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## MEMORANDUM

ATTENTION	Senate	DATE	April 7, 2015
FROM	Gordon Myers, Chair Senate Committee on Undergraduate Studies	PAGES	1/2
RE:	Faculty of Science (SCUS 15-12)		

## For information:

Acting under delegated authority at its meeting of April 2, 2015 SCUS approved the following curriculum revisions effective Spring 2016.

1. Biomedical Physiology and Kinesiology (SCUS 15-12a)

## (i) Lower Division Requirement changes to the:

- Biomedical Physiology Minor
- Biomedical Physiology Major and Honours programs

## (ii) New Course Proposal: BPK 401-2, Muscle Biomechanics

## (iii) New Course Proposal: BPK 432-3, Physiological Basis of Temperature Regulation (Fall 2016)

## (iv) Upper division requirement changes to the:

- Biomedical Physiology Major and Honours programs
- Biomedical Physiology Minor programs
- Kinesiology Major and Honours programs – Active Health and Rehabilitation Concentration

## (v) Title and description change for BPK 412

2. Department of Mathematics (SCUS 15-12b)

## (i) Upper and Lower division requirement changes to the Mathematics and Computing Science Joint Honours program

3. Department of Biological Sciences (SCUS 15-12c)

## (i) New Course Proposal: BISC 420-3, Community Ecology and Macroecology

## (ii) Description change for BISC 490, 491, 492W, 497W, 498, 499

#### 4. Department of Chemistry [SCUS 15-12e]

- (i) New Course Proposal: NUSC 482-3, Directed Study in Advanced Topics in Nuclear Science
- (ii) Upper division requirement changes to the Nuclear Science Minor program
- (iii) Prerequisite change for CHEM 260, 360
- (iv) Upper and Lower requirement changes to the Chemistry Honours program

#### 5. Department of Earth Sciences [SCUS 15-12f]

- (i) Credit change for EASC 209W
- (ii) Description change to EASC 306
- (iii) Credit change for EASC 499
- (iv) Upper and Lower Division requirement changes to the:
  - Chemistry and Earth Sciences Joint Honours program
  - Chemistry and Earth Sciences Joint Major program
  - Earth Sciences Honours program
  - Earth Sciences Major program



**FACULTY OF SCIENCE**  
Dean of Science

**SCUS 15-12**

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**MEMORANDUM**

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<b>ATTENTION</b>	Senate Committee for Undergraduate Studies, SFU	<b>DATE</b>	March 23, 2015
<b>FROM</b>	Carl Lowenberger, Chair, Science UCC		
<b>RE:</b>	Submission of Undergraduate Curriculum Business from the Faculty of Science for inclusion on the Agenda of the March 2015 SCUS Meeting		

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**BPK**

- Motion: BPK Calendar updates
  - Add BPK 207 – Human Motor Systems (3) as a requirement for the Biomedical Physiology Minor
  - Add CHEM 283(3) as an option for CHEM 282(2) for the Biomedical Physiology MAJOR and HONOURS students.
  - Add PHYS 347 - Introduction to Biological Physics (3) to Biomedical Physiology Major Faculty of Science electives.
  - Add PHYS 347 - Introduction to Biological Physics (3) to Biomedical Physiology Honours Faculty of Science electives.
  - Add BPK 401 and BPK 432 to list of BPK specific options for the Biomedical Physiology Major.
  - Add BPK 401 and BPK 432 to list of BPK specific options for the Biomedical Physiology Honours.
  - Add BPK 432 to list of BPK specific options for the Biomedical Physiology Minor.
  - Add BPK 401, BPK 432 and BPK 443 to list of BPK specific options for the Kinesiology Major – Active Health Concentration.
  - Add BPK 401, BPK 432 and BPK 443 to list of BPK specific options for the Kinesiology Honours – Active Health Concentration.
- Motion: BPK 401, approve new course proposal
- Motion: BPK 432, approve new course proposal
- Motion: BPK 412, approve course change

## MATH

- Motion: Calendar language updates to change the lower and upper division requirements for the Mathematics and Computing Science Joint Honours Program.
- Motion: Calendar language updates to change the lower and upper division requirements for the Operations Research Honours Program.

## BIOLOGY

- Motion: BISC 420, approve new course proposal, learning outcomes, and overlap supporting documentation
- Motion: BISC 490, approve course change
- Motion: BISC 491, approve course change
- Motion: BISC 492, approve course change
- Motion: BISC 497, approve course change
- Motion: BISC 498, approve course change
- Motion: BISC 499, approve course change

## PHYSICS

- Motion: Calendar language update add the choice of CHEM 123 and CHEM 124 to all PHYS majors

## CHEMISTRY

- Motion: NUSC 482, new course proposal
- Motion: Addition of CHEM 462 and 464 to NUSC minor
- Motion: CHEM 260, approve course change
- Motion: CHEM 360, approve course change
- Motion: Calendar language update for CHEM Majors program
- Motion: Calendar language update for CHEM Honours Program

## EARTH SCIENCES

- Motion: EASC 209W, approve course change
- Motion: EASC 306, approve course change
- Motion: EASC 499, approve course change
- Motion: Calendar language update for EASC CHEM Joint Honours
- Motion: Calendar language update for EASC CHEM Joint Majors
- Motion: Calendar language update for EASC Majors
- Motion: Calendar language update for EASC Honours



**BPK Motions for Faculty of Science UCC – March 2015 – Ryan Dill**

**. BPK Motion:** Add BPK 207 – Human Motor Systems (3) as a requirement for the Biomedical Physiology Minor

**Rationale :** BPK 207 was added as a requirement for all major programs and substituted as a prerequisite for BPK 306 in place of BPK 201. Currently a Biomedical Physiology Minor does not require BPK 207 but does require BPK 306 which is a prerequisite for several other courses that are options in the program (BPK 415, 446 and 448)

**TO:**

**Biomedical Physiology - Minor**

**Program Requirements**

**Lower Division Requirements**

Students complete all of

BISC 101 - General Biology (4)

BISC 102 - General Biology (4)

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 122 - General Chemistry II (2)

CHEM 126 - General Chemistry Laboratory II (2)

CHEM 281 - Organic Chemistry I (4)

CHEM 282 - Organic Chemistry II (2)

BPK 142 - Introduction to Kinesiology (3)

BPK 205 - Introduction to Human Physiology (3)

**BPK 207 - Human Motor Systems (3)**

MBB 222 - Molecular Biology and Biochemistry (3)

MBB 231 - Cellular Biology and Biochemistry (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)

and one of

MATH 152 - Calculus II (3)

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

**. BPK MOTION : Add CHEM 283(3) as an option for CHEM 282(2) for our Biomedical Physiology MAJOR and HONOURS students.**

**Rationale:** CHEM 283(3) is an enriched version of CHEM 282(2) taken during the same semester. CHEM 282 runs for the first two thirds of the semester and has a final exam. Students then elect whether to take the enriched version, for an additional unit, for the last third of the semester. MBB and BISC have this as an option in their programs.

**TO :**

Biomedical Physiology Major and Honours Programs

Lower Division Requirements

Students complete 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 126 - General Chemistry Laboratory II (2)  
CHEM 281 - Organic Chemistry I (4)  
~~CHEM 282 - Organic Chemistry II (2)~~  
BPK 142 - Introduction to Kinesiology (3)  
BPK 201 - Biomechanics (3)  
BPK 205 - Introduction to Human Physiology (3)  
BPK 207 - Human Motor Systems (3)  
STAT 201 - Statistics for the Life Sciences (3)  
MBB 222 - Molecular Biology and Biochemistry (3)  
MBB 231 - Cellular Biology and Biochemistry (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)  
MATH 154 - Calculus I for the Biological Sciences (3)  
and one of

**MATH 152 - Calculus II (3)**

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

COURSE SUBJECT Muscle Biomechanics

NUMBER BPK 401

## COURSE TITLE

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

Muscle Biomechanics

## AND

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

Muscle Biomechanics

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 mechanics and function of skeletal muscle, from the level of single muscle fibres to the whole muscle-tendon unit. The role of muscle structure, recruitment patterns and contractile conditions to the force development, power output and efficiency of contractions will be considered. Theoretical, experimental and computational aspects will be covered.

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](http://lib.sfu.ca/collections/course-assessments)

There are no additional requirements from the Library

## RATIONALE FOR INTRODUCTION OF THIS COURSE

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

Skeletal muscle forms up to 40 % of our bodies, and is responsible for maintaining our posture and driving our body movements and locomotion. Skeletal muscle thus plays a very important role in maintaining our mobility, health and also sporting performance. This new course will provide a comprehensive covering of the structure and function of skeletal muscle. Currently the coverage of skeletal muscle by the BPK courses has been identified as an under-represented topic. This new course will partly address this gap, and in particular will provide students with a thorough and mechanistic understanding of the functioning of our muscles. This course should be of interest to both KIN and BIF Majors and added to the upper division specified list for the Active Health Concentration, and BIF majors.

## 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:

SPRING 2016 . OFFERED ON AN ANNUAL BASIS.

Will this be a required or elective course in the curriculum? ☐ Required ☒ Elective

What is the probable enrollment when offered? Estimate: 20-30



### UNITS

Indicate number of units:

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

### OTHER

One 1-hour session each week will be given to lab visits, practical experience in both experimental or computational aspects, or paper review sessions. The exact nature of this session will vary each week, and is outlined in the attached Course Description.

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

Dr. James Wakeling (primary)

Dr. Max Donelan

**WQB DESIGNATION** (attach approval from Curriculum Office)

### PREREQUISITE AND / OR COREQUISITE

Prerequisites: 90 credits, BPK(or KIN) 201 and 205, or BPK(or KIN) 208.

### 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?

BPK(or KIN) 421 - Muscle Biomechanics

### COURSE – LEVEL EDUCATIONAL GOALS (OPTIONAL)

By the end of the course, the student will:

- Be able to describe the structure and mechanical function of the muscle-tendon unit
- Be able to interpret experimental data about muscle function
- Be able to create simple computer models to predict mechanical properties of contracting muscle.
- Be able to analyze information from scientific papers

### 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:

### 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

James Wakeling



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 study of human temperature regulation in extreme environments. Physiological responses in hot and cold environments with be studied at molecular, cellular and whole body/systems physiology levels. The course focuses on the mechanisms of control of human temperature as well as unresolved topics in this area of physiology.

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](http://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

The two primary goals of homeostasis in humans and other mammals are to regulate body core temperature and acidity (i.e. pH). This proposed course in temperature regulation will give students an advanced understanding of this fundamental physiology topic that is central to homeostasis. The topics covered in this proposed course are the mechanisms of control of thermoregulatory responses that permit regulation of core temperature in humans. This course will give BPK students with a focus in physiology an advanced understanding of this important topic.

Students in BPK have a strong foundation in basic physiology that they develop in lower and upper level BPK courses. In the department there is one upper level elective course in environmental physiology. It is Kin 484 Altitude and Aerospace Physiology and it is focused on gravitational physiology. Kin 310 Exercise/Work Physiology includes some material on 'Exercise and Environment Temperature'. The proposed course will build on some of these topics introduced in Kin 310. The course will also help introduce senior BPK students to the environmental physiology area that is one of the streams of study in our graduate program.

**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:

Indicate no. of contact hours for:

Lecture

Seminar

Tutorial

Lab

Other – please explain

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

Dr White

**WQB DESIGNATION** (attach approval from Curriculum Office)**PREREQUISITE AND / OR COREQUISITE**

Prerequisites: BPK (or Kin) 305 or BISC 305, Recommended BPK (or Kin) 407

**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?

BPK 420 - Physiological Basis of Temperature Regulation

**COURSE – LEVEL EDUCATIONAL GOALS (OPTIONAL)**

....have an advanced understanding and be able to give a detailed explanation of:

-different candidate physiological models of temperature regulation

-the physiological mechanisms and unresolved topics in the area of the control of eccrine sweating and cutaneous vasodilatation in hyperthermic humans

**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:

None

### 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

**. BPK MOTION - BPK MOTION - Add PHYS 347 - Introduction to Biological Physics (3) to Biomedical Physiology Major Faculty of Science electives.**

**Rationale:**

The course will be of significant interest to some of our students. In particular, it covers models of electrophysiology, which would greatly benefit any of our students interested in cardiac physiology. Furthermore, the course focuses on physics at the cellular level, which our Biomedical Physiology Majors could use more of. All prerequisites are currently required in the Biomedical Physiology Major and Honours programs.

**TO:**

**BIOMEDICAL PHYSIOLOGY MAJOR  
Upper Division Requirements**

and one of

BISC 303 - Microbiology (4)  
BISC 307 - Animal Physiology Laboratory (3)  
BISC 307W - Animal Physiology Laboratory (3)  
BISC 316 - Vertebrate Biology (4)  
BISC 329 - Introduction to Experimental Techniques (4)  
BISC 333 - Developmental Biology (3) ^  
BISC 357 - Gene Cloning (3) ^  
BISC 403 - Current Topics in Cell Biology (3)  
BISC 405 - Neurobiology (3)  
CHEM 360 - Thermodynamics and Chemical Kinetics (3)  
MBB 308 - Molecular Biology Laboratory (3) ^  
MBB 309W - Biochemistry Laboratory (4)  
MBB 322 - Molecular Physiology (3)  
MBB 323 - Introduction to Physical Biochemistry (3)  
MBB 324 - Protein Biochemistry (3)  
MBB 331 - Molecular Biology (3) ^  
**PHYS 347 - Introduction to Biological Physics (3)**

**BPK MOTION - Add PHYS 347 - Introduction to Biological Physics (3) to Biomedical Physiology Honours Faculty of Science electives.**

**Rationale:**

The course will be of significant interest to some of our students. In particular, it covers models of electrophysiology, which would greatly benefit any of our students interested in cardiac physiology. Furthermore, the course focuses on physics at the cellular level, which our Biomedical Physiology Majors could use more of. All prerequisites are currently required in the Biomedical Physiology Major and Honours programs.

