THE UNIVERSITY OF BRITISH COLUMBIA

April 2, 2009

CURRICULUM COMMITTEE
Vancouver Senate
2016 - 1874 East Mall
Vancouver, B.C. Canada V6T 1Z1

To: Vancouver Senate

From: Senate Curriculum Committee

Re: April Curriculum Proposals **(approval)**

The Senate Curriculum Committee has reviewed the material forwarded to it by the Faculties and encloses those proposals it deems as ready for approval.

As such, the following is recommended to Senate:

Motion: *That the curriculum proposals brought forward by the Faculties of Applied Science, Graduate Studies (College for Interdisciplinary Studies, Land & Food Systems, and Science), and Science be approved.*

Respectfully submitted,

Peter Marshall, Chair
Senate Curriculum Committee

THE UNIVERSITY OF BRITISH COLUMBIA

Vancouver Senate Curriculum Committee
c/o
Enrolment Services | Senate & Curriculum Services
Brock Hall 2016 – 1874 East Mall | Vancouver BC | V6T 1Z1
jonathan.preston@ubc.ca | PH 604.822.9134 | FX 604.822.5945

2 April 2009

To: Vancouver Senate

From: Senate Curriculum Committee

RE: Faculty of Applied Science

Attached please find proposals for a new course and a calendar change for your consideration.

New Course

MINE 488 (3)

Calendar Change

Pre-Med Alternative Path

UBC Curriculum Proposal Form
Change to Course or Program

Category: (1)

Faculty: Applied Science **Department:** **Faculty Approval Date:** **Effective Session:** September 2009	**Date:** January 28, 2009 **Contact Person:** Michael Hitch **Phone:** 604-827-5089 **Email:** mhitch@mining.ubc.ca
Proposed Calendar Entry: **MINE 488 (3)** Heavy Oil Sand Mining and Processing Life cycle of the production of Oil Sands resources, including mining, bitumen extraction and reclamation. [2-3-0] *Prerequisite*: None	**URL:** N/A **Present Calendar Entry:** N/A **Type of Action:** New Course **Rationale:** The recovery of oil from Oil Sands deposits is a unique area of mining that is growing in importance to Canada's economy. This course will raise awareness of the uniqueness of this resource and prepare students to meet the challenges in this growing industry.

UBC Curriculum Proposal Form
Change to Course or Program

Category: 1

Faculty: Applied Science **Department: -** **Faculty Approval Date:** March 9, 2009 **Effective Session** _09_ **Term** 1 Year**_2009_** for Change	**Date:** 9 March 2009 **Contact Person:** Bruce Dunwoody **Phone:** 2-6556 **Email:** bruce.dunwoody@ubc.ca
Proposed Calendar Entry: **Pre-Med Alternative Path** This alternative path is intended for students with an engineering background wishing to apply to medical schools. It provides access to courses required by many medical schools for students to be considered for admission. Registration in this alternative path is very competitive and is limited. Students in this path follow the same requirements for first year engineering with the following modifications, where they take: • (APSC 151, CHEM 121 and CHEM 123) instead of (APSC 150 and CHEM 154). • a first-year English course (ENGL 110, 111, 120 or 121) in place of a humanities elective. This is in addition to the required ENGL 112. The following courses are also required after first year: • BIOL 121, BIOL 140, CHEM 205, CHEM 233 and CHEM 235. • BIOC 300 Special standard timetables are available for first year courses. Given the additional courses taken over and above the engineering degree, students should on the average expect an additional term to complete these course requirements along with their engineering degree requirements. Some courses may be offered in the summer term. Some programs may accept selected courses above as part of their degree	**URL:** www.students.ubc.ca/calendar/index.cfm?tree=12,195,272,33 **Present Calendar Entry:** There is currently no Calendar entry. This Calendar entry will appear just below the **Dual Degree Program in Arts and Applied Science** entry. **Type of Action:** Add text. **Rationale:** This proposal is for an undergraduate alternative path that allows engineering students organized access to courses required for application to medical school while completing their accredited engineering degree. While this alternative path will be clearly appreciated by engineering students, it will also help diversify the pool of applicants to medical schools, something that medical schools are working to achieve. By allowing more engineering students to qualify for application to medical schools, we hope to provide technology-savvy candidates who will be at ease in today's highly technological medical field.

requirements thus reducing the additional time needed. Consult the specific calendar entry for these programs for details. Different medical schools have different course requirements. Students are strongly advised to verify the course requirements with prospective medical schools. It should also be noted that the course requirement is only one of the criteria used by medical schools to assess applications. It is the student's responsibility to inform themselves of the applicable criteria.	

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2 April 2009

To: Vancouver Senate

From: Senate Curriculum Committee

RE: Graduate Proposals

Attached please find proposals for new courses, a calendar change, and a new dual degree program for your consideration.

College for Interdisciplinary Studies

New Dual Degree Program

M.A.A.P.S./M.A.P.

