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MEMORANDUM

ATTENTION	Senate	DATE	March 6, 2015
FROM	Gordon Myers, Chair Senate Committee on Undergraduate Studies	PAGES	1/1
RE:	Faculty of Applied Sciences (SCUS 15-10)		

For information:

Acting under delegated authority at its meeting of March 5, 2015 SCUS approved the following curriculum revisions effective Fall 2015.

1. School of Computing Science (SCUS 15-10a)

- (i) Description change for CMPT 165
- (ii) New Course Proposal: CMPT 295-3, Introduction to Computer Systems
- (iii) Lower Division requirement changes to the Computing Science Major Program
- (iv) Lower Division requirement changes to the Computing Science Honours Program
- (v) Lower Division requirement changes to the Software Systems Major Program
- (vi) Upper and Lower Division requirement changes to the Computing Science and Linguistics Joint Major Program
- (vii) Upper and Lower Division requirement changes to the Molecular Biology and Biochemistry and Computing Science Joint Major
- (viii) Upper and Lower Division requirement changes to the Molecular Biology and Biochemistry and Computing Science Joint Honours Program



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MEMORANDUM

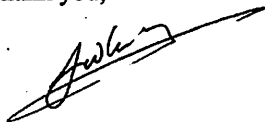
ATTENTION	Senate Committee on Undergraduate Studies	DATE	February 20, 2015
FROM	Ed Park, Associate Dean	PAGES	
RE:	Curriculum Changes		

The following changes have been approved by the FAS Undergraduate Curriculum Committee and are appended here for approval by SCUS and recommendation to Senate.

- 1.) School of Computing Science
 - a. Course Description Changes
 - CMPT 165
 - a. New Course Proposal
 - CMPT 295
 - b. Calendar Changes
 - Computing Science Major
 1. Replace CMPT 275 with CMPT 276.
 2. Replace CMPT 150 with CMPT 295
 - Computing Honours Program
 1. Replace CMPT 275 with 276
 2. Replace CMPT 150 and 250 with CMPT 295
 - Software Systems Major
 1. Replace CMPT 150 and 250 with CMPT 295
 - Computing Science and Linguistics Joint Major
 1. Add CMPT 127-3 as a required class
 2. Remove CMPT 126-3 as an alternative to the CMPT 120, (125 + 127) sequence
 3. Add CMPT 130 and CMPT 135 as an alternate sequence of introductory classes
 4. Replace CMPT 275 with CMPT 276
 5. Change language in Computing Science upper division requirements to clarify
 6. Replace CMPT 150 with CMPT 295
 - Computing Science and Molecular Biology and Biochemistry Joint Major
 1. Add CMPT 127-3 as a required class
 2. Remove CMPT 126-3 as an alternative to the CMPT 120, (125 + 127) sequence

3. Add CMPT 130 and CMPT 135 as an alternate sequence of introductory classes
 4. Replace CMPT 275 with CMPT 276
 5. Add MATH 232 or MATH 240 as a lower division requirement
 6. Replace CMPT 150 with CMPT 295
 7. Replace MBB 442 with MBB 463
- Computing Science and Molecular Biology and Biochemistry Joint Honours
 1. Add CMPT 127-3 as a required class
 2. Remove CMPT 126-3 as an alternative to the CMPT 120, (125 + 127) sequence
 3. Add CMPT 130 and CMPT 135 as an alternate sequence of introductory classes
 4. Replace CMPT 275 with CMPT 276
 5. Add MATH 232 or MATH 240 as a lower division requirement
 6. Replace CMPT 150 with CMPT 295
 7. Replace MBB 442 with MBB 463

Thank you,



Edward Park
Associate Dean

(EP/mt)



EXISTING COURSE, CHANGES RECOMMENDED

Please check appropriate revision(s):

☐ Course number ☐ Credit ☐ Title ☒ Description ☐ Prerequisite ☐ Course deletion ☐ Learning Outcomes

Indicate number of hours for: Lecture _____ Seminar _____ Tutorial _____ Lab _____

FROM _____ **TO** _____
Course Subject/Number CMPT 165 Course Subject/Number _____

Credits _____ Credits _____

TITLE

(1) LONG title for calendar and schedule, no more than 100 characters including spaces and punctuation.

FROM: _____ **TO:** _____

(2) SHORT title for enrollment and transcript, no more than 30 characters including spaces and punctuation.

FROM: _____ **TO:** _____

DESCRIPTION

FROM:

In this course, we shall examine the structure of the Internet and the World Wide Web as well as design and create web sites. Students who have obtained credit for, or are currently enrolled in a CMPT course at the 200 division or higher, CMPT 118 or 170, or IAT 265 or 267 may not take CMPT 165 for further credit. Breadth-Science.

PREREQUISITE

Does this course replicate the content of a previously approved course to such an extent that students should not receive credit for both courses? If so, this should be **noted in the prerequisite**.

FROM:

LEARNING OUTCOMES

DESCRIPTION

TO:

We shall examine the structure of the Internet and the World Wide Web as well as design and create web sites. Students with credit for, or who are currently enrolled in a CMPT course at the 200 division or higher, CMPT 125, 135 or 170, or IAT 265 or 267 may not take CMPT 165 for further credit. Breadth-Science.

PREREQUISITE

TO:

RATIONALE

CMPT 165 is an introductory course with some programming. It is not considered appropriate for students who have completed the second course in one of the two streams of first year programming courses (i.e. CMPT 125 or CMPT 135) to take CMPT 165 for further credit. CMPT 118 removed since it is no longer offered.

Effective term and year
Fall 2015

NOVEMBER 2012

COURSE SUBJECT NUMBER **COURSE TITLE**

LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation

AND

SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation

CAMPUS where course will be normally taught: ☒ Burnaby ☒ Surrey ☒ Vancouver ☐ Great Northern Way ☐ Off campus**COURSE DESCRIPTION (FOR CALENDAR). 50 WORDS MAXIMUM. ATTACH A COURSE OUTLINE TO THIS PROPOSAL**

The curriculum introduces students to topics in computer architecture that are considered fundamental to an understanding of the digital systems underpinnings of computer systems.

REPEAT FOR CREDIT ☒ YES ☐ NO How many times? Within a term? ☐ YES ☒ NO**LIBRARY RESOURCES**

NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by a library report and, if appropriate, confirmation that funding arrangements have been addressed.

Library report status, see lib.sfu.ca/collections/course-assessments **RATIONALE FOR INTRODUCTION OF THIS COURSE**

If more space is needed, please use the provided text box on page 4 of this document

This course is intended to replace CMPT 150 in the Computing Science curriculum with a more contemporary course that addresses deficiencies in the existing CMPT 150 curriculum and provides some of the content previously included in the CMPT 250 curriculum now that the latter course is no longer required.