**TO:**

**BIOMEDICAL PHYSIOLOGY HONOURS**

**Upper Division Requirements**

and one of

BISC 303 - Microbiology (4)

BISC 307 - Animal Physiology Laboratory (3)

BISC 307W - Animal Physiology Laboratory (3)

BISC 316 - Vertebrate Biology (4)

BISC 329 - Introduction to Experimental Techniques (4)

BISC 333 - Developmental Biology (3) ^

BISC 357 - Gene Cloning (3) ^

BISC 403 - Current Topics in Cell Biology (3)

BISC 405 - Neurobiology (3)

CHEM 360 - Thermodynamics and Chemical Kinetics (3)

MBB 308 - Molecular Biology Laboratory (3) ^

MBB 309W - Biochemistry Laboratory (4)

MBB 322 - Molecular Physiology (3)

MBB 323 - Introduction to Physical Biochemistry (3)

MBB 324 - Protein Biochemistry (3)

MBB 331 - Molecular Biology (3) ^

**PHYS 347 - Introduction to Biological Physics (3)**

**BPK MOTION – Add BPK 401 and BPK 432 to list of BPK specific options for the Biomedical Physiology Major.**

**TO:**

**Biomedical Physiology Major  
Upper Division Requirements**

and seven of

BPK 301 - Biomechanics Laboratory (3)

BPK 308 - Experiments and Models in Systems Physiology (3)

BPK 310 - Exercise/Work Physiology (3)

BPK 336 - Histology (3)

BPK 340 - Active Health: Behavior and Promotion (3)

**BPK 401 – Muscle Biomechanics (3)**

BPK 402 - Mechanical Behavior of Biological Tissues (3)

BPK 412 - Molecular and Cellular Cardiology (3)

BPK 415 - Neural Control of Movement (3)

BPK 420 - Selected Topics in Kinesiology I (3) \*

BPK 421 - Selected Topics in Kinesiology II (3) \*

BPK 422 - Selected Topics in Kinesiology III (3) \*

BPK 423 - Selected Topics in Kinesiology IV (3) \*

BPK 426 - Neuromuscular Anatomy (3)

BPK 430 - Human Energy Metabolism (3)

BPK 431 - Integrative Cancer Biology (3)

**BPK 432 – Physiological Regulation of Temperature (3)**

BPK 444 - Cardiac Disease: Pathophysiology and Assessment (3)

BPK 446 - Neurological Disorders (3)

BPK 448 - Rehabilitation of Movement Control (3)

BPK 484 - Altitude and Aerospace Physiology (3)

BPK 496 - Directed Study I (3) \*

BPK 498 - Directed Study II (3) \*

and three upper division units from any faculty.

\* must be selected topics courses in physiology

^ require additional prerequisites outside of program requirements

**BPK MOTION – Add BPK 432 to list of BPK specific options for the Biomedical Physiology Minor.**

**TO:  
Biomedical Physiology Minor  
Upper Division Requirements**

~~Students must complete 6 additional upper division BPK units from the following list~~  
**and two of**

(note that some classes may require additional pre-requisites):

BPK 304W - Inquiry and Measurement in Biomedical Physiology and Kinesiology (3) ++

BPK 310 - Exercise/Work Physiology (3)

BPK 336 - Histology (3)

BPK 402 - Mechanical Behavior of Biological Tissues (3)

BPK 412 - Molecular and Cellular Cardiology (3)

BPK 415 - Neural Control of Movement (3)

BPK 420 - Selected Topics in Kinesiology I (3) \*

BPK 421 - Selected Topics in Kinesiology II (3) \*

BPK 422 - Selected Topics in Kinesiology III (3) \*

BPK 423 - Selected Topics in Kinesiology IV (3) \*

BPK 426 - Neuromuscular Anatomy (3)

BPK 430 - Human Energy Metabolism (3)

BPK 431 - Integrative Cancer Biology (3)

**BPK 432 – Physiological Regulation of Temperature (3)**

BPK 444 - Cardiac Disease: Pathophysiology and Assessment (3)

BPK 446 - Neurological Disorders (3)

BPK 448 - Rehabilitation of Movement Control (3)

BPK 484 - Altitude and Aerospace Physiology (3)

BPK 496 - Directed Study I (3) \*

BPK 498 - Directed Study II (3) \*

A minimum GPA of 2.0 calculated on all biomedical physiology and kinesiology courses used to satisfy the requirements is required as well as a minimum upper division GPA of 2.0 calculated on those upper division biomedical physiology and kinesiology courses used to satisfy the requirements.

\* must be selected topics courses in physiology

++ satisfies the University's breadth requirements of three upper division units in writing

**BPK MOTION – Add BPK 401, BPK 432 and BPK 443 to list of BPK specific options for the Kinesiology Major – Active Health Concentration.**

**TO:**

**Kinesiology Major**

**Upper Division Requirements**

**Active Health and Rehabilitation Concentration**

**and four of**

BPK 308 - Experiments and Models in Systems Physiology (3)

BPK 311 - Applied Human Nutrition (3)

BPK 312 - Nutrition for Fitness and Sport (3)

BPK 375 - Human Growth and Development (3)

BPK 381 - Psychology of Work (3)

BPK 382 - Workplace Health (3)

**BPK 401 – Muscle Biomechanics (3)**

BPK 402 - Mechanical Behavior of Biological Tissues (3)

BPK 412 - Molecular and Cellular Cardiology (3)

BPK 415 - Neural Control of Movement (3)

BPK 417W - Obesity, Adipocyte Function and Weight Management (3)

BPK 420 - Selected Topics in Kinesiology I (3) ^

BPK 421 - Selected Topics in Kinesiology II (3) ^

BPK 422 - Selected Topics in Kinesiology III (3) ^

BPK 423 - Selected Topics in Kinesiology IV (3) ^

BPK 426 - Neuromuscular Anatomy (3)

BPK 431 - Integrative Cancer Biology (3)

**BPK 432 – Physiological Regulation of Temperature (3)**

**BPK 443 – Advanced Exercise Prescription (3)**

BPK 444 - Cardiac Disease: Pathophysiology and Assessment (3)

BPK 445 - Advanced Cardiac Rehabilitation (3)

BPK 446 - Neurological Disorders (3)

BPK 448 - Rehabilitation of Movement Control (3)

BPK 461 - Physiological Aspects of Aging (3)

BPK 481 - Musculoskeletal Disorders (3)

BPK 496 - Directed Study I (3) ^

BPK 498 - Directed Study II (3) ^

and one additional upper division biomedical physiology and kinesiology course, excluding BPK (or KIN) 325, 342, 497, 499

and an additional two units of upper division units chosen from any discipline within the University

Students admitted in September 2006 or later are also required to complete the

University's writing, quantitative and breadth (WQB) requirements, which includes the requirement of completing three units of writing-intensive credit at the upper division. The W component may be included within the upper division unit total for this program.

^ can be counted toward area of concentration if relevant to active health or rehabilitation kinesiology. Please see the head of the area of concentration for permission to count any of these courses toward the area of concentration requirement.



**BPK MOTION – Add BPK 401, BPK 432 and BPK 443 to list of BPK specific options for the Kinesiology Honours – Active Health Concentration.**

**TO:**

**Kinesiology Honours**

**Upper Division Requirements**

**Active Health and Rehabilitation Concentration  
and four of**

BPK 308 - Experiments and Models in Systems Physiology (3)

BPK 311 - Applied Human Nutrition (3)

BPK 312 - Nutrition for Fitness and Sport (3)

BPK 375 - Human Growth and Development (3)

BPK 381 - Psychology of Work (3)

BPK 382 - Workplace Health (3)

**BPK 401 – Muscle Biomechanics (3)**

BPK 402 - Mechanical Behavior of Biological Tissues (3)

BPK 412 - Molecular and Cellular Cardiology (3)

BPK 415 - Neural Control of Movement (3)

BPK 417W - Obesity, Adipocyte Function and Weight Management (3)

BPK 420 - Selected Topics in Kinesiology I (3) ^

BPK 421 - Selected Topics in Kinesiology II (3) ^

BPK 422 - Selected Topics in Kinesiology III (3) ^

BPK 423 - Selected Topics in Kinesiology IV (3) ^

BPK 426 - Neuromuscular Anatomy (3)

BPK 431 - Integrative Cancer Biology (3)

**BPK 432 – Physiological Regulation of Temperature (3)**

**BPK 443 – Advanced Exercise Prescription (3)**

BPK 444 - Cardiac Disease: Pathophysiology and Assessment (3)

BPK 445 - Advanced Cardiac Rehabilitation (3)

BPK 446 - Neurological Disorders (3)

BPK 448 - Rehabilitation of Movement Control (3)

BPK 461 - Physiological Aspects of Aging (3)

BPK 481 - Musculoskeletal Disorders (3)

BPK 496 - Directed Study I (3) ^

BPK 498 - Directed Study II (3) ^

and one additional upper division biomedical physiology and kinesiology course,  
excluding BPK (or KIN) 325, 342, 497, 499

and an additional two units of upper division units chosen from any discipline within the  
University

Students admitted in September 2006 or later are also required to complete the University's writing, quantitative and breadth (WQB) requirements, which includes the requirement of completing three units of writing-intensive credit at the upper division. The W component may be included within the upper division unit total for this program.

^ can be counted toward area of concentration if relevant to active health or rehabilitation kinesiology. Please see the head of the area of concentration for permission to count any of these courses toward the area of concentration requirement.



**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 \_\_\_\_\_

<b>FROM</b>		<b>TO</b>	
Course Subject/Number	BPK 412	Course Subject/Number	BPK 412
Credits	3	Credits	3

**TITLE**

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

**FROM:**

Molecular and Cellular Cardiology

**TO:**

Molecular Cardiac Physiology

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

**FROM:**

**TO:**

**DESCRIPTION**

**FROM:**

This course entails a detailed analysis of the molecular and cellular basis of cardiac function. The material will be derived from myriad disciplines including: anatomy (histology and ultrastructure), biomechanics, physiology, electrophysiology, biochemistry and molecular biology. A particular emphasis will be placed on the mechanisms by which the heart responds to stresses such as ischemia and exercise. Students with credit for KIN 412 may not repeat this course for further credit. Prerequisite: BPK (or KIN) 305.

**DESCRIPTION**

**TO:**

This course entails a detailed analysis of the molecular and cellular basis of cardiac function. The material will be derived from myriad disciplines including: structure (histology and ultrastructure, molecular), biophysics, biomechanics, physiology, electrophysiology, biochemistry and molecular biology. A particular emphasis will be placed on the mechanisms by which inherited arrhythmias and cardiomyopathies manifest as a pathological phenotype. Students with credit for KIN 412 may not repeat this course for further credit.

**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**.

**PREREQUISITE**

**TO:**

**LEARNING OUTCOMES**

To learn the molecular and cellular bases of physiological function of the heart  
To learn how to critically evaluate the literature in the field and understand the controversies in the field  
To gain experience in expressing these controversies publically in the form of debates  
To learn how to cogently write about important topics in the field and support these arguments rigorously

**RATIONALE**

These changes are more consistent with the way the course is currently being taught.

**Motion I: To change the lower and upper division requirements for the Mathematics and Computing Science Joint Honours Program.**

**From (Lower and Upper Division Requirements for the Mathematics and Computing Science Joint Honours Program):**

**Program Requirements**

The program is subject to Faculty of Science and University regulations. Course and prerequisite admission is subject to departmental requirements.

Faculty of Applied Sciences residency requirements apply to the computing science courses used toward the program.

**Lower Division Requirements**

Students complete at least 44-48 units, including all three 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 150 - Introduction to Computer Design (3)  
CMPT 225 - Data Structures and Programming (3)  
MACM 101 - Discrete Mathematics I (3)  
MACM 201 - Discrete Mathematics II (3)  
MATH 242 - Introduction to Analysis I (3)  
MATH 251 - Calculus III (3)  
STAT 270 - Introduction to Probability and Statistics (3)

and either

CMPT 275 - Software Engineering I (4)

or

CMPT 276 - Introduction to Software Engineering (3)

and two of

MACM 203 - Computing with Linear Algebra (2)

MACM 204 - Computing with Calculus (2)

MATH 294 - Computational Studies in Mathematics (2)

or with prior approval, one of+

MACM 401 - Introduction to Computer Algebra (3)

MACM 409 - Numerical Linear Algebra: Algorithms, Implementation and Applications (3)

MATH 439 - Selected Topics in Algebra (3)

+cannot be used to satisfy other upper division requirements for a major program

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) \*\*

\*\* strongly recommended

++ with a B grade or better

### **Upper Division Requirements**

Students complete 30 units, including all of



CMPT 307 - Data Structures and Algorithms (3)  
CMPT 405 - Design and Analysis of Computing Algorithms (3)  
MACM 316 - Numerical Analysis I (3)  
**MATH 310 - Introduction to Ordinary Differential Equations (3)**  
MATH 340 - Algebra II: Rings and Fields (3)  
MATH 345 - Introduction to Graph Theory (3)

and one of

CMPT 308 - Computability and Complexity (3)  
**MACM 300 - Introduction to Formal Languages and Automata with Applications (3)**

and one of

CMPT 300 - Operating Systems I (3)  
CMPT 371 - Data Communications and Networking (3)

and one of

CMPT 361 - Introduction to Computer Graphics (3)  
CMPT 379 - Principles of Compiler Design (3)

and one of

**MATH 308 - Linear Optimization (3)**  
MATH 309 - Continuous Optimization (3)

**Additional course work is required** to total 27 upper division MATH units and 27 upper division CMPT units including core requirements. MACM courses are counted in an alternating fashion towards the MATH and CMPT requirements, starting with the first MACM course completed counting towards either MATH or CMPT. Eighteen units must be completed at the 400 division or higher, including at least six units each of CMPT and MATH.