Graduate Studies

Calendar Change

Grading Practices

Land & Food Systems

New Course

ANSC 549 (12/18)

Science

New Courses

BIOC 549 (18)
EOSC 516 (2)
PHYS 560 (3)

UBC Curriculum Proposal Form
Change to Course or Program

Category: 1

Faculty: College for Interdisciplinary Studies **Department:** Institute of Asian Research **Faculty Approval Date: March 18, 2008** **Effective Session** Winter Session, First Term 2009	**Date:** October 25, 2007 **Contact Person:** Michael Leaf **Phone:** 2-3288 **Email:** leaf@interchange.ubc.ca [corrected 10/08; 2/09]
Proposed Calendar Entry: **Master of Arts in Asia-Pacific Policy Studies / Master of Arts in Planning** **Members** **Professors** T. Brook, T. Cheek, A. H. J. Dorcey, P. Evans, T. A. Hutton, P. C. Gurstein, T. L. McDaniels, M. Nakamura, P. Potter, W. E. Rees, L. Sandercock, H. Schreier I. Vertinsky. **Associate Professors** L. C. Angeles, S. E. Chang, L. D. Frank, M. Kandlikar, A. Kusno, M. Leaf, K. A. Park. **Assistant Professors** A. Bailey, J. Dierkes, M. Fryer, H. G. Lynn, M. W. Senbel, T. Shakya. This program enables students to obtain the MAAPS and MAP degrees through a concurrent course of study. The program enables students enrolled in Asia-Pacific Policy Studies and in Planning to pursue a specialized curriculum in community and	**URL:** **http://www.students.ubc.ca/calendar/index.cfm?tree=12,287,873,1386** **Present Calendar Entry:** N/A **Type of Action:** New Program under section of Calendar: Dual Degree Programs. http://www.students.ubc.ca/calendar/index.cfm?tree=12,204,828,1405 **Rationale:** The Asia-Pacific Region is experiencing the greatest transformation in its long history. Urbanization is happening at a phenomenal speed in both relative and absolute numbers, leading to huge population displacements, environmental problems, and political change. The economic centre will be shifting from West to East. There is no question that Asia Pacific Policy Studies combined with community, urban, regional and environmental studies, which is what SCARP can offer, will lead qualified individuals to find professional work in this interconnected world. Graduates from the new dual MAAPS/MAP would qualify for appointments to government departments at all hierarchical levels as well as non-profit organizations. At the same time, there are substantial opportunities for

regional planning (leading to an accredited professional degree) and Asia-Pacific Policy Studies. **Admission Requirements:** Students wishing to pursue the MAAPS/MAP dual degree program must be admitted separately to Asia-Pacific Policy Studies for the MAAPS degree and to Planning for the MAP degree. Those seeking admission to the dual degree program must provide notice to this effect in their applications to IAR and SCARP, indicating in writing their desire to enroll in the MAAPS/MAP program and the desired areas of specialization in both. Students wishing to transfer to the MAAPS/MAP program from another UBC program must satisfy all requirements for admission to Asia-Pacific Policy Studies (http://www.iar.ubc.ca/mapps/programdetails/admission.aspx) and to Planning (http://www.scarp.ubc.ca/masadmis.htm#Core). This may involve separate graduate study applications to FoGS if the student is not currently registered in a graduate program. Enrollment in the dual degree program requires the consent of the Director of IAR and the Director of SCARP. **Program Requirements:** Students in the MAAPS/MAP dual degree program are required to complete all course requirements for graduation in both Master's programs, subject to the following modifications: • Completion of IAR 500 will count for six credits towards MAAPS and six credits towards MAP degrees • 6 credits of coursework in MAP will be counted towards MAAPS electives. • Students are required to complete either a 12-credit thesis or a 12-credit	employment in the private sector. The research elements of the program—a thesis in planning and a field research exercise or Practicum in MAAPS will enable graduates to be well prepared for admission to doctoral programs if they so desire.

practicum.

With these modifications, a total of 78 credits are required for graduation, Total Credits:
78 (MAAPS:30// MAP: 48)

The MAAPS and MAP will be conferred at the completion of the dual program after all requirements for both degrees have been met. Students who choose to receive either the MAAPS or the MAP prior to completion of the dual degree program may apply for one of the degrees provided all requirements for that degree have been satisfied. Students selecting this option must withdraw from the dual degree program.

Contact Information

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C.K. Choi Building, 251–1855 West Mall
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Tel: 604.822.3801
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Web: www.iar.ubc.ca/mapps
Nilda Oñate, M.A.A.P.S. Graduate Secretary

UBC Curriculum Proposal Form
Change to Course or Program

Category: (1)

Faculty: Graduate Studies
Department: Dean's Office
Faculty Approval Date:

Effective Session _summer___ Term _1__ Year_2009__ for Change

Date: February 9, 2009
Contact Person: Joyce Tom
Phone: 2-6965
Email: joyce.tom@ubc.ca

Proposed Calendar Entry:

Grading Practices* > *Introduction

In most faculties, individual courses are normally graded as follows:

Percentage (%)	Letter Grade
90–100	A+
85–89	A
80–84	A-
76–79	B+
72–75	B
68–71	B-
64–67	C+
60–63	C
55–59	C-
50–54	D
0–49	F (Fail)

Instructors are responsible for providing written guidelines to all students at the start of each course, outlining how the final grade for the course will be calculated, and including any related policies such as arrangements that may be made for students who are unable to complete a test or other graded work because of short term illness or for other reasons. Guidelines made available on the Web meet this requirement (students who are unable to access the Web should ask their instructor to provide these guidelines in an **alternative** format).

If a student in a baccalaureate program who receives a "T" standing in a graduating essay or other course approved by the faculty completes the course within 12 months of the end of the term in which the student first registered for the course the "T" standing will be replaced by the grade assigned. If the course is not completed within 12 months the "T" standing will be replaced by a grade of zero (or "F" standing in a Pass/Fail course).