Identified Deficiencies with the existing course:

1. Because the present course (CMPT 150) has no pre-requisites, most students are not sufficiently prepared to address the topics of digital design and assembly language programming.
2. Digital design and computer architecture are subjects that can better be addressed in a single semester in the second year of studies when students have accumulated some prior university background in mathematics and computer science.
3. Some topics currently in CMPT 250 provide insights into later systems and database courses. With the elimination of CMPT 250 as a requirement, these topics still need to be introduced but are not found in the current CMPT 150 curriculum.

SCHEDULING AND ENROLLMENT INFORMATION

Term and year course would first be offered (e.g. FALL 2014) and planned frequency (e.g. each semester) of offering thereafter:

Will this be a required or elective course in the curriculum? ☒ Required ☐ ElectiveWhat is the probable enrollment when offered? Estimate:

UNITS

Indicate number of units: 3

Indicate no. of contact hours for: 3 Lecture 0 Seminar 0 Tutorial 1 Lab 0 Other – please explain

OTHER**FACULTY** Which of your present CFL faculty have the expertise to offer this course?

Greg Baker, Diana Cukierman, Tony Dixon, Harinder Khangura, Brian Fraser, Ramesh Krishnamurti

WQB DESIGNATION (attach approval from Curriculum Office)

none

PREREQUISITE AND / OR COREQUISITEMACM 101 - Discrete Mathematics I and
CMPT 125 - Introduction to Computing Science and Programming II and CMPT 127 - Computing Laboratory
or
CMPT 135 - Introduction to Computer Programming II**EQUIVALENT COURSES**

Does this course replicate the content of a previously-approved course to such an extent that students should not receive credit for both courses?

Students with credit for CMPT 150 or 250 may not take this course for further credit.

COURSE – LEVEL EDUCATIONAL GOALS (OPTIONAL)**FEES**Are there any proposed student fees associated with this course other than tuition fees? ☐ YES ☒ NO



RESOURCES

List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

Resource needs can be met with those used for CMPT 150 and CMPT 250, which the new course replaces.

OTHER IMPLICATIONS

Final Exam required: ☒ YES ☐ NO

Criminal Record Check required: ☐ YES ☒ NO

OVERLAP CHECK

Checking for overlap is the responsibility of the Associate Dean.

Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator

New Course Proposal: CMPT 295 – Introduction to Computer Systems

Preamble :

This course is intended to replace CMPT 150 in the Computing Science Curriculum with a more contemporary course that addresses deficiencies in the existing CMPT 150 curriculum and provides some of the content previously included in the CMPT 250 curriculum now that the latter course is no longer required

Identified Deficiencies with the existing course :

1. Because the present course (CMPT 150) has no pre-requisites, most students are not sufficiently prepared to address the topics of digital design and assembly language programming.
2. Digital design and computer architecture are subjects that can better be addressed in a single semester in the second year of studies when students have accumulated some prior university background in mathematics and computer science.
3. Some topics currently in computer architecture (CMPT 250) provide insights into later systems and database courses. With the elimination of CMPT 250 as a requirement, these topics still need to be introduced but are not found in the current CMPT 150 curriculum.

Proposed Prerequisites :

- CMPT 125 or CMPT 135 (Basic programming experience. C preferred. Students need to be familiar with the basic high-level programming constructs: assignment statements, control (if and case), functions, structured data types).
- MACM 101 (Elementary Boolean algebra: Huntington postulates, Deriving equivalencies, truth tables.)
- Conversion between base 10, base 2 and base 16 (MACM 101?)
- Finite state machines (MACM 101?)

Course Outline :

1. Representation of data (3 lectures)
 - Character encoding (ASCII, Unicode) ($\frac{1}{2}$ lecture)
 - Signed integer representation. (1 lecture)
 - Floating point representation. ($1\frac{1}{2}$ lectures)
2. Representation of instructions (Instruction Set Architecture) (3 lectures)
 - Components of an instruction (operation, operands)
 - Role of instructions (data transfer, computation, testing, branching)
 - Encoding instructions (machine language, instruction length)
 - Instruction design (von Neumann bottleneck, instruction format)

3. Assembly language programs (8 lectures)
 - Implementing control structures (2 lectures)
 - Implementing arrays (pointers, static arrays, dynamic arrays) (2 lectures)
 - implementing subprograms (stack frames) (4 lectures)
4. Basic Digital Systems (6 lectures)
 - Implementing Boolean functions with gates (2 lectures)
 - Digital switching (multiplexers and decoders) (1 lecture)
 - Storage (registers, RAM memory, ROM, register files) (2 lectures)
 - Functional units (Adder, ALU, Comparator) (1 lecture)
5. CPU organization (9 lectures)
 - Instruction Execution (Fetch/execute cycle) (2 lectures)
 - one-cycle machine (3 lectures)
 - Multi-cycle machine. (2 lectures)
 - Pipelining (Organization, hazards) (2 lectures)
6. Memory organization (6 lectures)
 - RAM technologies (SRAM, DRAM) (1 lecture)
 - Block structured memory (1 lecture)
 - Locality of reference (1 lecture)
 - Hierarchical memory systems (3 lectures)
7. Threads and synchronization (4 lectures)
 - Processes and threads (1.5 lectures)
 - Synchronization using semaphores (2 lectures)
 - Introduction to deadlock (1/2 lecture)

Recommended Textbook :

“Computer Systems: A Programmer’s Perspective, 2nd ed”, Randal E. Bryant, David R. O’Hallaron, Prentice Hall, 2011.

Comments :

1. The textbook is too comprehensive to be delivered as an introductory course over 13 weeks. The authors provide several alternative curricula that can be supported by the book. The "ORG" option (page xxvii) best meets the curriculum proposed above, although instructors may wish to draw from other chapters as well.
2. The proposed curriculum attempts to merge those topics from the existing CMPT 150 and CMPT 250 curriculum descriptions that are considered fundamental to having an understanding of the digital systems underpinnings of computer systems. The textbook provides a contemporary perspective of these topics.
3. The proposed textbook covers most of the material in Part 1, excluding chapter 5. I would therefore propose that a custom edition of the text be used that includes only Part I of the text, to reduce textbook cost.

Revision to Computing Science Major Program

Faculty of Applied Sciences Curriculum Committee

John Edgar

February 2015

Description and Rationale

We propose two amendments to the Lower Division Requirement of the CS Major program.

1. Replace CMPT 275 with CMPT 276. CMPT 275 is a 4 credit course with a workload that is considered very difficult to manage for both students and instructors. CMPT 276 covers less material and has a smaller project and has been offered successfully at the Surrey campus since 2010. Students who wish to pursue farther studies in this area have a number of upper division options.

