

ACADEMIC PROGRAM REVIEW
BSc (General Science) – Grenfell Campus
FINAL REPORT

Review Panel:

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French & Humanities - Grenfell Campus, Memorial University

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Academic Program Review – BSc (General Science), Grenfell Campus, Memorial University
13-16 March 2013

OVERVIEW OF PROCESS

The Academic Program Review of the Bachelor of Science (General and Honours) in General Science took place from 13-16 March 2013. The format of the review has been long established by the Centre for Institutional Analysis and Planning at Memorial University. The list of individuals with whom the panel met is included in Appendix A. It is important, however, to underline the process that the Review Panel followed in meeting with individuals and groups:

- Throughout our in-person consultations, individuals and groups were informed that their comments would be anonymous. While we wanted to include every viewpoint and perspective in our deliberations, it was important that all individuals feel that they were able to speak in a free and open manner. The Review Panel felt that this was indeed the case and, in fact, that several individuals were able to express thoughts that they had initially wanted to keep to themselves.
- Individuals and groups were also told that we would not 'lead' their feedback by asking initial questions, as we did not want to reveal what other groups and individuals had said already in the process. That said, we did, at times, confirm that a comment had been heard elsewhere in the process. The exception to this general rule was in our meetings with the Program Chair, the Division Head, and the Dean of Record, during which we felt that our role was not only to listen to their input but also provide feedback on what we had heard.
- All panelists were given the opportunity to ask questions. Similarly, every individual who came to see the panel spoke on more than one occasion. We would like to thank all those who came to see us for their thoughtful commentary.

It must be underscored that the Panel feels that this process was run very smoothly, due in no small part to the efficient organization by both the Division of Science and CIAP. In addition, the Panel engaged in quite an extensive amount of deliberation in our spare moments, including extensive discussion in the evening hours. It is our belief that the report that we present today reflects not only our own views but a majority consensus view shared by most individuals with whom we spoke. It should be noted, however, that the Review Panel was often not unanimous in its thoughts, and there were several differences of opinion that emerged. Discussions have continued long after the site visit concluded. This document presented today reflects the majority opinion but also incorporates minority positions.

ASSESSMENT OF PROGRAM

The Committee initially reviewed the Self-Study report provided by the academic unit. The Panel wishes to thank in particular Dr. Georg Gunther, who authored the report and who provided us with interesting material that outlines why the program was first created. The Self-Study outlines that the General Science program was created for practical and idealistic reasons. We summarize them here not in order to repeat what is contained in the Self-Study report but also to characterize what we heard throughout the Review Process:

1. When it was first created, the General Science degree would provide a 'home' for many faculty members teaching in disciplines that did not have their own degree program in 2002-2003 (Math, Earth Science, Physics), as colleagues in Biology and Chemistry felt (and still do to this day, based upon input we received) that their allegiance is to Environmental Science, which had been created in 1995. The program would also allow those faculty members to teach courses at

the upper levels. The creation of the program therefore closely mimics the purposes of the former Humanities program when it was created - as well as the Social/Cultural Studies program.

2. The General Science degree would provide an overall education in undergraduate science. The program essentially consists of a 'triple minor' in that students complete 24 credit hours (or 8 courses) in three different sciences (Biology, Chemistry, Earth Science, Mathematics, Physics) in addition to two first-year Mathematics courses, Science 4900, and Science 4950 (the independent research project, which is a hallmark of Grenfell degrees).
3. In addition, but just as importantly given the fiscal climate at the time, the fact that the degree was, and is, very cheap to run (faculty teach the courses anyway, and the only 'real' costs are a teaching remission for the Program Chair and any 4950 project supervision costs) would provide a way to increase course offerings to students with no real added cost to the University. This continues to be the case today.
4. The General Science degree would also allow students to pursue a career in Education, as the General Science degree would allow students applying to Primary/Elementary Education to claim Science as a teachable and would allow those pursuing Intermediate/Secondary Education to claim three different science areas as teachable areas. The Panel was also intrigued by this claim and engaged in much discussion of the matter. The Panel also engaged in further correspondence with the Faculty of Education following the Review Process, to which we shall later refer. It has been further argued that the program prepares students for the competitive entry process to Medical School.

It was in assessing these three arguments that have justified the General Science degree, and which the Self-Study outlines as the program's goals, that the Panel developed its recommendations. The Panel wishes to underscore that one should not read too much into the order in which the recommendations are presented. There are only two principal recommendations, but they are mutually exclusive, as only one can truly be adopted. Under Recommendation 2, however, the Panel proposes "sub-recommendations" that could be incorporated based on the choice between Recommendation 1 and Recommendation 2.

RECOMMENDATION 1: That the Division of Science, Grenfell Campus, seriously consider discontinuing both the Honours and General degree programs in General Science.