The **Faculty** of Dentistry, the Schools of Library,

URL:

http://www.students.ubc.ca/calendar/index.cfm?tree=3,42,96,0

Present Calendar Entry:

Page 54, column 2

Grading Practices* > *Introduction

In most faculties, individual courses are normally graded as follows:

Percentage (%)	Letter Grade
90–100	A+
85–89	A
80–84	A-
76–79	B+
72–75	B
68–71	B-
64–67	C+
60–63	C
55–59	C-
50–54	D
0–49	F (Fail)

Instructors are responsible for providing written guidelines to all students at the start of each course, outlining how the final grade for the course will be calculated, and including any related policies such as arrangements that may be made for students who are unable to complete a test or other graded work because of short term illness or for other reasons. Guidelines made available on the Web meet this requirement (students who are unable to access the Web should ask their instructor to provide these guidelines in an **alternate** format).

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Archival and Information Studies, Nursing, and Rehabilitation Sciences, define Fail (F) as below 60%.

For master's students registered in the Faculty of Graduate Studies, Fail (F) for individual courses is defined as below 60%:

Percentage (%)	Letter Grade
90–100	A+
85–89	A
80–84	A-
76–79	B+
72–75	B
68–71	B-
64–67	C+
60-63	C
0–59	F (Fail)

However, only 6 credits of pass standing (60-67%) may be counted towards a master's program. For all other courses, a minimum of 68% must be obtained. Some graduate programs may require a higher passing grade for specific courses.

For doctoral students registered in the Faculty of Graduate Studies, Fail (F) for individual courses is defined as below 68%. Some graduate programs may require a higher passing grade for specific courses.

Percentage (%)	Letter Grade
90–100	A+
85–89	A
80–84	A-
76–79	B+
72–75	B
68–71	B-
0–67	F (Fail)

In the Faculty of Medicine, individual courses in the Doctor of Medicine undergraduate program are graded on an Honours (H), Pass (P), Fail (F) system. The Faculty defines Fail as below 60% and a Pass as 60% or greater, but below Honours. An Honours grade is assigned by individual course directors and approved by the promotions committee.

Faculties, departments and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department or school. Grades are not official until they appear on a student's academic record.

The **Faculties** of Dentistry ~~**and Graduate Studies**~~ **and the Schools of Library** ~~**and**~~ **Archival Studies,** Nursing, and Rehabilitation Sciences, define Fail (F) as below 60%.

In the Faculty of Medicine, individual courses in the Doctor of Medicine undergraduate program are graded on an Honours (H), Pass (P), Fail (F) system. The Faculty defines Fail as below 60% and a Pass as 60% or greater, but below Honours. An Honours grade is assigned by individual course directors and approved by the promotions committee.

Faculties, departments and schools reserve the right to scale grades in order to maintain equity among sections and conformity to University, faculty, department, or school norms. Students should therefore note that an unofficial grade given by an instructor might be changed by the faculty, department or school. Grades are not official until they appear on a student's academic record.

Type of Action:

- add statements and tables describing grading for master's and doctoral students http://www.students.ubc.ca/calendar/index.cfm?tree=3,42,96,0
- add tables describing grading for master's and doctoral students in FGS chapter http://www.students.ubc.ca/calendar/index.cfm?tree=12,204,342,615
- correct typographical errors

Rationale:

The change makes the description in this part of the Calendar consistent with the current requirements described in the Faculty of Graduate Studies section of the Calendar for master and doctoral students. http://www.students.ubc.ca/calendar/index.cfm?tree=12,204,342,615

UBC Curriculum Proposal Form
Change to Course or Program

Category: (1)

Faculty: Land & Food Systems/Graduate Studies **Department: Animal Science** **Faculty Approval Date: June 26, 2008** **Effective Session: 08W**	**Date: December 11, 2008** **Contact Person: Marina von Keyserlingk (Graduate Advisor)** **Phone: 822-2040** **Email: nina@interchange.ubc.ca**
Proposed Calendar Entry: **ANSC 549 (12/18)C Master's Thesis**	**URL: ANSC 549** **Present Calendar Entry:** **ANSC 549 (12) Master's Thesis** **Type of Action:** Change credits for MSc thesis to include an 18 credit option as well as the 12 credit option. **Rationale:** Students who are planning a professional career will typically enroll in the 12 credit thesis option; thus, requiring a minimum of 18 credits of course work to complete the 30 credits required for the completion of the degree. This 18 credit thesis option will be particularly appropriate for students considering a PhD program and/or a research career.
Proposed Calendar Entry: **Master of Science ……** **Program Requirements** Completion of the M.Sc. program requires a thesis (12 or 18 credits) plus coursework, for a total of 30 credits. With a 12 credit thesis, students can include a maximum of 6 credits senior undergraduate courses. With an 18 credit thesis, students can include a maximum of 3 credits senior undergraduate courses. Students who are planning a professional career will typically enroll in the 12 credit thesis option. The 18 credit value option requires a more intensive research experience and is more appropriate for students considering the PhD program or research career. The	**URL:** **http://www.students.ubc.ca/calendar/index.cfm?tree=12,204,828,1113** **Present Calendar Entry:** **Master of Science ……** **Program Requirements** Completion of the M.Sc. program requires a minimum of 18 credits of coursework, plus 12 credits of thesis research. **Type of Action:** Change course credit allocation within the ANSC M.Sc. program to allow students with an intensive research experience to complete an 18 credit thesis and reduce their coursework from 18 credits to 12

thesis credit decision should be determined in consultation with the student and research advisor.	(maximum 3 credits of senior undergraduate courses). The total credits assigned to the M.Sc. in Animal Science remains at 30. **Rationale:** See rationale for ANSC 549 (12) Master's Thesis curriculum change (above).

Contact: Dr. Bill Ramey
Phone: 822-3300

Faculty Approval Date:

Email: wramey@interchange.ubc.ca

BIOCHEMISTRY

Effective Date for Change: 09WT1

Proposed Calendar Entry:

BIOC 549 (**18**) M.Sc. THESIS

Present Calendar Entry:

BIOC 549 (~~12~~) M.Sc. THESIS

Action: Credit value of the BIOC 549 M.Sc. Thesis is changed from 12 to 18 credits.

Rationale: The M.Sc. Thesis in Biochemistry and Molecular Biology represents a rigorous 2-3 year program of laboratory research and subsequent publication of the results obtained. Research activities toward the thesis make up >80% of a student's effort in the program. This is inconsistent with the M.Sc. thesis currently being assigned only 40% of the 30 credits of the degree. Furthermore, since the thesis portion of the M.Sc. degree is assigned too few credits in relation to the time commitment involved, students must take additional formal courses into their second year, significantly infringing on research time. A departmental decision has been made to more appropriately recognize the current effort students make to the M.Sc. thesis by assigning it 18 credits. This action will also bring our M.Sc. thesis credit value in line with other related research intensive departments -- CHEM 549 (18), ZOOL 549 (18), CELL 549 (18), BOTA 549 (18). This change will have no impact on the budget or the library because the course requirements are unchanged.

Supporting Documents: SCI-08-2-BIOC 549

EARTH & OCEAN SCIENCES	
Effective Date for Change: 09WT1 **Proposed Calendar Entry:** **EOSC 516 (2) TEACHING AND LEARNING IN EARTH AND OCEAN SCIENCES. (pass/fail)**	**Present Calendar Entry:** New course **Action:** add new course with pass/fail grading **Rationale:** Teaching is very important to the Earth and Ocean Sciences Department. Thus, like other departments in Science (notably, Physics, Biology, and Mathematics) EOS is developing a course on Teaching and Learning for graduate students in Earth and Ocean Sciences. This course will allow us to fulfill the training of graduate students for the specific demands in their discipline and prepare for university teaching. The course will be evaluated as pass/fail. **Supporting Documents: SCI-08-2-EOSC 516**

PHYSICS & ASTRONOMY	
Effective Session 09WT1 **Proposed Calendar Entry:** **PHYS 560 (3) PHYSICS AND ENGINEERING OF PARTICLE ACCELERATORS.** **Injectors, radio frequency acceleration, superconducting acceleration elements, beam dynamics and applications of electron accelerators.** **[**	**Present Calendar Entry**: None. **Type of Action:** Add new graduate course **Rationale:** Accelerator Physics has long been offered as an area of research for graduate students in the Department of Physics and Astronomy, but course offerings have typically been once every few years, offered as a Directed Studies special topic course (it is currently offered as PHYS 555B 207). With the recent expansion of TRIUMF's Accelerator Physics research program, and plans to construct a superconducting electron accelerator, a graduate course in Accelerator Physics should be formalized. **Supporting Documents: SCI-08-2-PHYS 560**

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2 April 2009

To: Vancouver Senate

From: Senate Curriculum Committee

RE: Faculty of Science

Attached please find proposals for new courses and for calendar changes for your consideration.

New Courses

BIOL 340 (3)
BIOL 341 (2)
CPSC 110 (4)
CPSC 210 (4)
CPSC 301 (3)

Calendar Changes

MATH 100 (3)
MATH 102 (3)
MATH 104 (3)
MATH 180 (4)
MATH 184 (4)

Contact: Dr. Bill Ramey **Faculty Approval Date:**
Phone: 822-3300 **Email: wramey@interchange.ubc.ca**

BIOLOGY

Effective Date for Change: 09WT1

Proposed Calendar Entry:

…

BIOL 340 (2) Introductory Cell Biology Laboratory.

Experiments using unicellular eukaryotes or prokaryotes with emphasis on techniques in microscopy and cell biology.
Prerequisite: BIOL 140, BIOL 200 and at least third year standing in Science [1-3-0].
…

Present Calendar Entry:

None

Action: New course.
Rationale: One of the objectives of the current revision of the biology program is to provide a core laboratory experience for all students in their main area of interest at the third year level. This is one of a pair of courses that introduces techniques in cell and molecular biology. The emphasis on this course is design of experiments and acquisition of basic manipulative and observational skills in cell biology. The companion course BIOL 341 introduces basic molecular biology techniques for DNA manipulation. To this point these skills have only been taught in smaller courses, and many students whose interests are chiefly in the cell and molecular biology area do not presently receive laboratory instruction in these areas. This proposal is to incorporate the teaching of cell and molecular biology techniques as a core component of the program.