2. CMPT 150 has no pre-requisites and most students are not sufficiently prepared to address the topics of digital design and assembly language programming. We believe that digital design and computer architecture are subjects that can better be addressed in the second year of studies. CMPT 295 merges topics from CMPT 150 and CMPT 250 that are considered fundamental to an understanding of the digital systems underpinnings of computer systems and updates coverage of these topics.

Current	Proposed
Lower Division Requirements	Lower Division Requirements
Students must complete the courses listed below. It is suggested that students complete a recommended schedule of courses within the first two years.	Students must complete the courses listed below. It is suggested that students complete a recommended schedule of courses within the first two years.
Students complete all of	Students complete all of
CMPT 120 - Introduction to Computing Science and Programming I (3)	CMPT 120 - Introduction to Computing Science and Programming I (3)
CMPT 125 - Introduction to Computing Science and Programming II (3)	CMPT 125 - Introduction to Computing Science and Programming II (3)

CMPT 127 - Computing Laboratory (3) CMPT 150 - Introduction to Computer Design (3) CMPT 225 - Data Structures and Programming (3) CMPT 275 - Software Engineering I (4) MACM 101 - Discrete Mathematics I (3) MACM 201 - Discrete Mathematics II (3) and one of MATH 150 - Calculus I with Review (4) MATH 151 - Calculus I (3) MATH 154 - Calculus I for the Biological Sciences (3) ** MATH 157 - Calculus I for the Social Sciences (3) ** and one of MATH 152 - Calculus II (3) MATH 155 - Calculus II for the Biological Sciences (3) ** MATH 158 - Calculus II for the Social Sciences (3) ** and one of MATH 232 - Applied Linear Algebra (3) MATH 240 - Algebra I: Linear Algebra (3) and one of STAT 270 - Introduction to Probability and Statistics (3) BUEC 232 - Data and Decisions I (4)	CMPT 127 - Computing Laboratory (3) CMPT 150 - Introduction to Computer Design (3) CMPT 225 - Data Structures and Programming (3) <u>CMPT 276 - Introduction to Software Engineering I (3)</u> <u>CMPT 295 - Introduction to Computer Systems (3)</u> MACM 101 - Discrete Mathematics I (3) MACM 201 - Discrete Mathematics II (3) and one of MATH 150 - Calculus I with Review (4) MATH 151 - Calculus I (3) MATH 154 - Calculus I for the Biological Sciences (3) ** MATH 157 - Calculus I for the Social Sciences (3) ** and one of MATH 152 - Calculus II (3) MATH 155 - Calculus II for the Biological Sciences (3) ** MATH 158 - Calculus II for the Social Sciences (3) ** and one of MATH 232 - Applied Linear Algebra (3) MATH 240 - Algebra I: Linear Algebra (3) and one of STAT 270 - Introduction to Probability and
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**** with a grade of at least B+, and with school permission.**

Statistics (3)

BUEC 232 - Data and Decisions I (4)

**** with a grade of at least B+, and with school permission.**

Revision to Computing Science Honours Program

Faculty of Applied Sciences Curriculum Committee

John Edgar

February 2015

Description and Rationale

We propose two amendments to the Lower Division Requirement of the CS Honours program.

1. Replace CMPT 275 with CMPT 276. CMPT 275 is a 4 credit course with a workload that is considered very difficult to manage for both students and instructors. CMPT 276 covers less material and has a smaller project and has been offered successfully at the Surrey campus since 2010. Students who wish to pursue farther studies in this area have a number of upper division options.
2. CMPT 150 has no pre-requisites and most students are not sufficiently prepared to address the topics of digital design and assembly language programming. We believe that digital design and computer architecture are subjects that can better be addressed in the second year of studies. CMPT 295 merges topics from CMPT 150 and CMPT 250 that are considered fundamental to an understanding of the digital systems underpinnings of computer systems and updates coverage of these topics.

Current	Proposed
Lower Division Requirements	Lower Division Requirements
Students must complete the following curriculum. It is suggested that students complete a recommended schedule of courses within the first two years.	Students must complete the following curriculum. It is suggested that students complete a recommended schedule of courses within the first two years.
Students complete all of	Students complete all of
CMPT 120 - Introduction to Computing Science and Programming I (3)	CMPT 120 - Introduction to Computing Science and Programming I (3)
CMPT 125 - Introduction to Computing Science and Programming II (3)	CMPT 125 - Introduction to Computing Science and Programming II (3)
CMPT 127 - Computing Laboratory (3)	CMPT 127 - Computing Laboratory (3)
CMPT 150 - Introduction to Computer Design (3)	CMPT 225 - Data Structures and Programming (3)

CMPT 225 - Data Structures and Programming (3)

~~CMPT 250 - Introduction to Computer Architecture (3)~~

~~CMPT 275 - Software Engineering I (4)~~

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

and one of

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

MATH 154 - Calculus I for the Biological Sciences (3) **

MATH 157 - Calculus I for the Social Sciences (3) **

and one of

MATH 152 - Calculus II (3)

MATH 155 - Calculus II for the Biological Sciences (3) **

MATH 158 - Calculus II for the Social Sciences (3) **

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

STAT 270 - Introduction to Probability and Statistics (3)

BUEC 232 - Data and Decisions I (4)

** with a grade of at least B+, and with

CMPT 276 - Introduction to Software Engineering I (3)

CMPT 295 - Introduction to Computer Systems (3)

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

and one of

MATH 150 - Calculus I with Review (4)

MATH 151 - Calculus I (3)

MATH 154 - Calculus I for the Biological Sciences (3) **

MATH 157 - Calculus I for the Social Sciences (3) **

and one of

MATH 152 - Calculus II (3)

MATH 155 - Calculus II for the Biological Sciences (3) **

MATH 158 - Calculus II for the Social Sciences (3) **

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

STAT 270 - Introduction to Probability and Statistics (3)

BUEC 232 - Data and Decisions I (4)

** with a grade of at least B+, and with school permission.

school permission.	
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Revision to Software Systems Major Program

Faculty of Applied Sciences Curriculum Committee

John Edgar

February 2015

Description and Rationale

We propose an amendment to the Lower Division Requirement of the Software Systems Major program that would replace CMPT 150 and CMPT 250 with a single new course, CMPT 295.

CMPT 150 has no pre-requisites and most students are not sufficiently prepared to address the topics of digital design and assembly language programming. We believe that digital design and computer architecture are subjects that can better be addressed in the second year of studies. CMPT 295 merges topics from CMPT 150 and CMPT 250 that are considered fundamental to an understanding of the digital systems underpinnings of computer systems and updates coverage of these topics.