### **Other Requirements**

The program is subject to Faculty of Science and University regulations. Course and prerequisite admission is subject to departmental requirements. MACM major graduation is contingent upon a cumulative grade point average (CGPA) and upper division grade point average (UDGPA) of 3.00 or better. Students must also achieve a 3.00 or better CGPA and UGPA in each of the CMPT, MACM and MATH designations.

Admission, continuation and graduation in the MACM honours is contingent upon 3.00 or better on all relevant GPAs. Faculty of Applied Sciences residency requirements apply to the computing science courses used toward the program.

### Faculty of Science Honours Requirements

In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements as follows:

- students are required to complete additional upper division units to total a minimum of 60 upper division units (excluding EDUC 401 to 406)
- students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (excluding EDUC 401 to 406) including six units minimum to be completed in the Faculty of Arts and Social Sciences

### Elective Courses

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

### Writing, Quantitative, and Breadth Requirements

Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.

### WQB Graduation Requirements

**A grade of C- or better is required to earn W, Q or B credit**

Requirement	Units	Notes	
W - Writing	6	Must include at least one upper division course, taken at Simon Fraser University within the student's major subject	
Q - Quantitative	6	Q courses may be lower or upper division	
B - Breadth	18	Designated Breadth	Must be outside the student's major subject, and may be lower or upper

			division 6 units Social Sciences: B-Soc 6 units Humanities: B-Hum 6 units Sciences: B-Sci
	6	Additional Breadth	6 units outside the student's major subject (may or may not be B-designated courses, and will likely help fulfil individual degree program requirements)  Students choosing to complete a joint major, joint honours, double major, two extended minors, an extended minor and a minor, or two minors may satisfy the breadth requirements (designated or not designated) with courses completed in either one or both program areas.

**To (Lower and Upper Division Requirements for the Mathematics and Computing Science Joint Honours Program):**

**Program Requirements**

The program is subject to Faculty of Science and University regulations. Course and prerequisite admission is subject to departmental requirements.

Faculty of Applied Sciences residency requirements apply to the computing science courses used toward the program.

Students complete at least 120 units of which at least 60 units are at the upper division level as specified below.

**Lower Division Requirements**

Students complete at least 43-47 units, including all three 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 150 - Introduction to Computer Design (3)  
CMPT 225 - Data Structures and Programming (3)  
CMPT 276 - Introduction to Software Engineering (3)  
MACM 101 - Discrete Mathematics I (3)  
MACM 201 - Discrete Mathematics II (3)  
MACM 203 - Computing with Linear Algebra (2) +  
MACM 204 - Computing with Calculus (2) +  
MATH 242 - Introduction to Analysis I (3)  
MATH 251 - Calculus III (3)  
STAT 270 - Introduction to Probability and Statistics (3)

~~and either~~

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

~~or~~

~~CMPT 276 - Introduction to Software Engineering (3)~~

~~and two of~~

~~MACM 203 - Computing with Linear Algebra (2)  
MACM 204 - Computing with Calculus (2)  
MATH 294 - Computational Studies in Mathematics (2)~~

~~or with prior approval, one of+~~

~~MACM 401 - Introduction to Computer Algebra (3)  
MACM 409 - Numerical Linear Algebra: Algorithms, Implementation and Applications (3)  
MATH 439 - Selected Topics in Algebra (3)~~

~~+cannot be used to satisfy other upper division requirements for a major program~~

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) \*\*

+ The following substitutions are also permitted.

They may not also be used to satisfy the upper division requirements below.

MACM 409 - Numerical Linear Algebra: Algorithms, Implementation and Applications (3) for MACM 203.

MACM 401 - Introduction to Computer Algebra (3) for MACM 204.

MACM 442 - Cryptography (3) for MACM 204.

\*\* strongly recommended

++ with a B grade or better

### **Upper Division Requirements**

Students complete 54 units, including all of

CMPT 307 - Data Structures and Algorithms (3)  
CMPT 308 - Computability and Complexity (3)  
CMPT 405 - Design and Analysis of Computing Algorithms (3)  
MACM 316 - Numerical Analysis I (3)  
MATH 308 - Linear Optimization (3)  
~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~  
MATH 340 - Algebra II: Rings and Fields (3)  
MATH 345 - Introduction to Graph Theory (3)

and one of

~~CMPT 308 - Computability and Complexity (3)~~

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

and one of

CMPT 300 - Operating Systems I (3)

CMPT 371 - Data Communications and Networking (3)

and one of

CMPT 361 - Introduction to Computer Graphics (3)

CMPT 379 - Principles of Compiler Design (3)

and one of

~~MATH 308 - Linear Optimization (3)~~

MATH 309 - Continuous Optimization (3)

MATH 310 - Introduction to Ordinary Differential Equations (3)

And additional course work ~~is required~~ to total 27 upper division MATH units and 27 upper division CMPT units including core requirements. MACM courses are counted in an alternating fashion towards the MATH and CMPT requirements, starting with the first MACM course completed counting towards either MATH or CMPT. Eighteen units must be completed at the 400 division or higher, including at least six units each of CMPT and MATH.

Students are encouraged to take either

CMPT 498 - Honours Research Project (6)

or both of

MATH 498 - Communication and Research Skills in the Mathematics Sciences (1)

MATH 499W - Honours Research Project (5)

### **Other Requirements**

Of the total 120 units required for honours, at least 60 must be from the upper division.



The program is subject to Faculty of Science and University regulations. Course and prerequisite admission is subject to departmental requirements. MACM major graduation is contingent upon a cumulative grade point average (CGPA) and upper division grade point average (UDGPA) of 3.00 or better. Students must also achieve a 3.00 or better CGPA and UDGPA in each of the CMPT, MACM and MATH designations.

Admission, continuation and graduation in the MACM honours is contingent upon 3.00 or better on all relevant GPAs. Faculty of Applied Sciences residency requirements apply to the computing science courses used toward the program.

### **Faculty of Science Honours Requirements**      *LEAVE IN.*

~~In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements as follows:~~

- ~~• students are required to complete additional upper division units to total a minimum of 60 upper division units (excluding EDUC 401 to 406)~~
- ~~• students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (excluding EDUC 401 to 406) including six units minimum to be completed in the Faculty of Arts and Social Sciences~~

### **Elective Courses**

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

### **Writing, Quantitative, and Breadth Requirements**

Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.

### **WQB Graduation Requirements**

**A grade of C- or better is required to earn W, Q or B credit**

Requirement	Units	Notes
-------------	-------	-------

W - Writing	6	Must include at least one upper division course, taken at Simon Fraser University within the student's major subject	
Q - Quantitative	6	Q courses may be lower or upper division	
B - Breadth	18	Designated Breadth	Must be outside the student's major subject, and may be lower or upper division 6 units Social Sciences: B-Soc 6 units Humanities: B-Hum 6 units Sciences: B-Sci
	6	Additional Breadth	6 units outside the student's major subject (may or may not be B-designated courses, and will likely help fulfil individual degree program requirements)  Students choosing to complete a joint major, joint honours, double major, two extended minors, an extended minor and a minor, or two minors may satisfy the breadth requirements (designated or not designated) with courses completed in either one or both program areas.

### **Rationale:**

Changes [Rationale in brackets]

Addition of

"Students complete at least 120 units of which at least 60 units are at the upper division level as specified below"

[This is the main change to go from 132 units to 120 units to (hopefully) improve Honours enrolment.]

Addition of CMPT 276-3 to the required course list and deletion of

and either

CMPT 275 Software Engineering I (4)

or

CMPT 276 Intro. to Software Engineering (3)

[Computing Science no longer offers CMPT 275-4]

Addition of MACM 203 and MACM 204 to required course list and update of alternates.

[These changes are the same changes already made to the Mathematics major and honours programs]

Requiring MATH 308 Linear Optimization instead of MATH 310 Intro. to Ordinary Differential Equations

[Mathematics felt that MATH 308 was a better required choice]

Deletion of MACM 300 from the choice

and one of

CMPT 308 - Computability and Complexity (3)

MACM 300 - Intro. to Formal Languages and Automata with Application (3)

[MACM 300 is no longer offered - last offered Spring 2010]

Addition of recommendation that students take either

CMPT 498 Honours Research Project (6)

or both of

MATH 498 Communication and Research Skills in the Mathematical Sciences

MATH 499W Honours Research Project (5)

[Self-explanatory]



## FACULTY OF APPLIED SCIENCES

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### MEMORANDUM

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ATTENTION Math Department  
FROM Ed Park, Associate Dean  
RE: Curriculum Changes

DATE March 11 2015  
PAGES

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The attached changes have been reviewed and approved by the FAS Undergraduate Curriculum Committee

- 1.) School of Computing Science
  - a. Calendar Changes - Computing Science and Math Joint Honours
    - Remove option to take CMPT 275
    - Add MACM 203 and MACM 204 to required courses (as alternatives)
    - Replace MATH 310 with MATH 308
    - Remove MACM 300
    - Add recommendation to take Research Project

Thank you,

A handwritten signature in blue ink, appearing to read "Ed Park", with a long horizontal stroke extending to the right.

Edward Park  
Associate Dean

(EP/mt)





**COURSE SUBJECT/NUMBER** BISC 420

**COURSE TITLE**

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

Community Ecology and Macroecology

**AND**

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

Community Ecology and Macroecology

**CAMPUS** where course will be taught: ☒ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

**COURSE DESCRIPTION (FOR CALENDAR). 50-60 WORDS MAXIMUM. ATTACH A COURSE OUTLINE TO THIS PROPOSAL.**

This course will examine the importance of species interactions that occur in ecological communities and the role of biotic and abiotic, natural and anthropogenic processes that underpin large-scale patterns of biodiversity. The course will provide a strong conceptual framework in community ecology with a focus on hypothesis development, alternative methodological approaches, the interpretation of data, and the synthesis of information across studies. Students who have completed BISC 304 or BISC 404 may not take BISC 420 for further credit.

**REPEAT FOR CREDIT**

☒

NO

☐

YES

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.

Approved. <http://www.lib.sfu.ca/collections/course-assessments>

Library report status

**RATIONALE FOR INTRODUCTION OF THIS COURSE**

The proposed course, in combination with a new lab and field based methods course for the Ecology, Evolution and Conservation stream, replaces BISC 304 (Animal Ecology) and BISC 404 (Plant Ecology). The new course incorporates material previously presented in Animal and Plant Ecology that were constrained taxonomically, and reduces overlap with courses BISC 407 (Population Dynamics) and BISC 309 (Conservation Biology). This course will complement courses on behavioral ecology and population dynamics that together provide upper level courses in ecology at the level of the individual, population and community.

**SCHEDULING AND ENROLLMENT INFORMATION**

Indicate effective **term and year** course would first be offered and planned **frequency** of offering thereafter:

1161

Will this be a required or elective course in the curriculum?

☐

Required

☒

Elective

What is the probable enrollment when offered? Estimate:

60-80





**CREDITS**

Indicate number of credits (units): 3

Indicate number of hours for:	Lecture	Seminar	Tutorial	Lab	Other
	3		1		

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

Green Elle Dulvy Moore Reynolds

**WQB DESIGNATION** (attach approval from Curriculum Office)

**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**.

BISC 204 or GEOG 215; with a grade of C- or better.

**COREQUISITE**

**STUDENT LEARNING OUTCOMES**

Upon satisfactory completion of the course students will be able to:

see attached sheet

**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:

## OTHER IMPLICATIONS

Articulation agreement reviewed? ☐ YES ☐ NO ☒ Not applicable  
Exam required: ☒ YES ☐ NO  
Criminal Record Check required: ☐ YES ☒ NO

## APPROVALS: APPROVAL IS SIGNIFIED BY DATE AND APPROPRIATE SIGNATURE.

- 1 Departmental approval indicates that the Department or School has approved the content of the course, and has consulted with other Departments/Schools/Faculties regarding proposed course content and overlap issues.

\_\_\_\_\_  
Chair, Department/School

\_\_\_\_\_  
Date

\_\_\_\_\_  
Chair, Faculty Curriculum Committee

\_\_\_\_\_  
Date

- 2 Faculty approval indicates that all the necessary course content and overlap concerns have been resolved, and that the Faculty/School/Department commits to providing the required Library funds.

\_\_\_\_\_  
Dean or designate

\_\_\_\_\_  
Date

LIST which other Departments, Schools and Faculties have been consulted regarding the proposed course content, including overlap issues. Attach documentary evidence of responses.

Other Faculties' approval indicates that the Dean(s) or Designate of other Faculties AFFECTED by the proposed new course support(s) the approval of the new course:

\_\_\_\_\_  
Date \_\_\_\_\_

\_\_\_\_\_  
Date \_\_\_\_\_

- 3 SCUS approval indicates that the course has been approved for implementation subject, where appropriate, to financial issues being addressed.

COURSE APPROVED BY SCUS (Chair of SCUS):

\_\_\_\_\_  
Date \_\_\_\_\_

## **BISC 420 Community Ecology and Macroecology**

This course will examine the importance of species interaction that occur in ecological communities and the role of biotic and abiotic, natural and anthropogenic processes that underpin large-scale patterns of biodiversity. This course will complement courses on behavioral ecology and population dynamics and that together provide upper level courses in ecology at the level of the individual, population and community.

The course will provide a strong conceptual framework in community ecology with a focus on hypothesis development, alternative methodological approaches, the interpretation of data, and the synthesis of information across studies. Students will work in pairs to produce short presentations describing a critical question and a recent advance in community ecology or macroecology, and lead discussions critically evaluating the evidence from multiple studies.

The proposed course, in combination with a new lab and field based methods course for the Ecology, Evolution and Conservation stream, replaces BISC 304 (Animal Ecology) and BISC 404 (Plant Ecology). The new course incorporates material previously presented in Animal and Plant Ecology that were constrained taxonomically, and reduces overlap with courses BISC 407 (Population Dynamics) and BISC 309 (Conservation Biology).

