

BSc and BA&Sc Interdisciplinary Programs

Faculty of Science, McGill University

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1 Introduction

During recent discussions in the Faculty of Science Academic Committee it was suggested that it would be useful to examine our interdisciplinary programs. This document summarizes our discussions and provides a snap shot and some insight into our interdisciplinary programs.

2 What is an interdisciplinary program?

There are many ways to categorize interdisciplinary programs. A working categorization is as follows:

Inter-unit Programs: Some interdisciplinary programs build upon the foundations of several disciplines, and often those disciplines are associated with existing departments. For example, the Neuroscience program draws upon foundations (courses) from Biology, Psychology, and Physiology. In the case of the BA&Sc Inter-faculty programs, the units are in both the Faculty of Science and the Faculty of Arts. A listing of all such programs is given in the attached table.

Joint Programs: Joint programs (Majors and Honours) are programs which combine two disciplines, and which contain the core of both disciplines. Examples are Mathematics and Physics, and Computer Science and Biology. In the BSc degree all joint programs are explicit combinations. However, in the BA&Sc degree students may combine any Arts major concentration with any Science concentration to form their own personalized implicit joint program. A listing of the BSc joint programs is given in the attached table.

Minors and Options: The majority of students study a specific discipline, but these students may also broaden their degree by choosing an option or minor.

Example of options that provide some interdisciplinarity are the Bio-organic option in Chemistry, and the Quantitative Biology option in Biology. However, not all options are interdisciplinary - for example, the Computer Games option in Computer Science is simply a more specialized Computer Science discipline.

A large number of BSc students (and all BSc Liberal and BA&Sc students) include a second program in their degree. Usually this is a Minor, Minor Concentration, a 2nd Major Concentration, or a 2nd Core Science Component. For example, a student might have a major in Biochemistry with a minor in Computer Science.

In our discussions it was noted that often a new program or area that is considered interdisciplinary at first eventually becomes a new discipline. For example, one of the AC members considers that Neuroscience is in fact its own discipline. However, it is not practical to create new academic units for every such discipline. Thus, part of the challenge is to support new interdisciplinary programs within the context of the existing departmental structure.

3 Growth in Interdisciplinary Programs

As clearly shown by the attached table, the number of students registered in a BSc/BA&Sc interdisciplinary program has more than doubled in the last five years. Almost all of the the older joint programs continue to attract students, the newly introduced joint programs such as the Computer Science and Biology program are also attracting students. Finally, the new inter-unit programs are also very popular, in particular the Neuroscience and Cognitive Science programs.

4 Designing a good Interdisciplinary Program

It is actually quite challenging to design a good interdisciplinary program. One wants to have a broad program using courses from several disciplines, while at the same time providing sufficient depth so that students get an adequate opportunity to do higher level 400 and 500-level courses.

In the last cycle of programs reviews we identified several Faculty programs which were interdisciplinary and did not provide adequate depth. The Faculty of Science retired all Faculty programs and replaced them with the BSc Liberal, which requires a Core Science Component and a second program (Minor, Minor Concentration, Major Concentration or a second Core Science Component). The BA&Sc Biomedical Sciences Major Concentration was another example of a program which lacked sufficient depth, and it was also retired.

In introducing new strong inter-unit programs, different approaches have been taken to ensure both breadth and depth. The Environment programs are structured as an integrative core, plus a domain. Thus all students get some core courses, plus some depth within their chosen domain. Other inter-unit programs are structured so that there are core courses, plus a structured choice of complementaries. This structuring is via several alternative streams, or via a selection of courses from specific specialized lists. There are likely other program designs which will work, but the key point is to remember to allow for (require) adequate depth and specialization.

Designing a joint program also requires some care. The program needs to include a significant number of core courses from both disciplines, as well as allowing students to proceed to advanced courses in both disciplines. In particular, it is the expectation that students in the Honours versions of these programs will have adequate background for graduate studies.

Minors must also be designed carefully so as to allow for, and require, some depth. Even interdisciplinary minors such as the Neuroscience and the Interdisciplinary Life Sciences Minors have been designed to ensure adequate depth by requiring a minimal number of higher-level courses.

5 Integration

Many inter-unit interdisciplinary programs have specific integrative courses which have been specifically designed for the program. Examples include the core Environment courses and the new Earth System Science core courses. All such courses are associated with an administering department.

Explicit joint programs may or may not have special integrative courses. For example, the Physics and Computer Science, and the Computer Science and Biology programs have a joint 400-level project course.

Implicit joint programs, such as the multi-track BA&Sc program, have no explicit integrative courses which integrate the two major concentrations. However, students may invent their own combinations of courses so that there is some good relationships between them. For example, students with major concentrations in Economics and Mathematics can choose courses which fit together naturally. Even less obvious combinations such as English and Physics can lead to programs which support specific goals, such as training to be a technical writer.

6 Advising

Within the Faculty of Science advising of interdisciplinary programs (both BSc and BA&Sc) is organized as follows.

BSc and BA&Sc Freshman Programs: All BSc and BA&Sc freshman students are advised by SOUSA (Science Office of Undergraduate Student Advising). All SOUSA advisors are familiar with the BSc and BA&Sc programs.

Inter-unit Programs: All inter-unit programs have assigned advisors. Environment programs are advised through the MSE advisor, Cognitive Science, Neuroscience and the Interdisciplinary Life Sciences Minor are advised through the Interdisciplinary Advisor in SOUSA, plus faculty members in the departments. The remaining inter-unit programs have advisors from appointed faculty members or department advisors.

Joint Programs: All joint programs are officially administered by one department (although clearly the consult with the other department). Thus students are advised in the first instance through the administering department, although they may also seek some specialized advice from professors in the other department.

7 Administration

There is a clear line of administration for all interdisciplinary programs.

Freshman Program: SOUSA follows up on all freshman programs.

Inter-unit Programs: Environment programs are administered through the MSE. All other inter-unit programs have a program director, and a program committee, with members of the committee taken from the faculty members of participating departments. Neuroscience and Cognitive Science have administrative support via the SOUSA interdisciplinary advisor. Other inter-unit programs are associated with an administering department. For example, the new Sustainability, Science and Society program is administered by Geography.

Joint Programs: Joint programs are administered through the department to which it is officially associated. Of course, appropriate consultation with the other department is also maintained.

8 Program Review

All programs, except for Neuroscience and Cognitive Science, are associated either with the MSE or a department. Thus, except for those two cases, the program should be reviewed when the administering department does their cyclical review. A cyclical review policy for Neuroscience and Cognitive Science needs to be created. We suggest that the program directors and committees be consulted to determine the best mechanism. One possibility is to assign the review to each participating department on a rotating basis.

9 Summary

Interdisciplinary programs are becoming increasingly popular. The support of such programs requires excellent disciplinary support through the departments and an appropriate advising and administrative structure. All inter-unit and joint programs offered through the Faculty of Science have such support and structure.

Designing good interdisciplinary programs is quite challenging, in order to provide enough core, breadth and depth. Old programs which did not achieve this have been retired, and all existing programs have a mechanism to ensure the correct balance.

AC-11-33 (data) Enrolment in Interdisciplinary Programs (BSc and BA&Sc)

Dark Grey, Interfaculty (AS) and Interdisciplinary Programs (SC)

White, Joint Programs

Light Grey, Retired Faculty Programs (SC)

STUDENT_T	(All)
REGD_NON	Y
GENDER	(All)
PRIM_DEPT1	(Multiple Items)

Count of ID		TERM				
PRIM_FACU1	PRIM_MAJOR1	200709	200809	200909	201009	201109
AS	Cognitive Science (ad hoc)	39	49	87	101	133
	Environment	33	43	51	47	47
	Sustainability, Sci & Soc				2	11
AS Total		72	92	138	150	191
SC	Cognitive Science (ad hoc)	1				
	Environment	98	86	92	112	121
	Earth System Science		12	15	16	19
	Neuroscience		98	149	171	176
	Immunology (Interdept)	34	22	25	26	28
	Atmospheric Sciences & Physics	6	3	4	3	2
	Biology & Mathematics			4	15	20
	Computer Science and Biology		1	9	24	38
	Phys & Computer Science (ad hoc Honours)	2	2			
	Physics & Computer Science	6	9	7	14	17
	Math & Computer Science	23	29	30	26	37
	Stats & Computer Science		1	3	6	8
	Mathematics and Physics	42	44	56	59	64
	Physics and Chemistry	2	3	5	2	6
	Physics and Geophysics	4	3	3	5	2
	Physiology and Mathematics	9	5	6	17	19
	Physiology and Physics	10	6	6	18	34
	Biology and Mathematics	8	4	1	1	
	Chemistry & Biological Sci	2	1			
	Chemistry & Mathematics	1	1	1		
Math, Chemistry & Physics	3	1	1			
Math, Stats & Computer Sci	3	1				
SC Total		254	332	417	515	591
Grand Total		326	424	555	665	782