Current	Proposed
Systems Requirements	Systems Requirements
Students complete at least 18 units, including all of	<u>Students complete at least 15 units, including all of</u>
CMPT 150 - Introduction to Computer Design (3)	<u>CMPT 295 - Introduction to Computer Systems (3)</u>
CMPT 250 - Introduction to Computer Architecture (3)	CMPT 300 - Operating Systems I (3)
CMPT 300 - Operating Systems I (3)	MSE 110 - Mechatronics Design I (3)
MSE 110 - Mechatronics Design I (3)	and two of
and two of	CMPT 170 - Introduction to Web Application Development (3)
CMPT 170 - Introduction to Web Application Development (3)	CMPT 354 - Database Systems I (3)
CMPT 354 - Database Systems I (3)	CMPT 371 - Data Communications and Networking (3)
CMPT 371 - Data Communications and	CMPT 433 - Embedded Systems (3)

Networking (3) CMPT 433 - Embedded Systems (3) CMPT 454 - Database Systems II (3) CMPT 470 - Web-based Information Systems (3) CMPT 471 - Networking II (3)	CMPT 454 - Database Systems II (3) CMPT 470 - Web-based Information Systems (3) CMPT 471 - Networking II (3)
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Revision to Computing Science and Linguistics Joint Major
John Edgar

February 2015

Description

Update Joint Major for changes to the Computing Science curriculum.

The substance of the changes are:

1. Add CMPT 127-3 as a required class
2. Remove CMPT 126-3 as an alternative to the CMPT 120, (125 + 127) sequence
3. Add CMPT 130 and CMPT 135 as an alternate sequence of introductory classes
4. Replace CMPT 275 with CMPT 276
5. Change language in Computing Science upper division requirements to clarify
6. Replace CMPT 150 with CMPT 295

Rationale

1. CMPT 127 was created to address students' lack of programming experience early in the program, which was preventing progress in other classes. With the increased popularity of Computing Science, students are entering the program with less experience than in the past.
2. CMPT 126 has been identical to 125 in practice for the last several years. This course will be refreshed and targeted at non-majors only, and disallowed for majors (except by appeal on transfer in to a CMPT program).
3. To facilitate transfer from the Surrey-based Software Systems program, which requires CMPT 130 and CMPT 135.
4. CMPT 275 is a 4 credit course with a workload that is considered very difficult to manage for both students and instructors. CMPT 276 covers less material and has a smaller project and has been offered successfully at the Surrey campus since 2010. Students who wish to pursue farther studies in this area have a number of upper division options.
5. The Computing Science Upper Division requirements were amended in a previous calendar change to a version which we considered to be unclear.
6. CMPT 150 has no pre-requisites and most students are not sufficiently prepared to address the topics of digital design and assembly language programming. We believe that digital design and computer architecture are subjects that can better be addressed in the second year of studies. CMPT 295 merges topics from CMPT 150 and CMPT 250 that are considered fundamental to an understanding of the digital systems underpinnings of computer systems and updates coverage of these topics.

Current Program Requirements	Proposed Program Requirements
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Lower Division Requirements

~~Students complete at least 46 units,
including one of~~

MATH 150 - Calculus I with Review (4)
MATH 151 - Calculus I (3)
MATH 154 - Calculus I for the Biological
Sciences (3) **
MATH 157 - Calculus I for the Social
Sciences (3) **

and one of

MATH 152 - Calculus II (3)
MATH 155 - Calculus II for the Biological
Sciences (3) **
MATH 158 - Calculus II for the Social
Sciences (3) **

and one of

MATH 232 - Applied Linear Algebra (3)
MATH 240 - Algebra I: Linear Algebra (3)

and one of

BUEC 232 - Data and Decisions I (4)
STAT 270 - Introduction to Probability and
Statistics (3)

and one of

COGS 100 - Exploring the Mind (3)

or one course chosen from the social
sciences electives list in the computing

Lower Division Requirements

Students complete at least 48 units,
including one of

MATH 150 - Calculus I with Review (4)
MATH 151 - Calculus I (3)
MATH 154 - Calculus I for the Biological
Sciences (3) **
MATH 157 - Calculus I for the Social
Sciences (3) **

and one of

MATH 152 - Calculus II (3)
MATH 155 - Calculus II for the Biological
Sciences (3) **
MATH 158 - Calculus II for the Social
Sciences (3) **

and one of

MATH 232 - Applied Linear Algebra (3)
MATH 240 - Algebra I: Linear Algebra (3)

and one of

BUEC 232 - Data and Decisions I (4)
STAT 270 - Introduction to Probability and
Statistics (3)

and one of

COGS 100 - Exploring the Mind (3)

or one course chosen from the social
sciences electives list in the computing

science major program's lower division requirements

** with a grade of at least B+, and with school permission

Computing Science Requirements

~~Students complete at least 19 units, including either~~

~~CMPT 126 - Introduction to Computing Science and Programming (3) **~~

~~or both of~~

~~CMPT 120 - Introduction to Computing Science and Programming I (3) **~~

~~CMPT 125 - Introduction to Computing Science and Programming II (3) **~~

and all of

~~CMPT 150 - Introduction to Computer Design (3)~~

CMPT 225 - Data Structures and Programming (3)

~~CMPT 275 - Software Engineering I (4)~~

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

~~** to aid your choice, prior to enrolment, consult an Applied Sciences Advisor.~~

Linguistics Requirements

Students complete at least nine units,

science major program's lower division requirements

** with a grade of at least B+, and with school permission

Computing Science Requirements

Students complete at least 21 units, including either all of

CMPT 120 - Introduction to Computing Science and Programming I (3)

CMPT 125 - Introduction to Computing Science and Programming II (3)

CMPT 127 - Computing Laboratory (3)

or both of

CMPT 130 - Introduction to Computer Programming I (3)

CMPT 135 - Introduction to Computer Programming II (3)

and all of

CMPT 225 - Data Structures and Programming (3)

CMPT 276 - Introduction to Software Engineering I (3)

CMPT 295 - Introduction to Computer Systems (3)

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

Linguistics Requirements

including all of

LING 220 - Introduction to Linguistics (3)

LING 221 - Introduction to Phonetics and Phonology (3)

LING 222 - Introduction to Syntax (3)

Upper Division Requirements

Computing Science Requirements

Students complete at least 24 units, including all of

CMPT 300 - Operating Systems I (3)

CMPT 307 - Data Structures and Algorithms (3)

CMPT 320 - Social Implications - Computerized Society (3)

CMPT 413 - Computational Linguistics (3)

~~and four courses chosen from the corresponding area as listed in Table I. CMPT 308 and 379 are recommended.~~

Table I - Computing Science Concentrations

ARTIFICIAL INTELLIGENCE

CMPT 310 - Artificial Intelligence Survey (3)

CMPT 340 - Biomedical Computing (3)

CMPT 411 - Knowledge Representation (3)

CMPT 412 - Computational Vision (3)

CMPT 413 - Computational Linguistics (3)

CMPT 414 - Model-Based Computer Vision (3)

CMPT 417 - Intelligent Systems (3)

CMPT 418 - Computational Cognitive Architecture (3)

Students complete at least nine units, including all of

LING 220 - Introduction to Linguistics (3)

LING 221 - Introduction to Phonetics and Phonology (3)

LING 222 - Introduction to Syntax (3)

Upper Division Requirements

Computing Science Requirements

Students complete at least 24 units, including all of

CMPT 300 - Operating Systems I (3)

CMPT 307 - Data Structures and Algorithms (3)

CMPT 320 - Social Implications - Computerized Society (3)

CMPT 413 - Computational Linguistics (3)

and four courses chosen from four distinct concentration areas as listed in Table I. CMPT 308 and 379 are recommended.