While this is the majority opinion of the Panel, we are not unanimously of the opinion that the program should be discontinued. However, it must be stated that the Panel is unanimously of the opinion that the *Honours program should be discontinued* for reasons elucidated later in this report. With regard to the 'general' degree being discontinued, this is the majority position of the Committee. What is clear to *all* members of the Panel, however, is that there must be a serious discussion that takes place within the Division of Science concerning the future of General Science as a general degree and whether it is worth keeping.

First and foremost, one must consider some arguments that could be made against discontinuing the program:

- As outlined in the Self-Study, the program is cost effective, as the only costs are a teaching remission for the Chair and a stipend for student supervisions. It could reasonably be argued, then, that the program does ‘no harm’ by existing, as it costs nearly nothing.
- The program has produced a small number of graduates who have gone on to successful careers (especially in teaching).

In its discussions, the Panel grappled with the existential question of whether the program should continue *because* it is both inexpensive and able to capture a small number of students. It was not lost on the Panel that some students wrote to express their satisfaction with the program – although it must be noted that most comments centered around particular instructors and courses rather than on the program as a whole. If the program is to be kept as a ‘general’ degree, the reasons would primarily be because the degree “does no harm” and is very inexpensive to run. In short, what is *gained* by eliminating the program?

The Panel was, however, struck by the overall malaise and indifference to the program from the perspective of faculty and staff. The Panel notes in particular the following:

- There is nearly no support for the program from existing faculty. Most faculty have little to no interest in the program’s future.
- Most faculty, naturally, feel more allegiance to a different degree program in which their own discipline figures prominently – or in which they have their own program. In particular, now that Grenfell offers degree programs in Physics and Computational Mathematics, faculty are, quite rightly, very excited by these programs, and their energy will be devoted to them. In addition, faculty in Environmental Science are indifferent to General Science and feel their

primary allegiance to what they self-identify as “Environmental Chemistry” or “Environmental Biology.”

- General Science suffers from very low student enrolment. The Panel did not find value in any sort of comparison with Environmental Science – or indeed with any other Science program at Grenfell. It is felt that those programs will be reviewed in due course; our concern is simply that numbers in General Science are very low indeed. While the Self-Study correctly points out that 43 students have graduated with the degree in the ten years for which it has been in existence, the Self-Study also points out (and this was verified in our interviews) that many students “ended up” doing the program. This is not a bad thing. However, it is worth noting that several students (current and alumni) whom we interviewed confirmed that if they were to begin their course of study at Grenfell today, they would not choose General Science. Instead, they would choose one of the newer Science degrees now offered at the Campus (Physics or Mathematics) or, in one case, Environmental Science. The fact that 90% of students who take General Science at Grenfell Campus choose a Mathematics stream is also, we feel, very revealing and could suggest that some students who would previously have taken General Science with a Mathematics stream may now instead opt for the new Computational Mathematics degree (though this cannot be verified yet).
- It was clear that there is next to no discussion among colleagues concerning the program’s mission, curriculum, or students taking place. The responsibility for the program is left nearly entirely in the hands of the Program Chair and Division Head. It was expressed to us on many occasions that faculty not only do not meet to discuss the program (except for routine matters mandated by the Collective Agreement such as search committee formation and teaching assignments, which usually take place following a regular Division of Science meeting), but faculty have no interest in doing so.

- The program does not do what it was, in part, intended to do – to be “General Science” degree because it only teaches students three student-chosen Science disciplines in isolation. The Panel questioned how a student could, for instance, really claim to have training in *General Science* degree having not studied, for instance, Chemistry in the event that she or he were to choose the Biology, Earth Systems, and Mathematics streams.
- The program is also not, strictly speaking, *an interdisciplinary program*. While it meets the definition of an interdisciplinary program as per the Grenfell BA/BSc Regulations in the 2012-2013 University Calendar (Regulation 4.2.1.b), the Panel feels that the degree program is really simply a triple minor with no exploration of points of intersection between the disciplines (except SCI 4000, which is not always taught in an interdisciplinary nature). The Panel noted in particular the fact that SCI 3000 and 3001 are no longer being offered is unfortunate, as these courses could help address this fundamental lack.
- The Panel questioned the claims that the General Science degree prepares students for medical school in that most Faculties of Medicine assess candidates based on their overall academic performance, quality of their file, and standardised test scores. While some of the content in individual courses may well prepare students for the MCAT, it is felt that claiming that the degree itself is helpful in this regard is somewhat of a stretch. For instance, a student could graduate from General Science without studying Biology or Physics. In addition, the Panel noted that only one student made the claim that the program was useful in preparing for medical school, and this student has not yet been accepted to such a program.