The table below describes:

- the major themes/topics covered in this course along with the expected learning outcomes.
- the skills and qualities fostered in this course.

## Course, structure, content and learning outcomes

Major topics:	At the end of this course, students should be able to:
Macroecology: major patterns in ecology	<ul style="list-style-type: none"><li>• Understand the methods used to describe patterns of biodiversity (gradients in diversity, species abundance, species area curves)</li><li>• Explain hypotheses (including niche/null models) proposed to explain these patterns</li><li>• Develop predictions and critical evaluate evidence for/against alternate hypotheses</li></ul>
Community ecology: species interactions	<ul style="list-style-type: none"><li>• Describe the methods used to measure the strength of interactions (competitive, predator-prey, consumer-resource, mutualistic)</li><li>• Distinguish between ecological and evolutionary outcomes, direct and indirect interactions</li><li>• Use conceptual and graphical models and empirical data to evaluate hypotheses for character displacement, coexistence, population cycles, costs/benefits of mutualistic interactions</li></ul>
Community ecology: complex ecological networks	<ul style="list-style-type: none"><li>• Describe food webs based on interactions, energy flow, network theory</li><li>• Describe approaches used to explore the importance of indirect effects, trophic cascades, bottom-up and top-down processes</li><li>• Critique experiments/simple models and evaluate evidence used to assess how intra-guild competition, predators and parasites alter interactions within foodwebs</li><li>• Evaluate hypotheses to explain the structure (length/modularity) of food webs</li></ul>
Community ecology: assembly and dynamics	<ul style="list-style-type: none"><li>• Describe and compare the approaches used to describe succession and community assembly by plant and animal ecologists</li><li>• Understand the role of facilitation, inhibition, tolerance, and history in community</li></ul>

	<p>assembly/dynamics</p> <ul style="list-style-type: none"> <li>• Understand the models and rules argued to underpin community structure</li> <li>• Evaluate the evidence for assembly rules (utilizing null models)</li> <li>• Assess empirical evidence that community dis-assembly (species loss) is predictable</li> </ul>
Landscape ecology	<ul style="list-style-type: none"> <li>• Use models (island biogeography, metapopulation theory) to explain how modification of the landscape is predicted to influence movement, population dynamics, and species richness</li> <li>• Evaluate how fragmentation can alter communities (using output from ordination/multivariate statistics)</li> </ul>
Ecosystem ecology: nutrient and energy flow	<ul style="list-style-type: none"> <li>• Describe approaches used by ecosystem scientists to measure the properties of an ecosystem</li> <li>• Compare the pools and fluxes of nutrients within different ecosystems</li> <li>• Describe the process that contribute to decomposition and the major controls over these processes</li> <li>• Explain the importance of animal movement for energy/nutrient flow within and across ecosystems</li> </ul>
Ecosystem Ecology: structure and function	<ul style="list-style-type: none"> <li>• Distinguish between alternative mechanisms that could lead to a relationship between biodiversity and ecosystem function</li> <li>• Understand how theoretical models and empirical data have shaped ideas relating diversity and stability, and regime shifts /alternative stable states</li> <li>• Evaluate observational and experimental approaches to the study of invasions</li> <li>• Use theory and data on community assembly and ecosystem function to explain the likely results of restoration activities</li> </ul>

### **Skills and qualities developed**

<b>This course aims to foster the following skills and qualities in students:</b>	<b>At a minimum, students should be able to:</b>
Interpretation of data	<ul style="list-style-type: none"><li>• interpret the results of statistical analyses of observational and experimental studies presented as tables or figures</li><li>• interpret the results of meta-analyses</li><li>• interpret the results of multivariate analyses (ordination plots)</li></ul>
Research abilities	<ul style="list-style-type: none"><li>• read and critically evaluate ecological studies in the primary literature</li><li>• provide a synthesis of the results obtained from a number of separate studies</li><li>• understand the concept of confounding effects and the importance of null models</li></ul>
Communication	<ul style="list-style-type: none"><li>• Give a succinct verbal presentation illustrating the relevance of a central question in community ecology and outlining recent advances in the area</li><li>• Use multiple strategies to engage an audience and lead a group discussion</li></ul>
Team-work and peer-review	<ul style="list-style-type: none"><li>• Work collaboratively with a peer to research a topic and present a talk</li><li>• Provide constructive feedback on the verbal presentations of peers</li></ul>

COURSE SUBJECT  NUMBER  TITLE

**INSTRUCTIONS (OVERALL):**

1. Using Microsoft Word draft changes using the following guideline. Paste in box below.
2. Rationale must be included. If more space is needed than provided below, please use the provided text box on page 2 of this document.
3. Indicate term = Fall, Spring, Summer

**TYPE OF CHANGES RECOMMENDED**

Please check appropriate revision(s):

☐ Course number ☐ Credit ☐ Title ☒ Description ☐ Prerequisite ☐ Deletion

**WORDING/DESCRIPTION EDITS**

4. Indicate deleted or changed text using strikethrough.
5. Indicate added or new text using underline.
6. Equivalent courses: preclusion statement should read:
  - a. Students with credit for x cannot take y for further credit.

Student will design an individual research project under the supervision and guidance of a faculty member. The project must relate to biological research or pedagogical research in biology. At the time of application, students will normally have a CGPA of 3.00 (B standing). BISC 490 may be taken in the term prior to BISC 491/492 by students intending to complete the three course ISS.

**SAMPLE**

POL 223 ~~Canadian~~ American Political Economy (3)

An introductory study of America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

~~This course is identical to CNS-280 and students cannot take both courses for credit.~~

Students with credit for CNS 280 cannot take POL 223 for further credit.

Recommended Pre-requisite: POL 100 or 101W.

Breadth – Social Sciences.

**RATIONALE**

If more space is needed, please use the provided text box on page 2 of this document

Science communication and pedagogical research are increasingly important to our Department, and we have faculty with considerable expertise in these areas. Broadening the scope of Undergraduate Research will allow students to develop valuable communication and pedagogical research skills within the context of a research environment. This is a rich learning opportunity, not currently available to students at SFU. This motion would also facilitate supervision of undergrad research projects by our current Teaching Faculty, and potential Teaching Professors (a new tenure-track category that focuses on research into teaching).

**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

SPRING 2016



COURSE SUBJECT  NUMBER  TITLE

**INSTRUCTIONS (OVERALL):**

1. Using Microsoft Word draft changes using the following guideline. Paste in box below.
2. Rationale must be included. If more space is needed than provided below, please use the provided text box on page 2 of this document.
3. Indicate term = Fall, Spring, Summer

**TYPE OF CHANGES RECOMMENDED**

Please check appropriate revision(s):

☐ Course number ☐ Credit ☐ Title ☒ Description ☐ Prerequisite ☐ Deletion

**WORDING/DESCRIPTION EDITS**

4. Indicate deleted or changed text using strikethrough.
5. Indicate added or new text using underline.
6. Equivalent courses: preclusion statement should read:
  - a. Students with credit for x cannot take y for further credit.

Student will carry out an individual research project under the supervision and guidance of a faculty member. The project must relate to biological or pedagogical research in biology.

**SAMPLE**

POL 223 ~~Canadian~~ American Political Economy (3)

An introductory study of America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

~~This course is identical to CNS 280 and students cannot take both courses for credit.~~

Students with credit for CNS 280 cannot take POL 223 for further credit.

Recommended Pre-requisite: POL 100 or 101W.

Breadth – Social Sciences.

**RATIONALE**

If more space is needed, please use the provided text box on page 2 of this document

Science communication and pedagogical research are increasingly important to our Department, and we have faculty with considerable expertise in these areas. Broadening the scope of Undergraduate Research will allow students to develop valuable communication and pedagogical research skills within the context of a research environment. This is a rich learning opportunity, not currently available to students at SFU. This motion would also facilitate supervision of undergrad research projects by our current Teaching Faculty, and potential Teaching Professors (a new tenure-track category that focuses on research into teaching).

**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

SPRING 2010



COURSE SUBJECT  NUMBER  TITLE

**INSTRUCTIONS (OVERALL):**

1. Using Microsoft Word draft changes using the following guideline. Paste in box below.
2. Rationale must be included. If more space is needed than provided below, please use the provided text box on page 2 of this document.
3. Indicate term = Fall, Spring, Summer

**TYPE OF CHANGES RECOMMENDED**

Please check appropriate revision(s):

☐ Course number ☐ Credit ☐ Title ☒ Description ☐ Prerequisite ☐ Deletion

**WORDING/DESCRIPTION EDITS**

4. Indicate deleted or changed text using striketthrough.
5. Indicate added or new text using underline.
6. Equivalent courses: preclusion statement should read:
  - a. Students with credit for x cannot take y for further credit.

Student will report on an individual research project under the supervision and guidance of a faculty member. The project must relate to biological or pedagogical research in biology.

**SAMPLE**

POL 223 ~~Canadian~~ American Political Economy (3)

~~An introductory study of America's~~ Canada's political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

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**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

- SPRING 2016

COURSE SUBJECT  NUMBER  TITLE

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~~Directed study and research in an area of biological science.~~ Directed study, and research or scientific communication, in an area of biology or biological pedagogy. A student may enrol in this course only with prior written agreement of a faculty member to act as a research supervisor, who will also provide instruction and feedback on the writing and presentation of results from the research. A maximum of three upper division research courses can be applied towards the major requirements.

**SAMPLE**

POL 223 ~~Canadian~~ American Political Economy (3)

An introductory study of America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

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**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

Spring 2016



COURSE SUBJECT  NUMBER  TITLE

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**SAMPLE**

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~~An introductory study of America's~~ Canada's political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

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**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

SPRING 2016

COURSE SUBJECT  NUMBER  TITLE

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**TYPE OF CHANGES RECOMMENDED**

Please check appropriate revision(s):

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**SAMPLE**

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**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

SPRING 2016

Chemistry Agenda Items to March 2015 FacSci meeting

1. New course proposal: NUSC 482 (See Attachment)

MOTION: To approve the new course offering NUSC 482-3 "Directed Study in Advanced Topics in Nuclear Science" as described in the new course proposal

2. Additions to the list of courses that can be counted towards the NUSC Minor (See attachment)

MOTION: To approve the addition of CHEM 462, CHEM 464 and "one of NUSC 482 or CHEM 482" to the list of courses that can be counted towards the NUSC Minor Program, and the requirement for "at least 9 units of NUSC-designated courses"

3. Harmonization of the CHEM 260 Physics prerequisites with current practice and course offerings in Physics (See attachment)

MOTION: To approve the change in prerequisites for CHEM 260.

4. CHEM 260 Prerequisite Addition for CHEM 360 (See Attachment)

MOTION: To approve the addition of CHEM 260 as a prerequisite for CHEM 360

5. Small changes to the CHEM Majors and Honours Programs (See attachments)

MOTION A: That the proposed changes to the CHEM Majors Program, as outlined in the documentation, be approved.

MOTION B: That the proposed changes to the CHEM Honours Program, as outlined in the documentation, be approved.



COURSE SUBJECT

NUSC

NUMBER

482

## COURSE TITLE

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

Directed Study in Advanced Topics in Nuclear Science

## AND

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

Directed Study Nuclear Science

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

Directed reading in a topic chosen in consultation with a supervisor. Admission requires selection of a faculty supervisor and submission of a study topic to the department a least one month prior to the start of the term in which the course will be taken. Normally taken during the fourth year of study.

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](http://lib.sfu.ca/collections/course-assessments)

In progress

## 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 will allow students to approach advanced topics that are not normally covered under typical course offerings, under the supervision of an expert faculty member. The analogous course exists for Chemistry students but has 3rd year CHEM prerequisites; this course has prerequisites of sufficient NUSC background and allows students with NUSC course experience but lacking the CHEM prerequisites to obtain credit for directed studies in Nuclear Science.

## 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:

Offered as required on a case by case basis

SPRING 2016

Will this be a required or elective course in the curriculum?

☐

Required

☒

Elective

What is the probable enrollment when offered? Estimate:

3-5 per year



**UNITS**Indicate number of units: Indicate no. of contact hours for:  Lecture  Seminar  Tutorial  Lab  Other – please explain**OTHER**

This directed studies course will involve one-on-one interaction with the supervising faculty member on a regular basis over the course of the term, but not on a specific schedule.

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

K. Starosta and C. Andreoiu (Chem. Dept.) and P. Schaffer and P. Kunz (TRIUMF., Adjunct Prof. SFU Chem.), with their expertise in Nuclear Science, can offer this course.

**WQB DESIGNATION** (attach approval from Curriculum Office)

None

**PREREQUISITE AND / OR COREQUISITE**

Prerequisite: Permission of the department.

**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?

N/A

**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:

None

### 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

D. Leznoff, Chemistry Undergraduate Studies Committee Chair

#### Nuclear Science Minor Changes:

Addition of CHEM 462 and CHEM 464 to the list of approved courses that can constitute the Minor, as well as a NUSC 482 Directed Study Course. Also, addition of a requirement that at least 9 units must be NUSC designated courses.

Rationale: These additions make it easier for students with a less comprehensive Physics background, including CHEM and MBB Majors, to complete the NUSC Minor Program. The requirement for 9 units of NUSC ensures that students who take the Minor Program do take a majority of courses that are NUSC-designated.

Additions/changes are underlined below.

#### Nuclear Science Minor

This program is offered jointly by the Departments of Chemistry and Physics.

##### Minimum Grade Requirement

Students wishing to enroll in physics courses must obtain a C- grade or better in prerequisite courses.

##### Program Requirements

Students complete a total of 14 upper division units, chosen from

CHEM 462 - Molecular Spectroscopy (3)

CHEM 464 - Quantum Chemistry (3)

NUSC 341 - Introduction to Radiochemistry (3)

NUSC 342 - Introduction to Nuclear Science (3)

NUSC 344 - Nucleosynthesis and Distribution of the Elements (3)

NUSC 346 - Radiochemistry Laboratory (2)

NUSC 444 - Special Topics in Nuclear Science (3)

PHYS 385 - Quantum Mechanics I (3)

PHYS 485 - Particle Physics (3)

and could include one of:

CHEM 482 - Directed Study in Advanced Topics of Chemistry (3)

NUSC 482 - Directed Study in Advanced Topics in Nuclear Science (3)

And must include at least nine units of NUSC-designated courses.



**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** **CHEM 260** **TO**  
Course Subject/Number \_\_\_\_\_ 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:** \_\_\_\_\_

**DESCRIPTION**

**TO:** \_\_\_\_\_

**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:** CHEM 122, MATH 152, PHYS 121.  
Recommended: MATH 232.

**PREREQUISITE**

CHEM 122, MATH 152, PHYS 102 (with at  
**TO:** least a B grade) or PHYS 121 or PHYS 126  
or ~~PHYS 141~~ Recommended: ~~MATH 232~~

**LEARNING OUTCOMES**

**RATIONALE**

Harmonizes the PHYS prerequisite options for CHEM 260 (a core Chemistry course) with the allowed PHYS course options for the Chemistry Major Program.



**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** **CHEM 360** **TO**  
Course Subject/Number \_\_\_\_\_ 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:**

**DESCRIPTION**

**TO:**

**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:** CHEM 122, MATH 152 (or 155), PHYS 121 (or 102). Recommended: MATH 251. Credit will not be granted for both CHEM 360 and MBB 323.

**PREREQUISITE**

**TO:** CHEM 260. Recommended: MATH 251. Credit will not be granted for both CHEM 360 and MBB 323.

**LEARNING OUTCOMES**

**RATIONALE**

CHEM 260 provides important prerequisite material for CHEM 360.

## Changes to Chemistry Honours Calendar Entry

These minor edits include alterations to reflect:

- The addition of new PHYS 1<sup>st</sup> year labs PHYS 132/133 to replace PHYS 131 and a name change for PHYS 231
- Research course credit restrictions on satisfying upper-division CHEM requirements
- Inclusion of the option to take CHEM 484-10 in place of CHEM 481-5
- Inclusion of MATH 240 as an alternative course for MATH 232

Additions are shown as underlined text and deletions are shown as strikethroughs. All changes are highlighted.

# Chemistry Honours

## BACHELOR OF SCIENCE

### Students intending to specialize in Chemistry

The point at which a high school or regional college student enters the chemistry program is governed by the student's subject knowledge. CHEM 110 and 111 are not required for the BSc degree but are available as electives to those with no chemistry knowledge or who are starting from BC high school chemistry 11. Those with BC high school chemistry 12 (or equivalent) normally start with CHEM 121. Major and honours students must fulfil program requirements below. Whether majoring in chemistry or not, students may not enroll in any CHEM course for which a D grade was obtained in any prerequisite.

Students are encouraged to complete the Department of Physics' standard stream (PHYS 120, 121, ~~131~~ 132, 133) or advanced stream (PHYS 125, 126, ~~131~~ 132, 133). Students may also choose to complete the studio physics stream (PHYS 140, 141). Students who complete the life sciences stream (PHYS 101, 102, 130, with a minimum B grade), which has a BISC 100 or 101 or 102 corequisite, should have sufficient preparation for the major program.

The following statements clarify and standardize the minimum requirements that a student must fulfil to complete a chemistry course as well as those to pass a combination lecture/laboratory course.

### Course non-completion

The following will constitute non-completion of the required material in a chemistry

course, not writing the final examination or its equivalent

not completing the required minimum number of experiments in a laboratory course or the laboratory component of a course

not completing additional or alternative material specified by the instructor

The letter grade N will be awarded in these cases.

Students must pass both the lecture and laboratory components individually to obtain a passing grade in lecture/laboratory combination courses.



## Program Requirements

Students complete 122 units, as specified below.

Mathematics and physics courses should be completed as early as possible.

For an example of a typical program schedule, visit <http://www.sfu.ca/chemistry/undergraduate.html#courseSequence>

### Lower Division Requirements

Students complete 62---63 units, including all of

CHEM 121 --- General Chemistry and Laboratory I (4)  
CHEM 122 --- General Chemistry II (2)  
CHEM 126 --- General Chemistry Laboratory II (2)  
CHEM 215 --- Introduction to Analytical Chemistry (4)  
CHEM 230 --- Inorganic Chemistry (3)  
CHEM 236W --- Inorganic Chemistry Laboratory (3)  
CHEM 260 --- Atoms, Molecules, Spectroscopy (4)  
CHEM 266 --- Physical Chemistry Laboratory I (2)  
CHEM 281 --- Organic Chemistry I (4)  
CHEM 283 --- Organic Chemistry IIb (3)  
CHEM 286 --- Organic Chemistry Laboratory II (2)  
MATH 152 --- Calculus II (3)  
~~MATH 232 --- Applied Linear Algebra (3)~~  
MATH 251 --- Calculus III (3)  
MBB 222 --- Molecular Biology and Biochemistry (3)  
PHYS 211 --- Intermediate Mechanics (3)  
PHYS 231 --- Physics Laboratory III (3)

and one of

MATH 150 --- Calculus I with Review (4)  
MATH 151 --- Calculus I (3)

and one of

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

and all of

PHYS 120 --- Mechanics and Modern Physics (3)  
PHYS 121 --- Optics, Electricity and Magnetism (3)  
~~PHYS 131 --- Physics Laboratory I (2)~~  
PHYS 132 --- Physics Laboratory I (1)  
PHYS 133 --- Physics Laboratory II (1)

or all of

PHYS 125 --- Mechanics and Special Relativity (3)  
PHYS 126 --- Electricity, Magnetism and Light (3)  
~~PHYS 131 --- Physics Laboratory I (2)~~  
PHYS 132 --- Physics Laboratory I (1)  
PHYS 133 --- Physics Laboratory II (1)

or both of

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

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

## Upper Division Requirements

Students complete 48 units, including all of

CHEM 316 --- Introductory Instrumental Analysis (4)

CHEM 332 --- The Chemistry of Transition Metals (3)

CHEM 336 --- Advanced Inorganic Chemistry Laboratory (2)

CHEM 360 --- Thermodynamics and Chemical Kinetics (3)

CHEM 366W --- Physical Chemistry Laboratory II (3)

CHEM 380 --- Chemical and Instrumental Methods of Identification of Organic Compounds (4)

~~CHEM 481 --- Undergraduate Research (5)~~

NUSC 341 --- Introduction to Radiochemistry (3)

and one of

CHEM 460 --- Advanced Physical Chemistry (3)

CHEM 464 --- Quantum Chemistry (3)

~~and one of either~~

~~CHEM 481 --- Undergraduate Research (5)~~

~~and an additional 18 upper division units in CHEM, MBB or NUSC courses, including at least nine units of 400 division CHEM courses.~~

~~Or~~

~~CHEM 484 --- Two Semester Undergraduate Research in Chemistry (10)~~

~~and an additional 13 upper division units in CHEM, MBB or NUSC courses, including at least four units of 400 division CHEM courses.~~

## Faculty of Science Honours Requirements

In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements as follows:

students are required to complete additional upper division units from any faculty to total a minimum of 60 upper division units

### Electives

In addition to the above, students complete at least 12 elective units,

including courses chosen to fulfil the WQB requirements

electives at any division from any faculty to provide the minimum 122 units for the honours

Those specializing in physical or theoretical chemistry should complete more mathematics courses than specified above and a course in computer programming.

In order to complete a Chemistry Honours degree in 122 units, students are encouraged to use upper division B-soc and B-hum courses to complete these electives rather than fulfil their B-soc and B-hum requirements with Lower Division courses.

## Writing, Quantitative, and Breadth Requirements



SCUS 15-12f

COURSE SUBJECT EASC

NUMBER 209W

TITLE Environmental Geoscience

## INSTRUCTIONS (OVERALL):

1. Using Microsoft Word draft changes using the following guideline. Paste in box below.
2. Rationale must be included. If more space is needed than provided below, please use the provided text box on page 2 of this document.
3. Indicate term = Fall, Spring, Summer

## TYPE OF CHANGES RECOMMENDED

Please check appropriate revision(s):

☐ Course number ☒ Credit ☐ Title ☒ Description ☐ Prerequisite

## WORDING/DESCRIPTION EDITS

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EASC 209W - Environmental Geoscience (3-4)  
Environmental geology is a branch of Earth science that deals with the relationship of people to their geological habitat. Topics covered will include environmental impact of mineral extraction and logging; erosion and sedimentation in rural and urban environments; and mass movements in mountainous terrain. The course includes two 1-day field trips that usually occur on Saturdays. This course is primarily designed for EASC program students and those pursuing degrees in other Departments and Faculties that require a strong foundational course in Environmental Geoscience. Students with credits for EASC 303W may not take this course for credit. Prerequisite: EASC 101. Writing.

## SAMPLE

POL 223 ~~Canadian~~ American Political Economy (3)

An introductory study of America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

~~This course is identical to CNS 280 and students cannot take both courses for credit.~~

Students with credit for CNS 280 cannot take POL 223 for further credit.

Recommended Pre-requisite: POL 100 or 101W.

Breadth - Social Sciences.

## RATIONALE

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The course was recently moved to 2nd year to act as an broad introduction to the breadth of Environmental Geoscience as EASC majors did not take any "environmental" courses until 3rd year. Unfortunately it has proved impossible to cover all the subjects in the time provided. Another hour of lecture a week should enable the material to be covered.

## EFFECTIVE TERM AND YEAR, FOR CHANGES

Fall, Spring, Summer and year

Spring 2016

COURSE SUBJECT EASC

NUMBER 306

TITLE Field Geology II

**INSTRUCTIONS (OVERALL):**

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3. Indicate term = Fall, Spring, Summer

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Please check appropriate revision(s):

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6. Equivalent courses: preclusion statement should read:
  - a. Students with credit for x cannot take y for further credit.

A 10-14 day field camp held after final exams in the Spring term. Students will learn how to observe, record and interpret geological features, and will carry out geological mapping and analysis. Approximately five 1-hour lectures Lectures on field methods, equipment and safety will may precede the field camp. Field locations may vary from year to year.

Prerequisite/Corequisite: EASC 201, 204, 205,<sup>1</sup> and 206

**SAMPLE**

POL 223 ~~Canadian~~ American Political Economy (3)

An introductory study of America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

~~This course is identical to CNS 280 and students cannot take both courses for credit.~~

Students with credit for CNS 280 cannot take POL 223 for further credit.

~~Recommended~~ Pre-requisite: POL 100 or 101W.

Breadth – Social Sciences.

**RATIONALE**

If more space is needed, please use the provided text box on page 2 of this document

The description of lectures that precede the field camp is too specific. The new wording allows for pre-camp lectures, but does not require them, nor does it state when they may occur. Such details are likely to vary from year to year and will be described in the course outline.

There is an apostrophe in the current list of pre/corequisites. It should be removed. The list of courses is not affected.

**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

Spring 2016



COURSE SUBJECT

EASC

NUMBER

499

TITLE

Honours Thesis

**INSTRUCTIONS (OVERALL):**

1. Using Microsoft Word draft changes using the following guideline. Paste in box below.
2. Rationale must be included. If more space is needed than provided below, please use the provided text box on page 2 of this document.
3. Indicate term = Fall, Spring, Summer

**TYPE OF CHANGES RECOMMENDED**

Please check appropriate revision(s):

☐ Course number ☒ Credit ☐ Title ☒ Description ☐ Prerequisite
**WORDING/DESCRIPTION EDITS**

4. Indicate deleted or changed text using strikethrough.
5. Indicate added or new text using underline.
6. Equivalent courses: preclusion statement should read:
  - a. Students with credit for x cannot take y for further credit.

**EASC 499 Honours Thesis (96)**

Will include experimental and/or theoretical research in ~~e~~Earth sciences or a related discipline, and the preparation of a thesis (research report). Selection of a research topic and preparation of the thesis will be done in consultation with a faculty member in ~~e~~Earth ~~s~~Sciences. A research seminar will be delivered at the end of the semester.

Prerequisite: 105 units, admittance to the honours program and consent of a thesis supervisor.

**SAMPLE**POL 223 ~~Canadian~~ American Political Economy (3)

An introductory study of America's ~~Canada's~~ political economy, stressing the interrelated nature of Canada's economic and political life. ~~The course~~ Focuses on current economic problems and policies, taking into account the geographical, historical and political environments. Topics include the resource and industrial structures, research and development, the public sector, fiscal and monetary policy, the role of the state, trade and foreign ownership, energy, regional disparity, corporate concentration and the political economy of federalism.

~~This course is identical to CNS 280 and students cannot take both courses for credit.~~

Students with credit for CNS 280 cannot take POL 223 for further credit.

Recommended Pre-requisite: POL 100 or 101W.

Breadth – Social Sciences.

**RATIONALE**

If more space is needed, please use the provided text box on page 2 of this document

The number of students completing honours theses in Earth Sciences is low, and has been decreasing. One possible concern is the high number of units (cost) assigned to this one semester course. We propose to reduce the total number of units by 3 to encourage more students to enter the honours program. In addition, we have revamped our honours program from 132 units to 121 units. Given that EASC 499 is a one-semester course in the 121 unit program, it should only be worth 6 units.

**EFFECTIVE TERM AND YEAR, FOR CHANGES**

Fall, Spring, Summer and year

SPRING 2016



Present Calendar Description	Proposed Calendar Description changes Underlined
<b>Chemistry and Earth Sciences Joint Honours Program</b> This Bachelor of Science (BSc) program is offered jointly by the Departments of Chemistry and Earth Sciences. Entry requires permission of both departments.	<b>Chemistry and Earth Sciences Joint Honours Program</b> This Bachelor of Science (BSc) program is offered jointly by the Departments of Chemistry and Earth Sciences. Entry requires permission of both departments.
<b>Minimum Grade Requirement</b> Students wishing to enroll in Chemistry and Earth Sciences courses must obtain a C- grade or better in prerequisite courses.	<b>Minimum Grade Requirement</b> Students wishing to enroll in Chemistry and Earth Sciences courses must obtain a C- grade or better in prerequisite courses.
<b>Program Requirements</b> Students complete a minimum of 132 units, as specified below including a minimum 3.00 cumulative grade point average to be awarded an honours degree.	<b>Program Requirements</b> Students complete a minimum of <del>132</del> <u>131</u> units, as specified below including a minimum 3.00 cumulative grade point average to be awarded an honours degree.
<b>Lower Division Requirements</b> Students will complete a minimum of 68 units including  all of CHEM 121-4 General Chemistry and Laboratory I CHEM 122-2 General Chemistry II CHEM 126-2 General Chemistry Laboratory II CHEM 215-4 Introduction to Analytical Chemistry CHEM 230-3 Inorganic Chemistry CHEM 236W-3 Inorganic Chemistry Laboratory CHEM 281-4 Organic Chemistry I EASC 101-3 Dynamic Earth EASC 201-3 Stratigraphy and Sedimentation EASC 202-3 Introduction to Mineralogy EASC 204-3 Structural Geology I EASC 205-3 Introduction to Petrology EASC 206-2 Field Geology I EASC 207-3 Introduction to Applied Geophysics EASC 208-3 Introduction to Geochemistry EASC 209W-3 Environmental Geoscience EASC 210-3 Historical Geology MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review MATH 152-3 Calculus II  and one of STAT 201-3 Statistics for the Life Sciences STAT 270-3 Introduction to Probability and Statistics  and all of PHYS 120-3 Mechanics and Modern Physics PHYS 121-3 Optics, Electricity and Magnetism PHYS 131-2 Physics Laboratory I  or all of PHYS 125-3 Mechanics and Special Relativity PHYS 126-3 Electricity, Magnetism and Light PHYS 131-2 Physics Laboratory I  or both of PHYS 140-4 Studio Physics-Mechanics and Modern Physics PHYS 141-4 Studio Physics-Optics, Electricity and Magnetism	<b>Lower Division Requirements</b> Students will complete a minimum of <del>68</del> <u>69</u> units including  all of CHEM 121-4 General Chemistry and Laboratory I CHEM 122-2 General Chemistry II CHEM 126-2 General Chemistry Laboratory II CHEM 215-4 Introduction to Analytical Chemistry CHEM 230-3 Inorganic Chemistry CHEM 236W-3 Inorganic Chemistry Laboratory CHEM 281-4 Organic Chemistry I EASC 101-3 Dynamic Earth EASC 201-3 Stratigraphy and Sedimentation EASC 202-3 Introduction to Mineralogy EASC 204-3 Structural Geology I EASC 205-3 Introduction to Petrology EASC 206-2 Field Geology I EASC 207-3 Introduction to Applied Geophysics EASC 208-3 Introduction to Geochemistry <del>EASC 209W-3 Environmental Geoscience</del> <u>EASC 209W-4 Environmental Geoscience</u> EASC 210-3 Historical Geology MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review MATH 152-3 Calculus II  and one of STAT 201-3 Statistics for the Life Sciences STAT 270-3 Introduction to Probability and Statistics  and all of PHYS 120-3 Mechanics and Modern Physics PHYS 121-3 Optics, Electricity and Magnetism <del>PHYS 131-2 Physics Laboratory I</del> <u>PHYS 132-1 Physics Laboratory I</u> <u>PHYS 133-1 Physics Laboratory II</u>  or all of PHYS 125-3 Mechanics and Special Relativity PHYS 126-3 Electricity, Magnetism and Light <del>PHYS 131-2 Physics Laboratory I</del> <u>PHYS 132-1 Physics Laboratory I</u> <u>PHYS 133-1 Physics Laboratory II</u>  or both of PHYS 140-4 Studio Physics-Mechanics and Modern Physics PHYS 141-4 Studio Physics-Optics, Electricity and Magnetism

<p><b>Upper Division Requirements</b> Upper division units must total a minimum of 50 units in CHEM and EASC, including at least 26 units in upper division CHEM, and all of</p> <p>CHEM 316-4 Introductory Instrumental Analysis CHEM 317-2 Analytical Environmental Chemistry CHEM 332-3 The Chemistry of Transition Metals CHEM 360-3 Thermodynamics and Chemical Kinetics CHEM 371-3 Chemistry of the Aqueous Environment CHEM 372-3 Chemistry of the Atmospheric Environment</p> <p>and 6 units of 400-level CHEM (which can include CHEM 481-5)</p> <p>EASC 306-3 Field Geology II EASC 308-3 Field Geology III</p> <p><b>Environmental Stream</b> Students who choose this stream will complete all of EASC 304-3 Hydrogeology EASC 403-3 Quaternary Geology</p> <p><b>Geology Stream</b> Students who choose this stream will complete all of EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology</p> <p>and one of EASC 315W-3 Geochemistry of Natural Waters EASC 310W-3 Paleontology</p> <p>and one of EASC 499-9 Honours Thesis CHEM 481-5 Undergraduate Research</p> <p>and one of NUSC 341-3 Introduction to Radiochemistry NUSC 344-3 Nucleosynthesis and Distribution of the Elements PHYS 346-3 Energy and the Environment</p>	<p><b>Upper Division Requirements</b> Upper division units must total a minimum of 50 units in CHEM and EASC, including at least 26 units in upper division CHEM, and all of</p> <p>CHEM 316-4 Introductory Instrumental Analysis CHEM 317-2 Analytical Environmental Chemistry CHEM 332-3 The Chemistry of Transition Metals CHEM 360-3 Thermodynamics and Chemical Kinetics CHEM 371-3 Chemistry of the Aqueous Environment CHEM 372-3 Chemistry of the Atmospheric Environment</p> <p>and 6 units of 400-level CHEM (which can include CHEM 481-5)</p> <p>EASC 306-3 Field Geology II EASC 308-3 Field Geology III</p> <p><b>Environmental Stream</b> Students who choose this stream will complete all of EASC 304-3 Hydrogeology EASC 403-3 Quaternary Geology</p> <p><b>Geology Stream</b> Students who choose this stream will complete all of EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology</p> <p>and one of EASC 315W-3 Geochemistry of Natural Waters EASC 310W-3 Paleontology</p> <p>and one of <del>EASC 499-9 Honours Thesis</del> <u>EASC 499-6 Honours Thesis</u> CHEM 481-5 Undergraduate Research</p> <p>and one of NUSC 341-3 Introduction to Radiochemistry NUSC 344-3 Nucleosynthesis and Distribution of the Elements PHYS 346-3 Energy and the Environment</p>
<p><b>Upper Division Electives</b> Upper division units must total a minimum of 60 units overall (not including EDUC 401-406)</p>	<p><b>Upper Division Electives</b> Upper division units must total a minimum of 60 units overall, <del>(excluding EDUC 401-406)</del></p>
<p><b>Faculty of Science Requirements</b> To satisfy Faculty of Science requirements, students complete additional upper division credit to total 44 units. Job practicum courses, STAT 302 and 403 may not be used to fulfill this requirement.</p>	<p><b>Faculty of Science Requirements</b> To satisfy Faculty of Science requirements, students complete additional upper division credit to total <del>44</del> <u>60</u> units. Job practicum courses, STAT 302 and 403 may not be used to fulfill this requirement.</p>
<p><b>Writing, Quantitative, and Breadth Requirements</b> Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>	<p><b>Writing, Quantitative, and Breadth Requirements</b> Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>
<p><b>Residency Requirements and Transfer Credit</b> The University's residency requirement stipulates that, in most</p>	<p><b>Residency Requirements and Transfer Credit</b> The University's residency requirement stipulates that, in most</p>

cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.	cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.
<b>Elective Courses</b> In addition to the courses listed above, students should consult an academic advisor to plan the remaining required elective courses.	<b>Elective Courses</b> In addition to the courses listed above, students should consult an academic advisor to plan the remaining required elective courses.

**Rationale:**

These changes reflect the increase in units to EASC 209W, the change in first year PHYS labs approved in the FOS UCC on Jan. 7, 2015, and the decrease in units for EASC 499. The minimum number of units decreases by 1 to 131. The removal of “(excluding EDUC 401-406)” from “Faculty of Science Requirements” reflects the fact that this wording is no longer required, and is being removed by all departments in science. EDUC 401 and/or 402 are pre-requisites 403 to 406, and 401/402 can only be taken with admission into the Professional Development Program.

Present Calendar Description	Proposed Calendar Description changes Underlined
<b>Chemistry and Earth Sciences Joint Major Program</b> This Bachelor of Science (BSc) program is offered jointly by the Departments of Chemistry and Earth Sciences. Entry requires permission of both departments.	<b>Chemistry and Earth Sciences Joint Major Program</b> This Bachelor of Science (BSc) program is offered jointly by the Departments of Chemistry and Earth Sciences. Entry requires permission of both departments.
<b>Minimum Grade Requirement</b> Students wishing to enroll in Chemistry and Earth Sciences courses must obtain a C- grade or better in prerequisite courses.	<b>Minimum Grade Requirement</b> Students wishing to enroll in Chemistry and Earth Sciences courses must obtain a C- grade or better in prerequisite courses.
<b>Program Requirements</b> Students complete a minimum of 122 units, as specified below.	<b>Program Requirements</b> Students complete a minimum of <del>122</del> <u>123</u> units, as specified below.
<b>Lower Division Requirements</b> Students will complete a minimum of 68 units including  all of CHEM 121-4 General Chemistry and Laboratory I CHEM 122-2 General Chemistry II CHEM 126-2 General Chemistry Laboratory II CHEM 215-4 Introduction to Analytical Chemistry CHEM 230-3 Inorganic Chemistry CHEM 236W-3 Inorganic Chemistry Laboratory CHEM 281-4 Organic Chemistry I EASC 101-3 Dynamic Earth EASC 201-3 Stratigraphy and Sedimentation EASC 202-3 Introduction to Mineralogy EASC 204-3 Structural Geology I EASC 205-3 Introduction to Petrology EASC 206-2 Field Geology I EASC 207-3 Introduction to Applied Geophysics EASC 208-3 Introduction to Geochemistry EASC 209W-3 Environmental Geoscience EASC 210-3 Historical Geology MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review MATH 152-3 Calculus II  and one of STAT 201-3 Statistics for the Life Sciences STAT 270-3 Introduction to Probability and Statistics  and all of PHYS 120-3 Mechanics and Modern Physics PHYS 121-3 Optics, Electricity and Magnetism PHYS 131-2 Physics Laboratory I  or all of PHYS 125-3 Mechanics and Special Relativity PHYS 126-3 Electricity, Magnetism and Light PHYS 131-2 Physics Laboratory I  or both of PHYS 140-4 Studio Physics-Mechanics and Modern Physics PHYS 141-4 Studio Physics-Optics, Electricity and Magnetism	<b>Lower Division Requirements</b> Students will complete a minimum of <del>68</del> <u>69</u> units including  all of CHEM 121-4 General Chemistry and Laboratory I CHEM 122-2 General Chemistry II CHEM 126-2 General Chemistry Laboratory II CHEM 215-4 Introduction to Analytical Chemistry CHEM 230-3 Inorganic Chemistry CHEM 236W-3 Inorganic Chemistry Laboratory CHEM 281-4 Organic Chemistry I EASC 101-3 Dynamic Earth EASC 201-3 Stratigraphy and Sedimentation EASC 202-3 Introduction to Mineralogy EASC 204-3 Structural Geology I EASC 205-3 Introduction to Petrology EASC 206-2 Field Geology I EASC 207-3 Introduction to Applied Geophysics EASC 208-3 Introduction to Geochemistry <del>EASC 209W-3 Environmental Geoscience</del> <u>EASC 209W-4 Environmental Geoscience</u> EASC 210-3 Historical Geology MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review MATH 152-3 Calculus II  and one of STAT 201-3 Statistics for the Life Sciences STAT 270-3 Introduction to Probability and Statistics  and all of PHYS 120-3 Mechanics and Modern Physics PHYS 121-3 Optics, Electricity and Magnetism <del>PHYS 131-2 Physics Laboratory I</del> <u>PHYS 132-1 Physics Laboratory I</u> <u>PHYS 133-1 Physics Laboratory II</u>  or all of PHYS 125-3 Mechanics and Special Relativity PHYS 126-3 Electricity, Magnetism and Light <del>PHYS 131-2 Physics Laboratory I</del> <u>PHYS 132-1 Physics Laboratory I</u> <u>PHYS 133-1 Physics Laboratory II</u>  or both of PHYS 140-4 Studio Physics-Mechanics and Modern Physics PHYS 141-4 Studio Physics-Optics, Electricity and Magnetism
<b>Upper Division Requirements</b>	<b>Upper Division Requirements</b>