The first offering of BIOL 340 is intended for 09WT1 where along with BIOL 341 it will provide a panel of 2 courses that can be used to replace BIOL 360 in the CGBI program. BIOL 360 will continue to be offered for one more year but will be eliminated for 10W, after which time BIOL 340 and 341 will act as third year laboratories for students in CGBI.
Supporting Documents: SCI-08-2-BIOL 340

Effective Date for Change: 09WT2 **Proposed Calendar Entry:** … **BIOL 341 (2) Introductory Molecular Biology Laboratory.** **Use of recombinant DNA techniques. Prerequisite: BIOL 200 and at least third year standing in Science. [1*-4-0]** **…**	**Present Calendar Entry:** None **Action:** New Course **Rationale:** Over the last 20 years the techniques of molecular biology have become pervasive in many areas of the Biological Sciences, having applications in sub-fields such as ecology, evolutionary biology, physiology, cell biology, and genetics. However, the only existing UBC laboratory courses focusing on this area that are available to students in the Biology Program are taught at a relatively advanced level to small numbers of specialist students. The proposed course will fill this void in our offerings by providing an introductory course that will be available to a much larger number of students, enhancing course availability, flexibility in programming, and experiential learning for students. The first offering of BIOL 341 is intended for 09WT2 where along with BIOL 340 it will provide a panel of 2 courses that can be used to replace BIOL 360 in the CGBI program. BIOL 360 will continue to be offered for one more year but will be eliminated for 10W, after which time BIOL 340 and 341 will act as third year laboratories for students in CGBI. **Supporting Documents: SCI-08-2-BIOL 341**

COMPUTER SCIENCE	
Effective Date for Change: 09WT1 **Proposed Calendar Entry:** **CPSC 110 (4) Computation, Programs and Programming** **Fundamental program and computation structures. Introductory programming skills. Computation as a tool for information processing, simulation and modeling, and interacting with the world. Prerequisite: Principles of Mathematics 12. [3-3-0]**	**Present Calendar Entry:** None. **Action:** New course. **Rationale:** We propose a new introductory course in Computer Science. Together with a companion proposal for CPSC 210, these two courses are intended to replace the existing CPSC 111, CPSC 211 sequence. Computation, programs and programming play a vital role in the work of scientists and other professionals: they allow us to gather data; develop computational models and simulations; organize, store, analyze and visualize information, and so on. (Not to mention sending email, connecting on Facebook and browsing the web.) The goals of this course are to provide students with the knowledge and skills to write programs of their own, as well as to understand more deeply how computation and programs work. We aim to prepare students for further course-based and independent learning of Computer Science skills and concepts. We also aim to present this material in a way that is interesting, accessible and useful to a wide range of students. **Supporting Documents: SCI-08-2-CPSC 110**

Effective Date for Change: 09WT1 **Proposed Calendar Entry:** **CPSC 210 (4) Software Construction** **Design, development and analysis of robust software components. Topics such as software design, computational models, data structures, debugging and testing. Prerequisite: One of CPSC 110, CPSC 260. [3-2-0]**	**Present Calendar Entry:** None. **Action:** New course. **Rationale:** Together with a companion proposal for CPSC 110, these courses are intended to replace the existing CPSC 111, 211 sequence. Software systems are amongst the most complex systems ever built by humans. Two fundamental concepts central to supporting the construction and evolution of software systems are abstraction and decomposition. Building on the introduction to these concepts in a prerequisite course (i.e., CPSC 110 or CPSC 260), CPSC 210 will explain how these concepts manifest over and over again in different forms as we build larger and larger computations and systems. CPSC 210 will describe how software systems students interact with everyday (as well as other systems surrounding them) work. The course will demonstrate some of the essential complexities and intellectual challenges of developing software systems that solve real problems. Students will gain the knowledge and skills to build and modify programs of non-trivial size (i.e., thousands of lines of code). **Supporting Documents: SCI-08-2-CPSC 210**

Effective Date for Change: 09WT1 **Proposed Calendar Entry:** **CPSC 301 (3) COMPUTING IN THE LIFE SCIENCES** **Basic concepts, tools and techniques for working with scientific data at larger scales, higher speeds and lower costs that would otherwise be impossible. Applications and examples drawn from the life sciences. No prior computing background is required. Not for credit for students who have credit for any of the following: APSC 160, Computer Science AP, CPSC 110, CPSC 111, EOSC 211 or transfer credit equivalent to CPSC 111.** **Prerequisites: One of MATH 101, 103, 105, 121 or Science One. Third year standing or higher. [3-2-0]**	**Present Calendar Entry:** None. **Action:** New course. **Rationale:** Although they are very good at it, computers are not just for word processing and networks are not just for downloading music. Computer science is the study of process, and when a process is automated the results can be revolutionary; for example, consider the explosion of gene sequence data since the advent of automated sequencing. Computer algorithms are increasingly in control of our lives in obvious – such as Google – and sometimes not so obvious – such as consumer credit ratings – ways. The inevitable conclusion is that computers and their networks are vital tools for creation, collection, analysis, visualization and storage of data throughout all fields of the sciences, arts, business, and engineering. Unfortunately, the computer fluency of many students is limited to tools like word processors and web browsers. A symptom of this lack of basic computing knowledge is the slow, frustrating and error-prone but all too common practice of manually transcribing data between applications, either by cut and paste or by typing numbers, simply because the two applications use different storage formats. While there are other computing courses throughout the Faculty of Science, these classes are focused on programming skills, are discipline dependent, and/or require numerous prerequisites. Designed for students with no previous university level computing experience, this course will introduce general concepts of information storage, transmission, retrieval, manipulation and visualization. The emphasis will be on practical tools and techniques, with applications and examples drawn from throughout science but in particular from the life sciences. **Supporting Documents: SCI-08-2-CPSC 301**

