Sciences Curriculum Committee

Supplement to Proposals for Committee Approval
(1 minor program modification proposal)

January 30, 2020
1 Minor Program Modification:

Bioinformatics and Computational Biology Specialist

Description:

The genomic and post-genomic era brings opportunities for new insight into all aspects of biology and medicine, based on the computational analysis of very large datasets in a biological context. The Bioinformatics and Computational Biology Program is an interdepartmental, interdisciplinary Program of Study that balances computer-science and life-science courses towards that goal. As a Specialist Program it is designed to prepare students for graduate studies in the field.

The Program is formally administered by the Department of Cell and Systems Biology and co-sponsored by the Departments of Biochemistry, Computer Science, Ecology and Evolutionary Biology, and Molecular Genetics; all sponsoring Departments have clear trajectories to extend the Program into graduate studies in the respective Department.

This program has unlimited enrolment and no specific admission requirements: All students who have completed at least 4.0 courses are eligible to enrol.

However, students are advised that the very rigorous courses that are part of the Program, the very limited overlap in course material between the theory-centric and the biology-centric courses; and the different academic cultures in the life- and computer sciences; make this Program suitable only for the academically strongest and most highly motivated students on campus: As a rule of thumb; students who expect to do well should be able to regularly perform at the top 20% level in their classes:

You should seek advice from both the Program Director and the Department of Computer Science on how to distribute your courses.

Note: this program has deregulated fees, which are incurred after enrolment in the program. Please refer to Arts & Science Registration Instructions for more information.

For additional information; please refer to http://biochemistry.utoronto.ca/bcb

Enrolment Requirements:

Previous:

New:

This is a limited enrolment program that can only accommodate a limited number of students. Admission will be determined based on the average of BIO130H1 + the best of CSC108H1 or CSC148H1. Alternatively, admission can be based on the average of BIO230H1 + CSC236H1.

Completion Requirements:

Specialist program:
(12.5 full courses or their equivalent)

First or second year:

Foundational The following courses are common prerequisites for required courses in the Program:
(5 Credits credits total):

(MAT135H1, MAT136H1)/MAT137Y1/MAT157Y1
Upper years:

The following courses are Program requirements (7.5 Credits total):

- STA237H1/STA247H1/STA255H1/STA257H1
- CSC207H1
- CSC209H1
- CSC373H1
- BIO230H1/BIO250Y1/(BIO240H1, BIO241H1)/BIO255H1
- BIO255Y1
- BCH210H1, (BCH311H1/CSB349H1/MGY311Y1)/BCH242Y1
- BCH441H1/CSB472H1
- BCB330Y1
- BCB410H1
- BCB420H1
- BCB430Y1

Course substitutions are possible with written permission of the Program Director. Note that the requirements for a co-sponsoring Department’s major can normally be fulfilled with 0.5 to 3.5 additional credits. All Major programs in the co-sponsoring life science departments require BIO120H1, however, it is not formally a part of this Specialist Program's requirements.

(1) The “missing” half-credit of the substitution does not have to be replaced. For details, please refer to the Computer Science Program instructions in this Calendar.

Former BCB students benefitted from taking CSB352H1, Bioinformatic Methods. They also found it to be helpful to take BCH441H1 prior to BCB410H1 due to BCB410H1’s R programming requirement.

Description of Proposed Changes:

We are proposing to turn the undergraduate Bioinformatics and Computational Biology Specialist program into a Limited program with a cohort size of 30 per year, with admission into it based on the average of first year BIO130H1 and (CSC108H1 or CSC148H1) grades, or for second year, the average of BIO230H1 and CSC236H1 grades. The program has no enrollment restrictions or limits of any kind at present. Additionally, we propose adding CSB349H as an alternate to BCH311H1/MGY311Y1, adding the new STA237H1 as a 2nd year statistics alternative, and removing legacy course codes from the program requirements (BIO150Y1, BIO240H1, BIO241H1, BIO250Y1, BIO255Y1).

Rationale:

Many students who choose the BCB program do not have the required background in BIO and CSC courses, having either not taken them or having received a low grade that does not prepare them for the rigors of the program. Based on an analysis of students admitted this year, we reached the following conclusions.

First, the BCB Program has two required research project courses (BCB330Y1 and BCB430Y1), which require student placement with participating research project supervisors. While we have been able to place 24 BCB330 project students this year, we are reaching capacity. Second, while the Department of Computer Science and the Registrar’s Office have generously provided a certain number of balloted slots for BCB students who want to take CSC207H1, CSC236H1 and CSC263H1, this is not a sustainable practice and does not ensure course access for all students. If the BCB Program were to become a “limited” program, then this would allow Computer Science to set priority enrollment access to those courses along with 3 other required CSC courses during the priority enrollment period for Computer Science students, and ensure sustainable access to required CSC courses for all students in the BCB program.

Impact:
The proposed changes will have an impact both on student success and resourcing. In terms of student success, of the new BCB POSt students, 35% don’t have the appropriate biological background (i.e., BIO130) and 31% don’t have the appropriate computational background (i.e., CSC108). Students who perform poorly in these and other “introductory” courses such as BIO230 and CSC207 are currently struggling in the BCB program. Introducing BIO130H1 and CSC108H1 as courses required for enrollment means that students will not be able to automatically choose the BCB program.

Limiting the cohort size to 30 will also allow us to continue to place students with research project supervisors for their BCB330Y and BCB430Y research project courses ensuring access to these courses for all students in the program. Last, students will benefit by having priority access to required CSC courses.

We have been in discussion with Michelle Craig (Computer Science undergraduate chair) regarding the current students in the program. She has informed us that Computer Science can accommodate these students in the BCB program so they too will have priority access to ensure that they can all complete the BCB program and graduate.

Consultation:
We have consulted with Michelle Craig (Computer Science undergrad chair)*, Vince Tropepe (CSB chair), Tony Harris (CSB undergrad associate chair), Janet Mannone (CSB undergrad coordinator), Bethany White (Statistics), Martha Harris (FAS, Manager, Faculty Governance & Curriculum), current BCB program students and the BCB Student’s Union (BCBSU, Cindy Fang, president – see attached comments “Meeting with Vince Tropepe + Nicholas Provart.pdf”).

Since BCB program students do not currently have priority access to CSC courses, it is a source of stress for students in the program. The students we consulted with named the balloting process for certain courses as an obstacle for students in the program, and expressed support for the change to a limited enrollment program if it would mean elimination of balloting.

Students expressed concern about whether the change would be retroactive. All current students in the program will be accommodated, with the change affecting students going forward.

*Comments from an email from Michelle Craig on September 18th, 2019: "So the language you want is that we would include ASSPE1868 in the list of POSts that have priority registration for these 3 other CSC courses [CSC207, CSC236 and CSC263, in addition to CSC209 and CSC373]. They would have the same access as students in CS POSts. [...] Certainly 20-30 students isn't a problem for us."

Resource Implications: