streams for my three minors. I found both the Physics and Chemistry to be challenging, especially the third year courses. I found the Mathematics less challenging, but I do not credit this to easier courses. I credit this to excellent instruction and a passion for the subject area.

My career goal is, and has been for a long time, to become a professor of Mathematics. As such, I needed to complete numerous undergraduate courses in Mathematics. Unfortunately, while completing this program, I was not able to obtain quite enough courses. Because of this, I completed an extra year of studies at Memorial University of Newfoundland, where I took more of the courses required for an undergraduate degree in Mathematics. But this does not make me regret my decision to take this program. When I enrolled in General Science, my plan was to become a high school Science and Math teacher, which made this the ideal degree program. It was during this program that my career goal evolved to what it is now, and I credit that to this program.

I truly enjoyed all aspects of the program. I feel as though I have a much broader understanding of science than my fellow Ph.D. students. My one criticism is the lack of choice in the courses, especially in Mathematics. There should be some Analysis courses required by the program (e.g. Real and Complex Analysis), which seems to focus more on Algebra. These are fundamental areas of Mathematics that were not part of the General Science program when I was in it, although this may have changed as I graduated five years ago. Also, there should be more choice in all the areas. I found that during my program, I had to take whatever courses from my three minors that were offered, and was left taking courses that did not interest me as much as other courses that were listed as options in the program requirements. I hope this will change due to the rumoured addition of a Physics major and a Mathematics major at Sir Wilfred Grenfell College.

For me, the General Science program (especially Dr. Georg Gunther) helped me find my passion for Mathematics. Looking back, it was not the best choice for me. It did allow me to stay in Corner Brook, where all my family and friends are located, but it slowed me down in the long run. I am currently in the third year of my Ph.D., but if I had taken a Degree in Mathematics program, I would already be graduated and seeking employment. Again, I wish to emphasize that this is not a fault of the program, but one of my own. I did not realize how much I enjoyed Mathematics until mid way through the program, and I feel as though I owe this realization to the excellent instruction I received during the General Science program.

I wish to add that even though taking the General Science program ultimately led to a longer path to my career goal, I do not regret taking it. It was during my time at Grenfell that I began to fully appreciate my gift in Mathematics, and I attribute this most to the Program Chair, Dr. Georg Gunther. While at Grenfell, I took every course he offered, and it is because of this program that I wish to become a professor in Mathematics. I would recommend this program in a heartbeat, and think it is an ideal program for those who have a love of science and wish to learn the fundamentals in many of them.

**Response from MUN # 2002xxxxx**

**General Science Review**

Being amongst some of the first General Science graduates is honestly a huge source of pride in my career. In my opinion, the program is exceptional and unique and that is what I particularly liked about it. The opportunities offered by the General Science program sets it apart from most other degree programs. The program is intellectually challenging in that it not only gives students the chance to study high levels of science, but that it does so while also challenging students to adapt to different learning environments. The variety and well-roundedness of the program also provides students with the groundwork to branch out into more particular fields of studies.

It is for reasons such as those that the program is the perfect springboard into other professional programs. When I was considering enrolling in the General Science degree program I was personally told by the Chair of General Science, Dr. Georg Gunther, that it could be used as a stepping stone into professions such as education, law, dentistry, medicine, journalism or library science. My goal was to go to law school so I made the choice to enrol. Now that I have graduated from law school, I do not feel that I could have made any wiser a choice. On entering into law school, most students are thrown into a foreign field of learning that requires almost immediate adaptation. The struggle that most first year law students experience can largely be attributed to this adjustment. The fact that the General Science program had prepared me for adaptation leaves no doubt in my mind that the program prepared me for my chosen career.

After thinking long and hard, I really do not have anything I can say I disliked about the General Science program; I thoroughly enjoyed it. That enjoyment can be attributed to a multitude of people and factors which includes the Chair, the faculty, the staff, the course/lab work, the atmosphere at Grenfell and the ability to always find assistance and guidance from those involved with the program. If I were to do it all over again, I would still choose the General Science program. In fact, I would highly recommend the same path to others who are similarly interested.

XXXXX, B.Sc. (Hons.), J.D.

**Response from XXXXX**

***A) Was the program intellectually challenging?***

Most definitely. I would assume most students who have completed a single degree would consider their degree difficult, and perhaps more difficult than others. A General Science degree however, is unique in its trials and difficulties. As a general science student you are required to be competent in more than one subject area. Additionally, the writing requirement for the degree creates good communicators. Being a dynamic student and switching gears between polar fields (i.e. Biology and Math) forces students to use different dimensions of intelligence. Not only is concept application important, but a student's ability to accurately memorize information is also tested.

***B) Did the program prepare you for your chosen career?***

I have not completed my degree yet, but I am sure that this degree has comprehensively prepared me. Some courses required for medical school were not offered at Grenfell, which caused me to pursue distance education, but the diversity of courses in a B. Sc. General Science creates students who are aware of global issues from multiple perspectives. For medical school, confidence in all sciences cannot be overvalued.



***C) Was there anything you particularly liked about the program? Disliked?***

**Likes –**

- Challenging
- Small class sizes allowed me to form relationships with my teachers
- Did not have to choose between strengths – I got to complete three.
- Unique degree program – this separates students as applicants to professional programs. Being unique amongst 5000 applicants is very important!

**Dislikes -**

- People hear ‘general’, and think ‘easy’, which is not the case
- There are an exceptional number of lab courses. This causes a real problem when scheduling.
- Limited number of courses in each stream forces students to take specific courses (only the offered ones)
- Being strong in many areas is amazing, but it would be nice to know you are very strong in one area
  - o i.e. Jack of all trades – master of none
- If ENV5 4000 and SCIE 4000 are joined together – Do not have two teachers in the same stream teach the course.

***D) Could you suggest any potential changes/revisions?***

Increase the number of possible writing courses in each area – to reduce the number of courses outside of a student’s interest necessary to fulfill the writing requirement. If a student needs to write a 20 page paper and do a presentation, it should be a writing course. Offering more courses in each stream would be appreciated. This also includes courses like Math 3340 – a course which many students wanted, but is not offered this upcoming semester. Some biochemistry courses on this campus would go a long way! Two biochemistry courses are important pre-requisites for many health-based programs. Additionally, biochemistry as one of the possible minors would be amazing! This could help students further diversify.

***E) If you were to do it all over again, would you choose the same program?***

Yes I would do the same program, but I would likely transfer to St. John’s. Grenfell limited the courses I could take. I was not a fan of some of the chemistry and biology courses I was obligated to take to fulfill requirements.

**For example:**

I was not interested in taking:

ENV5 3261 – Atmospheric Chemistry – But I had no other option

I would have preferred CHEM 3410 or CHEM 3411

Biology 2600 – Ecology

I would have preferred BIOL: 2060 or 2250

These are only suggestions. I have truly enjoyed my entire degree here at Grenfell Campus. I would just want to see some wiggle room in the courses I am required to take.

Thank you for taking the time to review my evaluation of this exceptional program.

Sincerely,

XXXXX