MATHEMATICS	
Effective Date for Change: 09WT1 **Proposed Calendar Entry:** MATH 100 (3) Differential Calculus with Applications to Physical Sciences and Engineering … Prerequisite: **High-school calculus and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 (or equivalent), (b) a score of 73% or higher in the BC provincial examination for Principles of Mathematics 12, or (c) a satisfactory score in the UBC Mathematics Basic Skills Test.**	**Present Calendar Entry:** MATH 100 (3) Differential Calculus with Applications to Physical Sciences and Engineering … Prerequisite: ~~High-school calculus and a score of 67% of higher in Principles of Mathematics 12~~ **Action:** Change prerequisite requirement. **Rationale:** Currently, the non honours, single-term first-year UBC differential-calculus courses MATH 100, 102, 104, 180, and 184 ("CA1" for short) require a score of 67% or higher in BC Principles of Math 12 ("PM12") or equivalent. The first three CA1 courses are taken by students who have completed a calculus course in high school, and the last two by those who have not. The PM12 grade for BC students has been the blended grade computed as 60% school grade and 40% provincial exam. This proposal to strengthen the prerequisite arises from two concerns: (1) Historical data given in the attached Table 1 show that Year-1 students with PM12 grades between 67% and 79% are at high risk of failing a CA1 course. The risk is especially high, around 50% overall, for students with a grade between 67% and 72%. These at-risk students will, under the proposed new prerequisite, be given an assessment test and if necessary be placed into MATH 110, a new course designed specifically for students with a poor high-school mathematics background. Ultimately, MATH 110 reaches the same level as the CA1 courses but in two terms instead of one, with the extra time being used for a review of necessary high-school material. Note that the number of at-risk students is small in MATH 100, 102, and 104, but relatively high in MATH 180 and 184. (2) BC students will be admitted to UBC in 2009W without having to write the provincial

	exams in their provincially examinable Grade-12 courses, with the exception of English 12. It is expected that most students will present a PM12 grade based purely on their school's evaluation. In Table 2, a comparison of school grades versus provincial-exam grades is given for Year-1 MATH 180 and 184 students in 2007W. The first two blocks of the table show that 83% of students with a grade between 73% and 79% in the provincial exam passed MATH 180 or 184 whereas only 81% of those with a school grade *between 80% and 85%* passed (note from Table 1 that these 2007W passing percentages are anomalously high). Also, the relatively small number of students with low school grades in the top block of Table 2 means that for at-risk students school grades cannot be used very effectively as predictors of success in CA1. The bottom two blocks of Table 2 show that the average school grade was about 5.5 points higher than the average provincial-exam grade, with the discrepancy greater for students with the lowest PM12 grades. The 7-point difference between options (a) and (b) in the proposed prerequisite is justified by the data in Table 2. In fact, over time as schools have both less incentive to and less data with which to standardize their grades, school grades may become further inflated and the level in option (a) may have to be increased. A 1977 study by George Bluman and Warren Smith (see www.math.ubc.ca/~gupta/BlumanSmith.pdf) suggests that the current half-letter-grade difference may eventually increase to a full letter grade. A basic skills test administered to all MATH 180 and 184 students in 2007W and 2008W was used to advise students but not to forcibly place them in remedial courses such as MATH 110. This test will be used for option (c) (see below for implementation details). Table 3 gives correlative data for the basic skills test administered in 2007W. Comparison with the top block of Table 2 shows that this test was a much better predictor of student success than PM12 school grades.

	In summary, the new prerequisite change will more effectively identify at-risk students, especially with provincial exams not required. The vast majority of UBC students are adequately prepared to take and succeed in CA1 courses, but the new process will allow the Mathematics Department to identify those 5% to 10% who are not. Standards in CA1 courses will not be raised as a result of the prerequisite change; rather the change is meant to allow the current standards to be maintained while at the same time improving outcomes for poorly prepared students by directing them into MATH 110. *Implications and Implementation Details:* Table 4 shows that 86% of Year-1 CA1 students in 2007W satisfied option (a) in the proposed prerequisite. The percentage varies considerably by students' degree/faculty. Approximately 93% of 2007W CA1 students were in Year 1, and 99% had a PM12 or equivalent grade on record. The percentage 86% becomes approximately 68% for students in Year 2, 3, or 4, but these percentages will increase somewhat as blended PM12 grades are replaced by school grades. Overall, well over 85% of all CA1 students will satisfy option (a) and be unaffected by this change. Students who do not satisfy the thresholds in options (a) or (b) will be required to initially register in MATH 110 and then take the basic skills test. If they achieve a satisfactory score on the test, they will be required to change their registration to a CA1 course. It is expected that perhaps half of the students who do not satisfy (a) or (b) and initially register in MATH 110 would subsequently be moved to a CA1 course. There will be many more CA1 sections than MATH 110 sections, so it will be relatively easy to move students from MATH 110 to CA1 than vice-versa. The basic skills test will be administered as a paper test. Three sittings are planned — one in early July, one in the week preceding the start of classes in September, and one in the first week

	of classes. All students will be allowed to write the test. Students who must take the test or choose to do so will be encouraged to take it at the earliest possible sitting. It is expected that a large proportion of students will be able to take the test in one of the first two sittings, before the start of classes. Students will be allowed to take the test only once. Students who satisfy (a) or (b) but choose to take the basic skills test may be allowed to move from a CA1 course to MATH 110, depending on their score on the test. Students who barely meet the thresholds in (a) or (b) will be encouraged to write the test. Overqualified students will be prevented from taking MATH 110. Students will be screened based on their high-school mathematics grades and/or their basic-skills-test score. According to Enrolment Services, the UBC student registration system permits the checking of PM12 or equivalent grades before allowing a student to register into a CA1 course. This capability will be used in the implementation described above. Simon Fraser University (see www.math.sfu.ca/ugrad/calctest) has had in place a prerequisite scheme similar to the one proposed here for a few years. SFU students are required to write the SFU Calculus Readiness Test in person in a computer lab. The possibility of synchronizing SFU's test with our own basic skills test, thereby reducing the amount of administrative work for both institutions, is under discussion with SFU. **Supporting Documents**: **SCI-08-2-MATH 100**