Table I - Computing Science Concentrations

ARTIFICIAL INTELLIGENCE

CMPT 310 - Artificial Intelligence Survey (3)

CMPT 340 - Biomedical Computing (3)

CMPT 411 - Knowledge Representation (3)

CMPT 412 - Computational Vision (3)

CMPT 413 - Computational Linguistics (3)

CMPT 414 - Model-Based Computer Vision (3)

CMPT 419 - Special Topics in Artificial Intelligence (3) <i>COMPUTER GRAPHICS AND MULTIMEDIA</i> CMPT 361 - Introduction to Computer Graphics (3) CMPT 363 - User Interface Design (3) CMPT 365 - Multimedia Systems (3) CMPT 461 - Image Synthesis (3) CMPT 464 - Geometric Modelling in Computer Graphics (3) CMPT 466 - Animation (3) CMPT 467 - Visualization (3) CMPT 468 - Introduction to Computer Music and Sound Synthesis (3) CMPT 469 - Special Topics in Computer Graphics (3) <i>COMPUTING SYSTEMS</i> CMPT 300 - Operating Systems I (3) CMPT 305 - Computer Simulation and Modelling (3) CMPT 371 - Data Communications and Networking (3) CMPT 379 - Principles of Compiler Design (3) CMPT 431 - Distributed Systems (3) CMPT 433 - Embedded Systems (3) CMPT 471 - Networking II (3) CMPT 479 - Special Topics in Computing Systems (3) CMPT 499 - Special Topics in Computer Hardware (3) <i>INFORMATION SYSTEMS</i> CMPT 301 - Information Systems Management (3) CMPT 354 - Database Systems I (3)	CMPT 417 - Intelligent Systems (3) CMPT 418 - Computational Cognitive Architecture (3) CMPT 419 - Special Topics in Artificial Intelligence (3) <i>COMPUTER GRAPHICS AND MULTIMEDIA</i> CMPT 361 - Introduction to Computer Graphics (3) CMPT 363 - User Interface Design (3) CMPT 365 - Multimedia Systems (3) CMPT 461 - Image Synthesis (3) CMPT 464 - Geometric Modelling in Computer Graphics (3) CMPT 466 - Animation (3) CMPT 467 - Visualization (3) CMPT 468 - Introduction to Computer Music and Sound Synthesis (3) CMPT 469 - Special Topics in Computer Graphics (3) <i>COMPUTING SYSTEMS</i> CMPT 300 - Operating Systems I (3) CMPT 305 - Computer Simulation and Modelling (3) CMPT 371 - Data Communications and Networking (3) CMPT 379 - Principles of Compiler Design (3) CMPT 431 - Distributed Systems (3) CMPT 433 - Embedded Systems (3) CMPT 471 - Networking II (3) CMPT 479 - Special Topics in Computing Systems (3) CMPT 499 - Special Topics in Computer Hardware (3) <i>INFORMATION SYSTEMS</i>
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CMPT 370 - Information System Design (3) CMPT 441 - Computational Biology (3) CMPT 454 - Database Systems II (3) CMPT 456 - Information Retrieval and Web Search (3) CMPT 459 - Special Topics in Database Systems (3) CMPT 470 - Web-based Information Systems (3) CMPT 474 - Web Systems Architecture (3) <i>PROGRAMMING LANGUAGES AND SOFTWARE</i> CMPT 373 - Software Development Methods (3) CMPT 375 - Mathematical Foundations of Software Technology (3) CMPT 383 - Comparative Programming Languages (3) CMPT 384 - Symbolic Computing (3) CMPT 473 - Software Quality Assurance (3) CMPT 475 - Software Engineering II (3) CMPT 477 - Introduction to Formal Verification (3) CMPT 489 - Special Topics in Programming Language (3) <i>THEORETICAL COMPUTING SCIENCE</i> CMPT 307 - Data Structures and Algorithms (3) CMPT 308 - Computability and Complexity (3) CMPT 404 - Cryptography and Cryptographic Protocols (3) CMPT 405 - Design and Analysis of Computing Algorithms (3) CMPT 407 - Computational Complexity (3) CMPT 408 - Theory of Computing Networks/Communications (3) CMPT 409 - Special Topics in Theoretical Computing Science (3)	CMPT 301 - Information Systems Management (3) CMPT 354 - Database Systems I (3) CMPT 370 - Information System Design (3) CMPT 441 - Computational Biology (3) CMPT 454 - Database Systems II (3) CMPT 456 - Information Retrieval and Web Search (3) CMPT 459 - Special Topics in Database Systems (3) CMPT 470 - Web-based Information Systems (3) CMPT 474 - Web Systems Architecture (3) <i>PROGRAMMING LANGUAGES AND SOFTWARE</i> CMPT 373 - Software Development Methods (3) CMPT 375 - Mathematical Foundations of Software Technology (3) CMPT 383 - Comparative Programming Languages (3) CMPT 384 - Symbolic Computing (3) CMPT 473 - Software Quality Assurance (3) CMPT 475 - Software Engineering II (3) CMPT 477 - Introduction to Formal Verification (3) CMPT 489 - Special Topics in Programming Language (3) <i>THEORETICAL COMPUTING SCIENCE</i> CMPT 307 - Data Structures and Algorithms (3) CMPT 308 - Computability and Complexity (3) CMPT 404 - Cryptography and Cryptographic Protocols (3) CMPT 405 - Design and Analysis of Computing Algorithms (3) CMPT 407 - Computational Complexity (3) CMPT 408 - Theory of Computing
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MACM 300 - Introduction to Formal Languages and Automata with Applications (3)

Linguistics Requirements

Students complete at least 21 units, including both of

LING 321 - Phonology (3)

LING 322 - Syntax (3)

and one of

LING 400 - Formal Linguistics (3)

MACM 300 - Introduction to Formal Languages and Automata with Applications (3)

and 12 units chosen from

LING 323 - Morphology (3)

LING 324 - Semantics (3)

LING 330 - Phonetics (3)

LING 401 - Topics in Phonetics (3)

LING 480 - Topics in Linguistics I (3) *

LING 481 - Topics in Linguistics II (3) *

* when offered with a suitable topic

Elective Courses

In addition to the courses listed above, students should consult an academic advisor to plan the remaining required elective courses.