It is felt that, given these seven points raised above, the program is not successful in terms of its “fulfillment of their own and the University's mission and strategic goals¹,” and, in addition, the program

¹ http://www.mun.ca/vpacademic/unit_program_review.php

itself does not seem to have any clearly defined mission or strategic goals. The program appears to exist in a “virtual” sense in that only the Program Chair is concerned at any given time with the overall coherence of the program and its promotion to students.

RECOMMENDATION TWO: The Division of Science continue to offer the General Science degree as a general degree only. Should the Division not wish to discontinue the program, the Division of Science, Grenfell Campus, should strengthen the General Science program, which will require significant resource implications.

The Panel struggled, both in its own deliberations and in meeting with stakeholders, to distinguish between discussions of General Science *as a degree program* and the overall objectives of the Division of Science, which is composed of many faculty who, we believe, are committed to excellence in undergraduate teaching. It was felt that the *values* of the General Science degree could instead be restyled into all Divisional programming. In this way, the Division could seriously consider offering and explicitly promoting degree options that combine a major with a minor (or even two minors) from among the Division’s program offerings. The language of ‘major’ and ‘minor’ is universally used; ‘General Science’ as a concept is hard to translate, and is regarded by the Division as inseparable from a ‘triple minor’, whose curricular failings are noted elsewhere in this report. The Division could instead consider retaining what was beneficial in the ‘General Science’ program, namely the opportunity for students to encounter a range of science subjects, with potential for interdisciplinarity. In particular, the value of the breadth enjoyed in ‘General Science’ to students seeking careers in teaching is demonstrable. However, as has been made clear by the panel’s research (later referenced), a degree with a major concentration and one or two other teachables is preferable with regard to future employment in the school system. This approach would encourage faculty members to focus their

energies in building up their respective areas, while continuing to give students maximal access to the Division's considerable range of course options.

The Panel has the following recommendations that could be used to strengthen the degree program:

- **[2a]** Re-introduce SCI 3000 and/or 3001 as courses required for the degree. The rationale for this recommendation is that the interdisciplinary value of courses, which draw upon both sciences and humanities disciplines and teaching emphases. One issue reported to the panel was the difficulty of opening up such courses to both science and arts students, given that the scientific content must be, from the point of view of sciences students, *reintroduced* at too simplistic a level. A possible solution is to restrict such courses to those pursuing a BSc, and to identify the courses in particular as humanities-based approaches to science subjects that both meet writing requirements but also fulfill a particular pedagogical/curricular mandate. Courses at other universities in fields of 'science studies' and 'history and philosophy of science' offer plenty of patterns for such offerings, as do previous offerings of SCI 3000/01 at Grenfell. However, the panel recognizes that this will require a new faculty hire, in all likelihood, since it is clear that all TU's are spoken for within the Division of Science with the arrival of Math and Physics degrees.
- **[2b]** The panel, as mentioned, unanimously recommends the removal of the Honours requirement as the current Honours program is contradictory to the theme of a General Science degree. An Honours degree implies a significant concentration in one area of science with potential undergraduate publications in scientific journals, and this is simply not possible with the existing infrastructure and the notion of a 'general' degree. It is clear to the panel that neither the laboratory nor the course requirements come close to meeting the normal standards for an Honours degree. This does not negate the fact that students can acquire areas

of concentration in their general degree that will strengthen their potential career employment possibilities.

- **[2c]** Review the Chemistry stream with the assistance of the chemists so that the required courses better reflect accepted norms across Canada, whereby students are required to take courses in analytical chemistry not only to prepare themselves as educators but as potential employees in the chemical industry. Chemistry faculty members mentioned to the panel that General Science students could avoid crucial laboratory courses with the present degree structure. If this degree is meant to train and prepare students for careers in education, medicine, or industry, laboratory experience is absolutely necessary in many streams of science. A review of the laboratory requirements for all streams should also be conducted with present faculty.
- **[2d]** Re-brand the program in a more 'honest' manner – it is essentially a training ground for Science teachers. It should be promoted as such to attract potential students. That said, the claims the program provides an additional advantage to students over other Science degrees is, we believe, somewhat misleading. The program allows students to complete the two focus areas necessary, and a special General Science focus area was developed by the Faculty of Education in order to accommodate students who complete the program. As correspondence with the Faculty has revealed, there have been very few applicants to Education from General Science (see attached correspondence).
- **[2e]** Review which faculty members 'belong' to the program (though this would necessitate a discussion surrounding Appendix G of the MUN-MUNFA Collective Agreement). It seems impractical that all members of the Division of Science belong to the program, as discussion surrounding General Science is often relegated to tag-on status following the end of Divisional meetings. Regular meetings should be held to discuss shared issues.

- [2f]The panel agrees that if this program were to be strengthened, students should take a minimum of two courses in each stream of Science (Physics, Math, Earth Systems, Chemistry and Biology) to reflect better the 'General Science' degree. Students can take upper-year classes to give them one or two areas of concentration. As it stands right now, a student can complete the General Science Program by completing science courses in only three of the five disciplines. If a student selects Mathematics, Biology, and Chemistry as her or his three focus areas, then she or he is able to complete all core requirements and graduate without completing any Physics or Earth Science courses. By missing these two subject areas, it is difficult to consider the student as having much of a General Science background. As the recommendation suggests, students should, as part of the General Science core requirements complete *at least* two courses in each of the five streams. We suspect this may put some strain on the students, particularly when it comes to scheduling; however, proper academic advising at an early stage should ensure that any General Science student will be able to complete this additional requirement.

OVERALL CONCLUSION: THE LEGACY OF GENERAL SCIENCE

The Panel recognizes that there is an argument to be made that General Science serves an important function in addition to preparing students for graduate school or to be science educators. The program also allows those few students completing the General Science degree solely because they like learning about science. These students, of which the panel heard/read about, are not looking for a career in the sciences or education and instead simply want to become a little better informed about their world around them. If the student is made fully aware early on that the degree will not likely adequately prepare them for graduate school or specialty occupations and if the faculty/program chair(s) are willing

to state these shortcomings about their General Science program to incoming students, then there seems little need to disband the program.

At the same time, the Panel was struck by the fact that very few faculty are concerned with the future and success of the program, as they are (perhaps understandably) more concerned with their primary appointment areas. In addition, the numbers are very low, and the Panel also questioned both the degree to which graduates are truly educated in 'general science' and the degree to which students are adequately prepared to teach a range of Science courses in the school system.

The fact that there has been no real, meaningful discussion of the future of the General Science program is telling. It is clear that there must be a serious and considered discussion over whether General Science is 'worth keeping' at this stage. The Panel is largely convinced that, as it stands right now, the program is not achieving the vision that it initially articulated, is servicing only a small number of students who can be absorbed elsewhere, and should be discontinued. However, the Panel is also of a unanimous opinion that if the Division of Science chooses to keep the program, it needs a number of revisions, which we have articulated in this report.

APPENDIX A: SITE VISIT SCHEDULE (SEE ATTACHED)

APPENDIX B: E-mail correspondence between Matthew Janes and Judi Mellor, Undergraduate Coordinator, Faculty of Education (Undergraduate Programs). [NOTE: Ms. Mellor's portion of the correspondence has been underlined)

Hello Matthew:

Thank you for your e-mail on behalf of the Review Panel. I have provided information (below) immediately following each of your questions.

Please let me know if you need anything further.

Judi

From: Janes, Matthew [<mailto:majanes@grenfell.mun.ca>]
Sent: March-18-13 2:26 PM
To: Mellor, Judith
Subject: Questions - BSc (General Science) graduates moving into Education

Hi Judi,

I recently chaired the Academic Program Review (APR) for the General Science program at Grenfell Campus. The Review Panel has a couple of questions that you, as the Undergraduate Studies Coordinator at the Faculty of Education, would be in the best position to answer. I know that you are very busy, but I would appreciate it if you could give us a written response when you are able to do so.

Here's what we're wondering:

For a student who graduates from Grenfell with a General Science degree, are there any advantages or disadvantages when applying to the Faculty of Education for either Primary/Elementary or Intermediate/Secondary as compared to other Science degrees at Memorial? There are no specific advantages or disadvantages in regard to admission compared to other science degrees. In applying to the Primary/Elementary program, graduates would certainly exceed the minimum requirements for a science focus area. However, to the best of my knowledge, we have never received an application to the Primary/Elementary program from a graduate of the B.Sc. (General Science). There is certainly a need for K-6 teachers with a strong science background. In this regard you may wish to contact Dr. Mary Stordy who is our lead faculty member in the development of a STEM program for pre-service teachers.

For the Intermediate/Secondary program, the Faculty of Education worked with Grenfell personnel to introduce a General Science teachable to accommodate graduates of the B.Sc. (General Science). This was necessary as graduates did not meet the existing Intermediate/Secondary admission requirements of 12 courses in a first teachable area and 8 courses in a second teachable area. I have reviewed our admission numbers for the General Science teachable area and they are quite low. (It should be noted that graduates with other degrees may also apply under the General Science Teachable area.) If you require detailed figures on this, we would be pleased to assist.

2. For the same group of students, are there any advantages or disadvantages when they apply for positions within the Province at one of the various school boards? Please let me know if I should instead direct this inquiry to Deana Hatcher, Registrar of Teachers, at the Department of Education.

I would recommend that you contact the school district(s) on this matter. Teaching positions are normally advertised as requiring a specific major of minor which most often equates to the teachable areas. Please note that the two teachable areas are printed on the transcripts of B.Ed. (Intermediate/Secondary) graduates immediately below the designation of the degree awarded.

With thanks in advance,

Matthew

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