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TABLE 1

CALCULUS-1 STUDENTS IN YEAR 1 WITH A BC PRINCIPLES OF MATHEMATICS 12 (PM12) GRADE

MATH 100: Number of students with PM12 grade in given range and percentage who passed

PM12	2007W		2006W		2005W		2004W		2003W		AVERAGE	
86-100	648	97%	654	98%	527	98%	637	97%	744	94%	642	96%
80-85	99	92%	91	87%	85	81%	84	86%	89	76%	90	85%
73-79	32	84%	31	58%	33	67%	33	85%	34	62%	33	71%
67-72	2	50%	6	50%	5	60%	3	67%	5	60%	4	57%

MATH 102: Number of students with PM12 grade in given range and percentage who passed

PM12	2007W		2006W		2005W		2004W		2003W		AVERAGE	
86-100	299	97%	323	93%	346	97%	280	92%	241	93%	298	94%
80-85	46	85%	55	76%	37	78%	37	84%	13	77%	38	80%
73-79	26	85%	18	61%	7	71%	9	78%	2	100%	12	76%
67-72	5	80%	3	100%	0		8	50%	0		3	69%

MATH 104: Number of students with PM12 grade in given range and percentage who passed

PM12	2007W		2006W		2005W		2004W		2003W		AVERAGE	
86-100	357	97%	373	96%	328	93%	313	95%	304	97%	335	96%
80-85	90	90%	81	89%	72	75%	75	95%	88	93%	81	89%
73-79	47	96%	44	66%	29	45%	21	71%	35	69%	35	72%
67-72	7	57%	8	88%	7	29%	8	50%	6	50%	7	56%

MATH 180: Number of students with PM12 grade in given range and percentage who passed

PM12	2007W		2006W		2005W		2004W		2003W		AVERAGE	
86-100	210	89%	213	87%	272	87%	282	89%	236	86%	243	88%
80-85	72	82%	86	73%	89	67%	85	74%	99	73%	86	74%
73-79	43	67%	45	51%	35	51%	54	63%	51	59%	46	59%
67-72	14	36%	11	55%	21	38%	14	50%	12	50%	14	44%

MATH 184: Number of students with PM12 grade in given range and percentage who passed

PM12	2007W		2006W		2005W		2004W		2003W		AVERAGE	
86-100	189	96%	198	93%	234	88%	232	87%	232	88%	217	90%
80-85	97	88%	86	81%	115	68%	119	73%	112	79%	106	77%
73-79	63	76%	69	54%	56	41%	58	48%	82	70%	66	59%
67-72	25	60%	25	60%	16	44%	21	48%	29	48%	23	53%

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TABLE 2

PRINCIPLES OF MATHEMATICS 12 (PM12) SCHOOL GRADES VERSUS PROVINCIAL-EXAM GRADES FOR MATH 180 AND MATH 184 STUDENTS IN 2007W

PM12 School Grade	Number	Percentage Passing MATH 180 or MATH 184
86-100	403	90%
80-85	113	81%
73-79	67	67%
67-72	12	75%
50-66	7	29%
Total	602	85%

PM12 Provincial-Exam Grade	Number	Percentage Passing MATH 180 or MATH 184
86-100	250	93%
80-85	129	88%
73-79	109	83%
67-72	68	74%
50-66	45	51%
Total	601	85%

PM12 School Grade	Number	Average PM12 School Grade	Average PM12 Provincial-Exam Grade
86-100	403	91.6	85.3
80-85	113	82.5	77.2
73-79	67	76.4	73.1
67-72	12	69.3	68.6
50-66	7	63.1	63.1
Total	602	87.4	81.8

PM12 Provincial-Exam Grade	Number	Average PM12 Provincial-Exam Grade	Average PM12 School Grade
86-100	250	91.1	91.4
80-85	129	82.3	87.3
73-79	109	76.4	85.2
67-72	68	69.8	81.7
50-66	45	61.3	79.2
Total	601	81.9	87.4

TABLE 3

BASIC SKILLS TEST AS PREDICTOR FOR MATH 180 AND MATH 184 IN 2007W

Basic Skills Test Score (/30)	Number	Percentage Passing MATH 180 or MATH 184
20-30	470	93%
16-19	182	79%
13-15	69	68%
10-12	37	54%
5-9	13	31%
Total	771	84%

TABLE 4

PERCENTAGE OF FIRST-YEAR CA1 STUDENTS WITH AT LEAST 80% AND 86% IN PRINCIPLES OF MATHEMATICS 12 OR EQUIVALENT IN 2007W, BY DEGREE