Other Requirements

Networks/Communications (3)

CMPT 409 - Special Topics in Theoretical Computing Science (3)

MACM 300 - Introduction to Formal Languages and Automata with Applications (3)

Linguistics Requirements

Students complete at least 21 units, including both of

LING 321 - Phonology (3)

LING 322 - Syntax (3)

and one of

LING 400 - Formal Linguistics (3)

MACM 300 - Introduction to Formal Languages and Automata with Applications (3)

and 12 units chosen from

LING 323 - Morphology (3)

LING 324 - Semantics (3)

LING 330 - Phonetics (3)

LING 401 - Topics in Phonetics (3)

LING 480 - Topics in Linguistics I (3) *

LING 481 - Topics in Linguistics II (3) *

* when offered with a suitable topic

Elective Courses

In addition to the courses listed above, students should consult an academic advisor to plan the remaining required

Depending on the student's choice, either a bachelor of arts from the Faculty of Arts and Social Sciences (FASS), or a bachelor of science from the Faculty of Applied Sciences (FAS) will be awarded. Students must fulfil their chosen faculty's distinct requirements.

elective courses.

Other Requirements

Depending on the student's choice, either a bachelor of arts from the Faculty of Arts and Social Sciences (FASS), or a bachelor of science from the Faculty of Applied Sciences (FAS) will be awarded. Students must fulfil their chosen faculty's distinct requirements.

Revision to Molecular Biology and Biochemistry and Computing Science Joint Major

John Edgar and Ingrid Northwood

February 2015

Description

Update Joint Major for changes to the Computing Science and Molecular Biology and Biochemistry curricula.

The substance of the changes is:

1. Add CMPT 127-3 as a required class
2. Remove CMPT 126-3 as an alternative to the CMPT 120, (125 + 127) sequence
3. Add CMPT 130 and CMPT 135 as an alternate sequence of introductory classes
4. Replace CMPT 275 with CMPT 276
5. Add MATH 232 or MATH 240 as a lower division requirement
6. Replace CMPT 150 with CMPT 295
7. Replace MBB 442 with MBB 463

Rationale

1. CMPT 127 was created to address students' lack of programming experience early in the program, which was preventing progress in other classes. With the increased popularity of Computing Science, students are entering the program with less experience than in the past.
2. CMPT 126 has been identical to 125 in practice for the last several years. This course will be refreshed and targeted at non-majors only, and disallowed for majors (except by appeal on transfer in to a CMPT program).
3. To facilitate transfer from the Surrey-based Software Systems program, which requires CMPT 130 and CMPT 135.
4. CMPT 275 is a 4 credit course with a workload that is considered very difficult to manage for both students and instructors. CMPT 276 covers less material and has a smaller project and has been offered successfully at the Surrey campus since 2010. Students who wish to pursue farther studies in this area have a number of upper division options.
5. One of MATH 232 or MATH 240 is a required prerequisite for CMPT 307, which is a required course for the program. The MATH 232 or MATH 240 requirement was omitted by accident in a previous revision.
6. CMPT 150 has no pre-requisites and most students are not sufficiently prepared to address the topics of digital design and assembly language programming. We believe that digital design and computer architecture are subjects that can better be addressed in the second year of studies. CMPT 295 merges topics from CMPT 150 and CMPT 250 that are considered fundamental to an understanding of the digital systems underpinnings of computer systems and updates coverage of these topics.
7. MBB 442 will no longer be offered and will be replaced with a new course, MBB 463 Forensic Genomics. MBB 463 was approved by Senate (S.15-12)

7. MBB 442 will no longer be offered and will be replaced with a new course, MBB 463 Forensic Genomics. MBB 463 was approved by Senate (S.15-12)

Current	Proposed
Lower Division Requirements Students complete a total of 63-70 units including either CMPT 126 - Introduction to Computing Science and Programming (3) or both of CMPT 120 - Introduction to Computing Science and Programming I (3) CMPT 125 - Introduction to Computing Science and Programming II (3) and one of CHEM 282 - Organic Chemistry II (2) CHEM 283 - Organic Chemistry IIb (3) and one of MATH 150 - Calculus I with Review (4) MATH 151 - Calculus I (3) and all of BISC 101 - General Biology (4) BISC 102 - General Biology (4) BISC 202 - Genetics (3) CHEM 121 - General Chemistry and Laboratory I (4)	Lower Division Requirements <u>Students complete a minimum of 68 units including either all of</u> <u>CMPT 120 - Introduction to Computing Science and Programming I (3)</u> <u>CMPT 125 - Introduction to Computing Science and Programming II (3)</u> <u>CMPT 127 - Computing Laboratory (3)</u> <u>or both of</u> <u>CMPT 130 - Introduction to Computer Programming I (3)</u> <u>CMPT 135 - Introduction to Computer Programming II (3)</u> and one of CHEM 282 - Organic Chemistry II (2) CHEM 283 - Organic Chemistry IIb (3) and one of MATH 150 - Calculus I with Review (4) MATH 151 - Calculus I (3) <u>and one of</u> <u>MATH 232 - Applied Linear Algebra (3)</u> <u>MATH 240 - Algebra I: Linear Algebra (3)</u>

~~CMPT 150 - Introduction to Computer Design (3)~~

CMPT 225 - Data Structures and Programming (3)

~~CMPT 275 - Software Engineering I (4)~~

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

MATH 152 - Calculus II (3)

MBB 222 - Molecular Biology and Biochemistry (3)

MBB 231 - Cellular Biology and Biochemistry (3)

STAT 270 - Introduction to Probability and Statistics (3)

and one of

PHYS 101 - Physics for the Life Sciences I (3)

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 125 - Mechanics and Special Relativity (3)

PHYS 140 - Studio Physics - Mechanics and Modern Physics (4)

and one of

PHYS 102 - Physics for the Life Sciences II (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3)

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4)

Upper Division Requirements

Students complete 44-46 units, including all of

CMPT 307 - Data Structures and Algorithms (3)

CMPT 320 - Social Implications - Computerized

and all of

BISC 101 - General Biology (4)

BISC 102 - General Biology (4)

BISC 202 - Genetics (3)

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 122 - General Chemistry II (2)