<p>Students will complete a minimum of 42 units including all of</p> <p>CHEM 316-4 Introductory Instrumental Analysis  CHEM 317-2 Analytical Environmental Chemistry  CHEM 332-3 The Chemistry of Transition Metals  CHEM 360-3 Thermodynamics and Chemical Kinetics  CHEM 371-3 Chemistry of the Aqueous Environment  CHEM 372-3 Chemistry of the Atmospheric Environment</p> <p>and 3 units of 400-level CHEM not including CHEM 481-5 or CHEM 483-5</p> <p>EASC 306-3 Field Geology II  EASC 308-3 Field Geology III</p> <p><b>Environmental Stream</b>  Students who choose this stream will complete all of  EASC 304-3 Hydrogeology  EASC 403-3 Quaternary Geology</p> <p><b>Geology Stream</b>  Students who choose this stream will complete all of  EASC 301-3 Igneous Petrology  EASC 302-3 Sedimentary Petrology</p> <p>and one of  EASC 315W-3 Geochemistry of Natural Waters  EASC 310W-3 Paleontology</p> <p>and 3 additional units of 400-level EASC courses</p> <p>and one of  NUSC 341-3 Introduction to Radiochemistry  NUSC 344-3 Nucleosynthesis and Distribution of the Elements  PHYS 346-3 Energy and the Environment</p>	<p>Students will complete a minimum of 42 units including all of</p> <p>CHEM 316-4 Introductory Instrumental Analysis  CHEM 317-2 Analytical Environmental Chemistry  CHEM 332-3 The Chemistry of Transition Metals  CHEM 360-3 Thermodynamics and Chemical Kinetics  CHEM 371-3 Chemistry of the Aqueous Environment  CHEM 372-3 Chemistry of the Atmospheric Environment</p> <p>and 3 units of 400-level CHEM not including CHEM 481-5, <del>or</del> CHEM 483-5 <u>or CHEM 484-10</u></p> <p>EASC 306-3 Field Geology II  EASC 308-3 Field Geology III</p> <p><b>Environmental Stream</b>  Students who choose this stream will complete all of  EASC 304-3 Hydrogeology  EASC 403-3 Quaternary Geology</p> <p><b>Geology Stream</b>  Students who choose this stream will complete all of  EASC 301-3 Igneous Petrology  EASC 302-3 Sedimentary Petrology</p> <p>and one of  EASC 315W-3 Geochemistry of Natural Waters  EASC 310W-3 Paleontology</p> <p>and 3 additional units of 400-level EASC courses</p> <p>and one of  NUSC 341-3 Introduction to Radiochemistry  NUSC 344-3 Nucleosynthesis and Distribution of the Elements  PHYS 346-3 Energy and the Environment</p>
<p><b>Upper Division Electives</b>  Upper division units must total a minimum of 44 upper division units (excluding EDUC 401-406)</p>	<p><b>Upper Division Electives</b>  Upper division units must total a minimum of 44 upper division units, <del>(excluding EDUC 401-406)</del></p>
<p><b>Faculty of Science Requirements</b>  To satisfy Faculty of Science requirements, students complete additional upper division credit to total 44 units. Job practicum courses, STAT 302 and 403 may not be used to fulfill this requirement.</p>	<p><b>Faculty of Science Requirements</b>  To satisfy Faculty of Science requirements, students complete additional upper division credit to total 44 units. Job practicum courses, STAT 302 and 403 may not be used to fulfill this requirement.</p>
<p><b>Writing, Quantitative, and Breadth Requirements</b>  Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>	<p><b>Writing, Quantitative, and Breadth Requirements</b>  Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>
<p><b>Residency Requirements and Transfer Credit</b>  The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.</p>	<p><b>Residency Requirements and Transfer Credit</b>  The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.</p>
<p><b>Elective Courses</b>  In addition to the courses listed above, students should consult an</p>	<p><b>Elective Courses</b>  In addition to the courses listed above, students should consult an</p>



academic advisor to plan the remaining required elective courses.	academic advisor to plan the remaining required elective courses.
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**Rationale:**

These changes reflect the increase in units to EASC 209W, and the change in first year PHYS labs approved in the FOS UCC on Jan. 7, 2015. The minimum number of units increases by 1 to 123. The removal of “(excluding EDUC 401-406)” from “Faculty of Science Requirements” reflects the fact that this wording is no longer required, and is being removed by all departments in science. EDUC 401 and/or 402 are pre-requisites 403 to 406, and 401/402 can only be taken with admission into the Professional Development Program.

Present Calendar Description	Proposed Calendar Description changes Underlined
<p><b>Earth Sciences Honours Program</b>  This bachelor of science (BSc) with honours program offers a wide cross-section of discipline-related courses while providing an opportunity for independent research. The program has three course stream options leading to course concentrations: geology stream, environmental geoscience stream, and general earth sciences stream.</p> <p>The geology and environmental geoscience streams are designed to permit a student to enrol as a geologist or environmental geoscientist respectively, in the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), the governing body that regulates geoscience practice in BC. All students intending to practice as a geoscientist in BC must be licensed by APEGBC, and are strongly advised to pursue one of these two streams. Many other Canadian provinces also require professional licensing.</p> <p>Students who are not intending to practice as professional geoscientists, may choose to pursue the general Earth Sciences stream. This stream may best accommodate students in some joint major programs.</p> <p>Students should seek the advice of a departmental program advisor.</p>	<p><b>Earth Sciences Honours Program</b>  This bachelor of science (BSc) with honours program offers a wide cross-section of discipline-related courses while providing an opportunity for independent research. The program has three course stream options leading to course concentrations: geology stream, environmental geoscience stream, and general earth sciences stream.</p> <p>The geology and environmental geoscience streams are designed to permit a student to enrol as a geologist or environmental geoscientist respectively, in the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), the governing body that regulates geoscience practice in BC. All students intending to practice as a geoscientist in BC must be licensed by APEGBC, and are strongly advised to pursue one of these two streams. Many other Canadian provinces also require professional licensing.</p> <p>Students who are not intending to practice as professional geoscientists, may choose to pursue the general Earth Sciences stream. This stream may best accommodate students in some joint major programs.</p> <p>Students should seek the advice of a departmental program advisor.</p>
<p><b>Admission Requirements</b>  Entry to the program requires a 3.00 or higher (B standing) cumulative grade point average (CGPA), and departmental permission.</p>	<p><b>Admission Requirements</b>  Entry to the program requires a 3.00 or higher (B standing) cumulative grade point average (CGPA), and departmental permission.</p>
<p><b>Minimum Grade Requirement</b>  Students wishing to enroll in Earth Sciences courses must obtain a C- grade or better in prerequisite courses.</p>	<p><b>Minimum Grade Requirement</b>  Students wishing to enroll in Earth Sciences courses must obtain a C- grade or better in prerequisite courses.</p>
<p><b>Program Requirements</b>  Students complete a minimum of 132 units, as specified below including a minimum 3.00 cumulative grade point average to be awarded an honours degree.</p>	<p><b>Program Requirements</b>  Students complete a minimum of <del>132</del> <u>121</u> units, as specified below including a minimum 3.00 cumulative grade point average to be awarded an honours degree.</p>
<p><b>Lower Division Requirements</b>  All students, no matter which streams they will choose, will complete a minimum of 54 units including</p> <p>all of</p> <p>CHEM 121-4 General Chemistry and Laboratory I  CHEM 122-2 General Chemistry II  CHEM 126-2 General Chemistry Laboratory II  EASC 101-3 Dynamic Earth  EASC 201-3 Stratigraphy and Sedimentation  EASC 202-3 Introduction to Mineralogy  EASC 204-3 Structural Geology I  EASC 205-3 Introduction to Petrology  EASC 206-2 Field Geology I  EASC 207-3 Introduction to Applied Geophysics  EASC 208-3 Introduction to Geochemistry  EASC 209W-3 Environmental Geoscience  EASC 210-3 Historical Geology  MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review  MATH 152-3 Calculus II</p> <p>and one of</p> <p>STAT 201-3 Statistics for the Life Sciences  STAT 270-3 Introduction to Probability and Statistics</p> <p>and one of</p> <p>PHYS 101-3 Physics for the Life Sciences I*</p>	<p><b>Lower Division Requirements</b>  All students, no matter which streams they will choose, will complete a minimum of <del>54</del> <u>55</u> units including</p> <p>all of</p> <p>CHEM 121-4 General Chemistry and Laboratory I  CHEM 122-2 General Chemistry II  CHEM 126-2 General Chemistry Laboratory II  EASC 101-3 Dynamic Earth  EASC 201-3 Stratigraphy and Sedimentation  EASC 202-3 Introduction to Mineralogy  EASC 204-3 Structural Geology I  EASC 205-3 Introduction to Petrology  EASC 206-2 Field Geology I  EASC 207-3 Introduction to Applied Geophysics  EASC 208-3 Introduction to Geochemistry  <del>EASC 209W-3 Environmental Geoscience</del>  <u>EASC 209W-4 Environmental Geoscience</u>  EASC 210-3 Historical Geology  MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review  MATH 152-3 Calculus II</p> <p>and one of</p> <p>STAT 201-3 Statistics for the Life Sciences  STAT 270-3 Introduction to Probability and Statistics</p> <p>and one of</p>

<p>PHYS 120-3 Mechanics and Modern Physics  PHYS 125-3 Mechanics and Special Relativity  PHYS 140-4 Studio Physics - Mechanics and Modern Physics</p> <p>and one of  PHYS 102-3 Physics for the Life Sciences II*  PHYS 121-3 Optics, Electricity and Magnetism  PHYS 126-3 Electricity, Magnetism and Light  PHYS 141-4 Studio Physics - Optics, Electricity and Magnetism</p> <p>and if not completing PHYS 140/141, one of  PHYS 130-2 Physics for the Life Sciences Laboratory*  PHYS 131-2 Physics Laboratory I</p> <p>*Students are encouraged to complete the standard stream (PHYS 120, 121, 131) or the advanced stream (PHYS 125, 126, 131). Students may also choose to complete the studio physics stream (PHYS 140, 141). Students who complete the life sciences stream (PHYS 101, 102, 130) (which has a corequisite of BISC 100 or 101 or 102) with a minimum B grade should have sufficient preparation for the major program.</p>	<p>PHYS 101-3 Physics for the Life Sciences I*  PHYS 120-3 Mechanics and Modern Physics  PHYS 125-3 Mechanics and Special Relativity  PHYS 140-4 Studio Physics - Mechanics and Modern Physics</p> <p>and one of  PHYS 102-3 Physics for the Life Sciences II*  PHYS 121-3 Optics, Electricity and Magnetism  PHYS 126-3 Electricity, Magnetism and Light  PHYS 141-4 Studio Physics - Optics, Electricity and Magnetism</p> <p>and if not completing PHYS 140/141, <del>one of</del>  PHYS 130-2 Physics for the Life Sciences Laboratory*  <del>PHYS 131-2 Physics Laboratory I</del>  <u>or both of</u>  <u>PHYS 132-1 Physics Laboratory I</u>  <u>PHYS 133-1 Physics Laboratory II</u></p> <p>*Students are encouraged to complete the standard stream (PHYS 120, 121, <del>131</del> <u>132, 133</u>) or the advanced stream (PHYS 125, 126, <del>131</del> <u>132, 133</u>). Students may also choose to complete the studio physics stream (PHYS 140, 141). Students who complete the life sciences stream (PHYS 101, 102, 130) (which has a corequisite of BISC 100 or 101 or 102) with a minimum B grade should have sufficient preparation for the major program.</p>
<p><b>Upper Division Requirements</b>  Students will complete 60 units minimum of 300 and 400 division EASC or related courses that are approved by the department. Students are encouraged to select upper division elective courses in consultation with an academic advisor, as APEGBC has specific groupings of elective courses for each stream, respectively.</p>	<p><b>Upper Division Requirements</b>  Students will complete 60 units minimum of 300 and 400 division EASC or related courses that are approved by the department. Students are encouraged to select upper division elective courses in consultation with an academic advisor, as APEGBC has specific groupings of elective courses for each stream, respectively.</p>
<p><b>Geology Stream</b>  Students who choose this stream will complete a minimum of 51 units, including all of</p> <p>EASC 301-3 Igneous Petrology  EASC 302-3 Sedimentary Petrology  EASC 306-3 Field Geology II  EASC 308-3 Field Geology III  EASC 309-3 Global Tectonics  EASC 310W-3 Paleontology  EASC 311-3 Metamorphic Petrology  EASC 499-9 Honours Thesis</p> <p>and at least one of  EASC 304-3 Hydrogeology  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 403-3 Quaternary Geology</p> <p>and at least 18 units chosen from  EASC 300-3 Selected Topics in Earth Sciences  EASC 304-3 Hydrogeology  EASC 305-3 Quantitative Methods for the Earth Sciences  EASC 307-3 Applied Geophysics  EASC 312-3 Stratigraphy  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 314-3 Principles of Glaciology  EASC 315W-3 Geochemistry of Natural Waters</p>	<p><b>Geology Stream</b>  Students who choose this stream will complete a minimum of <del>51</del> <u>48</u> units, including all of</p> <p>EASC 301-3 Igneous Petrology  EASC 302-3 Sedimentary Petrology  EASC 306-3 Field Geology II  EASC 308-3 Field Geology III  EASC 309-3 Global Tectonics  EASC 310W-3 Paleontology  EASC 311-3 Metamorphic Petrology  <del>EASC 499-9 Honours Thesis</del>  <u>EASC 499-6 Honours Thesis</u></p> <p>and at least one of  EASC 304-3 Hydrogeology  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 403-3 Quaternary Geology</p> <p>and at least 18 units chosen from  EASC 300-3 Selected Topics in Earth Sciences  EASC 304-3 Hydrogeology  EASC 305-3 Quantitative Methods for the Earth Sciences  EASC 307-3 Applied Geophysics  EASC 312-3 Stratigraphy  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 314-3 Principles of Glaciology</p>