Degree	Number	% with >= 80% in PM12 or Equivalent	% with >= 86% in PM12 or Equivalent
BSC	1168	93%	82%
BA	595	73%	51%
BASC	580	93%	78%
BCOM	324	86%	71%
BSFN	154	73%	44%
BHK	36	83%	53%
BSAG	33	55%	24%
BSF	28	54%	21%
BSCN	13	54%	46%
BSCW	24	63%	29%
All	2955	86%	70%

Effective Date for Change: 09WT1 **Proposed Calendar Entry:** MATH 102 (3) Differential Calculus with Applications to Life Sciences **…** Prerequisite: **High-school calculus and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 (or equivalent), (b) a score of 73% or higher in the BC provincial examination for Principles of Mathematics 12, or (c) a satisfactory score in the UBC Mathematics Basic Skills Test.**	**Present Calendar Entry:** MATH 102 (3) Differential Calculus with Applications to Life Sciences **…** Prerequisite: ~~High-school calculus and a score of 67% of higher in Principles of Mathematics 12~~ **Action:** Change prerequisite requirement. **Rationale:** See rationale for MATH 100 prerequisite change. **Supporting Documents: SCI-08-2-MATH102**
Effective Date for Change: 09WT1 **Proposed Calendar Entry:** MATH 104 (3) Differential Calculus with Applications to Commerce and Social Sciences **…** Prerequisite: **High-school calculus and one of (a) a grade of 80% or higher in BC Principles of Mathematics 12 (or equivalent), (b) a score of 73% or higher in the BC provincial examination for Principles of Mathematics 12, or (c) a satisfactory score in the UBC Mathematics Basic Skills Test.**	**Present Calendar Entry:** MATH 104 (3) Differential Calculus with Applications to Commerce and Social Sciences **…** Prerequisite: ~~High-school calculus and a score of 67% of higher in Principles of Mathematics 12~~ **Action:** Change prerequisite requirement. **Rationale:** See rationale for MATH 100 prerequisite change. **Supporting Documents: SCI-08-2-MATH 104**

Effective Date for Change: 09W T1 **Proposed Calendar Entry:** MATH 180 (4) Differential Calculus With Physical Applications Topics as for Math 100; intended for students with no previous knowledge of Calculus. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. Not for credit for students with AP Calculus AB, AP Calculus BC, or a passing score on the UBC-SFU-UVIC-UNBC Calculus Challenge Examination. Prerequisite: **One of (a) a grade of 80% or higher in BC Principles of Mathematics 12 (or equivalent), (b) a score of 73% or higher in the BC provincial examination for Principles of Mathematics 12, or (c) a satisfactory score in the UBC Mathematics Basic Skills Test.** [4-0-0]	**Present Calendar Entry:** MATH 180 (4) Differential Calculus With Physical Applications Topics as for Math 100; intended for students with no previous knowledge of Calculus. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. Not for credit for students with ~~High School Calculus,~~ AP Calculus AB, AP Calculus BC, or a passing score on the UBC-SFU-UVIC-UNBC Calculus Challenge Examination. Prerequisite: ~~A score of 67% of higher in one of MATH 002, Principles of Mathematics 12~~ [4-0-0] **Action:** Remove statement about high school calculus. Change prerequisite requirement. **Rationale:** The currently stated prohibition for students with High School Calculus is in fact not enforced by the Mathematics Department. A small portion of students taking this course have seen calculus in high school, but historical data shows a very poor correlation between their high-school calculus grade and their grade in this course. The stated prohibition is being removed for accuracy and to eliminate student queries about it. Students with high-school calculus will continue to be encouraged to take MATH 100, 102, or 104 instead. The proposed change in prerequisite is intended to ensure that students with a high chance of failing the course enroll in more suitable courses. See rationale for MATH 100 prerequisite change. **Supporting Documents: SCI-08-2-MATH 180**

Effective Date for Change: 09W **Proposed Calendar Entry:** MATH 184 (4) Differential Calculus For Social Sciences and Commerce Topics as for Math 104; intended for students with no previous knowledge of Calculus. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. Not for credit for students with AP Calculus AB, AP Calculus BC, or a passing score on the UBC-SFU-UVIC-UNBC Calculus Challenge Examination Prerequisite**: One of (a) a grade of 80% or higher in BC Principles of Mathematics 12 (or equivalent), (b) a score of 73% or higher in the BC provincial examination for Principles of Mathematics 12, or (c) a satisfactory score in the UBC Mathematics Basic Skills Test.** [4-0-0]	**Present Calendar Entry:** MATH 184 (4) Differential Calculus For Social Sciences and Commerce Topics as for Math 104; intended for students with no previous knowledge of Calculus. Please consult the Faculty of Science Credit Exclusion List: www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,414. Not for credit for students with ~~High School Calculus,~~ AP Calculus AB, AP Calculus BC, or a passing score on the UBC-SFU-UVIC-UNBC Calculus Challenge Examination. Prerequisite: ~~A score of 67% of higher in one of MATH 002, Principles of Mathematics 12~~ [4-0-0] **Action:** Remove statement of ineligibility for students with High School Calculus. Change prerequisite requirement. **Rationale:** The currently stated prohibition for students with High School Calculus is in fact not enforced by the Mathematics Department. A small portion of students taking this course have seen calculus in high school, but historical data shows a very poor correlation between their high-school calculus grade and their grade in this course. The stated prohibition is being removed for accuracy and to eliminate student queries about it. Students with high-school calculus will continue to be encouraged to take MATH 100, 102, or 104 instead. **Supporting Documents: SCI-08-2-MATH 184**