CHEM 281 - Organic Chemistry I (4)

CMPT 225 - Data Structures and Programming (3)

CMPT 276 - Introduction to Software Engineering I (3)

CMPT 295 - Introduction to Computer Systems (3)

MACM 101 - Discrete Mathematics I (3)

MACM 201 - Discrete Mathematics II (3)

MATH 152 - Calculus II (3)

MBB 222 - Molecular Biology and Biochemistry (3)

MBB 231 - Cellular Biology and Biochemistry (3)

STAT 270 - Introduction to Probability and Statistics (3)

and one of

PHYS 101 - Physics for the Life Sciences I (3)

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 125 - Mechanics and Special Relativity (3)

PHYS 140 - Studio Physics - Mechanics and Modern Physics (4)

and one of

PHYS 102 - Physics for the Life Sciences II (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

Society (3)

CMPT 354 - Database Systems I (3)

CMPT 441 - Computational Biology (3)

MBB 308 - Molecular Biology Laboratory (3)

MBB 331 - Molecular Biology (3)

MBB 342 - Introductory Genomics and
Bioinformatics (3)

STAT 302 - Analysis of Experimental and
Observational Data (3)

and one of

CMPT 376W - Technical Writing and Group
Dynamics (3)

MBB 309W - Biochemistry Laboratory (4)

and at least two of

CMPT 305 - Computer Simulation and
Modelling (3)

CMPT 310 - Artificial Intelligence Survey (3)

CMPT 340 - Biomedical Computing (3)

CMPT 361 - Introduction to Computer
Graphics (3)

MACM 316 - Numerical Analysis I (3)

MBB 321 - Intermediary Metabolism (3)

and at least three of

CMPT 405 - Design and Analysis of Computing
Algorithms (3)

CMPT 413 - Computational Linguistics (3)

CMPT 419 - Special Topics in Artificial
Intelligence (3)

CMPT 454 - Database Systems II (3)

MBB 438 - Human Molecular Genetics (3)

MBB 441 - Bioinformatics (3)

PHYS 126 - Electricity, Magnetism and Light (3)

PHYS 141 - Studio Physics - Optics, Electricity
and Magnetism (4)

Upper Division Requirements

Students complete 44-46 units, including all
of

CMPT 307 - Data Structures and Algorithms (3)
CMPT 320 - Social Implications - Computerized
Society (3)

CMPT 354 - Database Systems I (3)

CMPT 441 - Computational Biology (3)

MBB 308 - Molecular Biology Laboratory (3)

MBB 331 - Molecular Biology (3)

MBB 342 - Introductory Genomics and
Bioinformatics (3)

STAT 302 - Analysis of Experimental and
Observational Data (3)

and one of

CMPT 376W - Technical Writing and Group
Dynamics (3)

MBB 309W - Biochemistry Laboratory (4)

and at least two of

CMPT 305 - Computer Simulation and
Modelling (3)

CMPT 310 - Artificial Intelligence Survey (3)

CMPT 340 - Biomedical Computing (3)

CMPT 361 - Introduction to Computer
Graphics (3)

MACM 316 - Numerical Analysis I (3)

MBB 442 - Proteomics (3) MBB 461 - Comparative Genomics (3) MBB 462 - Human Genomics (3) Students may be required to take an additional elective course to bring their upper division total to 45 units	MBB 321 - Intermediary Metabolism (3) and at least three of CMPT 405 - Design and Analysis of Computing Algorithms (3) CMPT 413 - Computational Linguistics (3) CMPT 419 - Special Topics in Artificial Intelligence (3) CMPT 454 - Database Systems II (3) MBB 438 - Human Molecular Genetics (3) MBB 441 - Bioinformatics (3) MBB 461 - Comparative Genomics (3) MBB 462 - Human Genomics (3) <u>MBB 463 Forensic Genomic (3)</u> Students may be required to take an additional elective course to bring their upper division total to 45 units
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Revision to Molecular Biology and Biochemistry and Computing Science Joint Honours Program

John Edgar and Ingrid Northwood

February 2015

Description

Update Joint Major for changes to the Computing Science and Molecular Biology and Biochemistry curricula.

The substance of the changes is:

1. Add CMPT 127-3 as a required class
2. Remove CMPT 126-3 as an alternative to the CMPT 120, (125 + 127) sequence
3. Add CMPT 130 and CMPT 135 as an alternate sequence of introductory classes
4. Replace CMPT 275 with CMPT 276
5. Add MATH 232 or MATH 240 as a lower division requirement
6. Replace CMPT 150 with CMPT 295
7. Replace MBB 442 with MBB 463

Rationale

1. CMPT 127 was created to address students' lack of programming experience early in the program, which was preventing progress in other classes. With the increased popularity of Computing Science, students are entering the program with less experience than in the past.
2. CMPT 126 has been identical to 125 in practice for the last several years. This course will be refreshed and targeted at non-majors only, and disallowed for majors (except by appeal on transfer in to a CMPT program).
3. To facilitate transfer from the Surrey-based Software Systems program, which requires CMPT 130 and CMPT 135.
4. CMPT 275 is a 4 credit course with a workload that is considered very difficult to manage for both students and instructors. CMPT 276 covers less material and has a smaller project and has been offered successfully at the Surrey campus since 2010. Students who wish to pursue farther studies in this area have a number of upper division options.
5. One of MATH 232 or MATH 240 is a required prerequisite for CMPT 307, which is a required course for the program. The MATH 232 or MATH 240 requirement was omitted by accident in a previous revision.
6. CMPT 150 has no pre-requisites and most students are not sufficiently prepared to address the topics of digital design and assembly language programming. We believe that digital design and computer architecture are subjects that can better be addressed in the second year of studies. CMPT 295 merges topics from CMPT 150 and CMPT 250 that are considered fundamental to an understanding of the digital systems underpinnings of computer systems and updates coverage of these topics.

7. MBB 442 will no longer be offered and will be replaced with a new course, MBB 463 Forensic Genomics. MBB 463 was approved by Senate (S.15-12)

Current	Proposed
Lower Division Requirements	Lower Division Requirements
Students complete a total of 63-70 units including either	<u>Students complete a total of 68-75 units including either all of</u>
CMPT 126 - Introduction to Computing Science and Programming (3)	<u>CMPT 120 - Introduction to Computing Science and Programming I (3)</u>
or both of	<u>CMPT 125 - Introduction to Computing Science and Programming II (3)</u>
CMPT 120 - Introduction to Computing Science and Programming I (3)	<u>CMPT 127 - Computing Laboratory (3)</u>
CMPT 125 - Introduction to Computing Science and Programming II (3)	<u>or both of</u>
and one of	<u>CMPT 130 - Introduction to Computer Programming I (3)</u>
CHEM 282 - Organic Chemistry II (2)	<u>CMPT 135 - Introduction to Computer Programming II (3)</u>
CHEM 283 - Organic Chemistry IIb (3)	and one of
and one of	CHEM 282 - Organic Chemistry II (2)
MATH 150 - Calculus I with Review (4)	CHEM 283 - Organic Chemistry IIb (3)
MATH 151 - Calculus I (3)	and one of
and all of	MATH 150 - Calculus I with Review (4)
BISC 101 - General Biology (4)	MATH 151 - Calculus I (3)
BISC 102 - General Biology (4)	<u>and one of</u>
BISC 202 - Genetics (3)	<u>MATH 232 - Applied Linear Algebra (3)</u>
CHEM 121 - General Chemistry and Laboratory I (4)	<u>MATH 240 - Algebra I: Linear Algebra (3)</u>

CHEM 122 - General Chemistry II (2) CHEM 281 - Organic Chemistry I (4) CMPT 150 - Introduction to Computer Design (3) CMPT 225 - Data Structures and Programming (3) CMPT 275 - Software Engineering I (4) MACM 101 - Discrete Mathematics I (3) MACM 201 - Discrete Mathematics II (3) MATH 152 - Calculus II (3) MBB 222 - Molecular Biology and Biochemistry (3) MBB 231 - Cellular Biology and Biochemistry (3) STAT 270 - Introduction to Probability and Statistics (3) and one of PHYS 101 - Physics for the Life Sciences I (3) PHYS 120 - Mechanics and Modern Physics (3) PHYS 125 - Mechanics and Special Relativity (3) PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) and one of PHYS 102 - Physics for the Life Sciences II (3) PHYS 121 - Optics, Electricity and Magnetism (3) PHYS 126 - Electricity, Magnetism and Light (3) PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) Upper Division Requirements Students complete a total of 54-55 units, including all of	and all of BISC 101 - General Biology (4) BISC 102 - General Biology (4) BISC 202 - Genetics (3) CHEM 121 - General Chemistry and Laboratory I (4) CHEM 122 - General Chemistry II (2) CHEM 281 - Organic Chemistry I (4) CMPT 225 - Data Structures and Programming (3) <u>CMPT 276 - Introduction to Software Engineering I (3)</u> <u>CMPT 295 - Introduction to Computer Systems (3)</u> MACM 101 - Discrete Mathematics I (3) MACM 201 - Discrete Mathematics II (3) MATH 152 - Calculus II (3) MBB 222 - Molecular Biology and Biochemistry (3) MBB 231 - Cellular Biology and Biochemistry (3) STAT 270 - Introduction to Probability and Statistics (3) and one of PHYS 101 - Physics for the Life Sciences I (3) PHYS 120 - Mechanics and Modern Physics (3) PHYS 125 - Mechanics and Special Relativity (3) PHYS 140 - Studio Physics - Mechanics and Modern Physics (4) and one of PHYS 102 - Physics for the Life Sciences II (3) PHYS 121 - Optics, Electricity and Magnetism (3)
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CMPT 307 - Data Structures and Algorithms (3)
CMPT 320 - Social Implications - Computerized Society (3)

CMPT 354 - Database Systems I (3)

CMPT 441 - Computational Biology (3)

MBB 308 - Molecular Biology Laboratory (3)

MBB 331 - Molecular Biology (3)

MBB 342 - Introductory Genomics and Bioinformatics (3)

STAT 302 - Analysis of Experimental and Observational Data (3)

and one of

CMPT 376W - Technical Writing and Group Dynamics (3)

MBB 309W - Biochemistry Laboratory (4)

and at least two of

CMPT 305 - Computer Simulation and Modelling (3)

CMPT 310 - Artificial Intelligence Survey (3)

CMPT 340 - Biomedical Computing (3)

CMPT 361 - Introduction to Computer Graphics (3)

MACM 316 - Numerical Analysis I (3)

MBB 321 - Intermediary Metabolism (3)

and at least three of

CMPT 405 - Design and Analysis of Computing Algorithms (3)

CMPT 413 - Computational Linguistics (3)

CMPT 419 - Special Topics in Artificial Intelligence (3)

CMPT 454 - Database Systems II (3)

PHYS 126 - Electricity, Magnetism and Light (3)

PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4)

Upper Division Requirements

Students complete a total of 54-55 units, including all of

CMPT 307 - Data Structures and Algorithms (3)

CMPT 320 - Social Implications - Computerized Society (3)

CMPT 354 - Database Systems I (3)

CMPT 441 - Computational Biology (3)

MBB 308 - Molecular Biology Laboratory (3)

MBB 331 - Molecular Biology (3)

MBB 342 - Introductory Genomics and Bioinformatics (3)

STAT 302 - Analysis of Experimental and Observational Data (3)

and one of

CMPT 376W - Technical Writing and Group Dynamics (3)

MBB 309W - Biochemistry Laboratory (4)

and at least two of

CMPT 305 - Computer Simulation and Modelling (3)

CMPT 310 - Artificial Intelligence Survey (3)

CMPT 340 - Biomedical Computing (3)

CMPT 361 - Introduction to Computer Graphics (3)

MACM 316 - Numerical Analysis I (3)

MBB 438 - Human Molecular Genetics (3) MBB 441 - Bioinformatics (3) MBB 442 - Proteomics (3) MBB 461 - Comparative Genomics (3) MBB 462 - Human Genomics (3) and six additional 400 division computing science units and six research related MBB units which are fulfilled by completing MBB 496-6	MBB 321 - Intermediary Metabolism (3) and at least three of CMPT 405 - Design and Analysis of Computing Algorithms (3) CMPT 413 - Computational Linguistics (3) CMPT 419 - Special Topics in Artificial Intelligence (3) CMPT 454 - Database Systems II (3) MBB 438 - Human Molecular Genetics (3) MBB 441 - Bioinformatics (3) MBB 461 - Comparative Genomics (3) MBB 462 - Human Genomics (3) <u>MBB 463 Forensic Genomic (3)</u> and six additional 400 division computing science units and six research related MBB units which are fulfilled by completing MBB 496-6
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MEMORANDUM

ATTENTION	Senate Committee for Undergraduate Studies, SFU	DATE	February 23, 2015
FROM	Carl Lowenberger, Chair, Science UCC		
RE:	Supporting documentation for removing MBB 442 and replacing with MBB 463 in both Joint Major and Joint Honours, MBB and Computing Science		

For the March 2015 SCUS meeting

The Faculty of Science UCC has passed the motion to support the calendar changes brought forward by Computing Science for removing MBB 442 and substituting with MBB 463 in both Joint Major and Joint Honours with MBB and Computing Science.