EASC 317-3 Global Geophysics EASC 400-3 Selected Topics in Earth Sciences EASC 401-3 Mineral Deposits EASC 402-3 Sedimentology EASC 403-3 Quaternary Geology EASC 404-3 Structural Geology II EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology EASC 421-3 Volcanology EASC 491-1 Directed Reading* EASC 492-2 Directed Reading* EASC 493-3 Directed Reading*	EASC 315W-3 Geochemistry of Natural Waters EASC 317-3 Global Geophysics EASC 400-3 Selected Topics in Earth Sciences EASC 401-3 Mineral Deposits EASC 402-3 Sedimentology EASC 403-3 Quaternary Geology EASC 404-3 Structural Geology II EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology EASC 421-3 Volcanology EASC 491-1 Directed Reading* EASC 492-2 Directed Reading* EASC 493-3 Directed Reading*
<b>Environmental Geoscience Stream</b> Students who choose this stream will complete a minimum of 51 units, including all of  EASC 304-3 Hydrogeology EASC 306-3 Field Geology II EASC 308-3 Field Geology III EASC 313-3 Introduction to Soil and Rock Engineering EASC 315W-3 Geochemistry of Natural Waters EASC 403-3 Quaternary Geology EASC 499-9 Honours Thesis  and at least one of EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 309-3 Global Tectonics EASC 310W-3 Paleontology  and a minimum of 21 units chosen from EASC 300-3 Selected Topics in Earth Sciences EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 305-3 Quantitative Methods for the Earth Sciences EASC 307-3 Applied Geophysics EASC 309-3 Global Tectonics EASC 310W-3 Paleontology EASC 311-3 Metamorphic Petrology EASC 312-3 Stratigraphy EASC 314-3 Principles of Glaciology EASC 317-3 Global Geophysics EASC 400-3 Selected Topics in Earth Sciences EASC 401-3 Mineral Deposits EASC 402-3 Sedimentology EASC 404-3 Structural Geology II EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology	<b>Environmental Geoscience Stream</b> Students who choose this stream will complete a minimum of <u>51</u> units, including all of  EASC 304-3 Hydrogeology EASC 306-3 Field Geology II EASC 308-3 Field Geology III EASC 313-3 Introduction to Soil and Rock Engineering EASC 315W-3 Geochemistry of Natural Waters EASC 403-3 Quaternary Geology <del>EASC 499-9 Honours Thesis</del> EASC 499-6 Honours Thesis  and at least one of EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 309-3 Global Tectonics EASC 310W-3 Paleontology  and a minimum of 21 units chosen from EASC 300-3 Selected Topics in Earth Sciences EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 305-3 Quantitative Methods for the Earth Sciences EASC 307-3 Applied Geophysics EASC 309-3 Global Tectonics EASC 310W-3 Paleontology EASC 311-3 Metamorphic Petrology EASC 312-3 Stratigraphy EASC 314-3 Principles of Glaciology EASC 317-3 Global Geophysics EASC 400-3 Selected Topics in Earth Sciences EASC 401-3 Mineral Deposits EASC 402-3 Sedimentology EASC 404-3 Structural Geology II EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology

<p>EASC 421-3 Volcanology  EASC 491-1 Directed Readings*  EASC 492-2 Directed Readings*  EASC 493-3 Directed Readings*  GEOG 311-4 Hydrology  GEOG 313-4 River Geomorphology  GEOG 317-4 Soil Science  GEOG 412W-4 Glacial Processes and Environments</p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493</p>	<p>EASC 420-3 Petroleum Geology  EASC 421-3 Volcanology  EASC 491-1 Directed Readings*  EASC 492-2 Directed Readings*  EASC 493-3 Directed Readings*  GEOG 311-4 Hydrology  GEOG 313-4 River Geomorphology  GEOG 317-4 Soil Science  GEOG 412W-4 Glacial Processes and Environments</p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493</p>
<p><b>General Earth Sciences Stream</b>  Students who choose this stream will complete a minimum of 51 units, including all of</p> <p>EASC 306-3 Field Geology II  EASC 308-3 Field Geology III  EASC 499-9 Honours Thesis</p> <p>and one of  EASC 310W-3 Paleontology  EASC 315W-3 Geochemistry of Natural Waters</p> <p>and at least 33 other upper division EASC units*</p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493.</p>	<p><b>General Earth Sciences Stream</b>  Students who choose this stream will complete a minimum of <del>51</del> <u>48</u> units, including all of</p> <p>EASC 306-3 Field Geology II  EASC 308-3 Field Geology III  <del>EASC 499-9 Honours Thesis</del>  <u>EASC 499-6 Honours Thesis</u></p> <p>and one of  EASC 310W-3 Paleontology  EASC 315W-3 Geochemistry of Natural Waters</p> <p>and at least 33 other upper division EASC units*</p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493.</p>
<p><b>Faculty of Science Requirements</b>  In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements as follows.</p> <p>students are required to complete additional upper division units to total a minimum of 60 upper division units (excluding EDUC 401 to 406)</p> <p>students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (excluding EDUC 401 to 406) including six units minimum to be completed in the Faculty of Arts and Social Sciences</p>	<p><b>Faculty of Science Requirements</b>  In addition to the above requirements, students must also satisfy Faculty of Science honours program requirements as follows.</p> <p>students are required to complete additional upper division units to total a minimum of 60 upper division units (<del>excluding EDUC 401-406</del>)</p> <p>students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (<del>excluding EDUC 401-406</del>) including six units minimum to be completed in the Faculty of Arts and Social Sciences</p>
<p><b>Writing, Quantitative, and Breadth Requirements</b>  Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>	<p><b>Writing, Quantitative, and Breadth Requirements</b>  Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>
<p><b>Residency Requirements and Transfer Credit</b>  The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.</p>	<p><b>Residency Requirements and Transfer Credit</b>  The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.</p>

Rationale:



"That Senate approve the requirements for an SFU honours degree be modified to reduce the minimum number of required units from 132 to 120 as follows: An honours degree is comprised of a minimum of a minimum of 132 120 units in a specified honours program including approximately 48-52 units in specified upper division courses in the honours subject or field. This to take effect in Fall 2014." – approved by Senate on Dec. 5, 2013

We have reduced units for the EASC Honours program from 132 to "a minimum of 121". This was accomplished by reducing the number of credits for an honours thesis (EASC 499) from 9 to 6, and making undeclared units optional. The reduction in units brings the Earth Sciences major program in line with those of other departments, and is intended to encourage students to pursue the honours program. Other changes include: 1) increase in units to EASC 209W, and 2) change in first year PHYS labs approved in the FOS UCC on Jan. 7, 2015, and 3). The removal of "(excluding EDUC 401-406)" from "Faculty of Science Requirements" reflects the fact that this wording is no longer required, and is being removed by all departments in science. EDUC 401 and/or 402 are pre-requisites 403 to 406, and 401/402 can only be taken with admission into the Professional Development Program.

Present Calendar Description	Proposed Calendar Description changes <u>Underlined</u>
<p><b>Earth Sciences Major Program</b> The department offers a bachelor of science (BSc) degree with three course stream options leading to course concentrations: geology stream, environmental geoscience stream, and general earth sciences stream.</p> <p>The geology and environmental geoscience streams are designed to permit a student to enrol as a geologist or environmental geoscientist respectively, in the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), the governing body that regulates geoscience practice in BC. All students intending to practice as a geoscientist in BC must be licensed by APEGBC, and are strongly advised to pursue one of these two streams. Many other Canadian provinces also require professional licensing.</p> <p>Students who are not intending to practice as professional geoscientists, may choose to pursue the general earth sciences stream. This stream may best accommodate students in some joint major programs.</p> <p>Students should seek the advice of a departmental program advisor.</p>	<p><b>Earth Sciences Major Program</b> The department offers a bachelor of science (BSc) degree with three course stream options leading to course concentrations: geology stream, environmental geoscience stream, and general earth sciences stream.</p> <p>The geology and environmental geoscience streams are designed to permit a student to enrol as a geologist or environmental geoscientist respectively, in the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC), the governing body that regulates geoscience practice in BC. All students intending to practice as a geoscientist in BC must be licensed by APEGBC, and are strongly advised to pursue one of these two streams. Many other Canadian provinces also require professional licensing.</p> <p>Students who are not intending to practice as professional geoscientists, may choose to pursue the general earth sciences stream. This stream may best accommodate students in some joint major programs.</p> <p>Students should seek the advice of a departmental program advisor.</p>
<p><b>Minimum Grade Requirement</b> Students wishing to enroll in Earth Sciences courses must obtain a C- grade or better in prerequisite courses.</p>	<p><b>Minimum Grade Requirement</b> Students wishing to enroll in Earth Sciences courses must obtain a C- grade or better in prerequisite courses.</p>
<p><b>Program Requirements</b> Students complete a minimum of 120 units, as specified below.</p>	<p><b>Program Requirements</b> Students complete a minimum of 120 units, as specified below.</p>
<p><b>Lower Division Requirements</b> All students, no matter which streams they will choose, will complete a minimum of 54 units including all of</p> <p>CHEM 121-4 General Chemistry and Laboratory I CHEM 122-2 General Chemistry II CHEM 126-2 General Chemistry Laboratory II EASC 101-3 Dynamic Earth EASC 201-3 Stratigraphy and Sedimentation EASC 202-3 Introduction to Mineralogy EASC 204-3 Structural Geology I EASC 205-3 Introduction to Petrology EASC 206-2 Field Geology I EASC 207-3 Introduction to Applied Geophysics EASC 208-3 Introduction to Geochemistry EASC 209W-3 Environmental Geoscience EASC 210-3 Historical Geology MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review MATH 152-3 Calculus II</p> <p>and one of STAT 201-3 Statistics for the Life Sciences STAT 270-3 Introduction to Probability and Statistics</p> <p>and one of PHYS 101-3 Physics for the Life Sciences I* PHYS 120-3 Mechanics and Modern Physics PHYS 125-3 Mechanics and Special Relativity PHYS 140-4 Studio Physics - Mechanics and Modern Physics</p>	<p><b>Lower Division Requirements</b> All students, no matter which streams they will choose, will complete a minimum of <del>54</del> <u>55</u> units including all of</p> <p>CHEM 121-4 General Chemistry and Laboratory I CHEM 122-2 General Chemistry II CHEM 126-2 General Chemistry Laboratory II EASC 101-3 Dynamic Earth EASC 201-3 Stratigraphy and Sedimentation EASC 202-3 Introduction to Mineralogy EASC 204-3 Structural Geology I EASC 205-3 Introduction to Petrology EASC 206-2 Field Geology I EASC 207-3 Introduction to Applied Geophysics EASC 208-3 Introduction to Geochemistry <del>EASC 209W-3 Environmental Geoscience</del> <u>EASC 209W-4 Environmental Geoscience</u> EASC 210-3 Historical Geology MATH 151-3 Calculus I or MATH 150-4 Calculus I with Review MATH 152-3 Calculus II</p> <p>and one of STAT 201-3 Statistics for the Life Sciences STAT 270-3 Introduction to Probability and Statistics</p> <p>and one of PHYS 101-3 Physics for the Life Sciences I* PHYS 120-3 Mechanics and Modern Physics PHYS 125-3 Mechanics and Special Relativity PHYS 140-4 Studio Physics - Mechanics and Modern Physics</p>

<p>and one of  PHYS 102-3 Physics for the Life Sciences II*  PHYS 121-3 Optics, Electricity and Magnetism  PHYS 126-3 Electricity, Magnetism and Light  PHYS 141-4 Studio Physics - Optics, Electricity and Magnetism</p> <p>and if not completing PHYS 140/141, one of  PHYS 130-2 Physics for the Life Sciences Laboratory*  PHYS 131-2 Physics Laboratory I</p> <p>*Students are encouraged to complete the standard stream (PHYS 120, 121, 131) or the advanced stream (PHYS 125, 126, 131). Students may also choose to complete the studio physics stream (PHYS 140, 141). Students who complete the life sciences stream (PHYS 101, 102, 130) (which has a corequisite of BISC 100 or 101 or 102) with a minimum B grade should have sufficient preparation for the major program.</p>	<p>and one of  PHYS 102-3 Physics for the Life Sciences II*  PHYS 121-3 Optics, Electricity and Magnetism  PHYS 126-3 Electricity, Magnetism and Light  PHYS 141-4 Studio Physics - Optics, Electricity and Magnetism</p> <p>and if not completing PHYS 140/141, <del>one of</del>  PHYS 130-2 Physics for the Life Sciences Laboratory*  <del>PHYS 131-2 Physics Laboratory I</del>  <u>or both of</u>  <u>PHYS 132-1 Physics Laboratory I</u>  <u>PHYS 133-1 Physics Laboratory II</u></p> <p>*Students are encouraged to complete the standard stream (PHYS 120, 121, <del>131</del> <u>132, 133</u>) or the advanced stream (PHYS 125, 126, <del>131</del> <u>132, 133</u>). Students may also choose to complete the studio physics stream (PHYS 140, 141). Students who complete the life sciences stream (PHYS 101, 102, 130) (which has a corequisite of BISC 100 or 101 or 102) with a minimum B grade should have sufficient preparation for the major program.</p>
<p><b>Upper Division Requirements</b>  Students are encouraged to select upper division elective courses in consultation with an academic advisor, as APEGBC has specific groupings of elective courses for each stream, respectively.</p>	<p><b>Upper Division Requirements</b>  Students are encouraged to select upper division elective courses in consultation with an academic advisor, as APEGBC has specific groupings of elective courses for each stream, respectively.</p>
<p><b>Geology Stream</b>  Students who choose this stream will complete a minimum of 45 units, including</p> <p>all of  EASC 301-3 Igneous Petrology  EASC 302-3 Sedimentary Petrology  EASC 306-3 Field Geology II  EASC 308-3 Field Geology III  EASC 309-3 Global Tectonics  EASC 310W-3 Paleontology  EASC 311-3 Metamorphic Petrology</p> <p>and at least one of  EASC 304-3 Hydrogeology  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 403-3 Quaternary Geology</p> <p>and at least 21 units chosen from  EASC 300-3 Selected Topics in Earth Sciences  EASC 304-3 Hydrogeology  EASC 305-3 Quantitative Methods for the Earth Sciences  EASC 307-3 Applied Geophysics  EASC 312-3 Stratigraphy  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 314-3 Principles of Glaciology  EASC 315W-3 Geochemistry of Natural Waters  EASC 317-3 Global Geophysics  EASC 400-3 Selected Topics in Earth Sciences  EASC 401-3 Mineral Deposits  EASC 402-3 Sedimentology  EASC 403-3 Quaternary Geology  EASC 404-3 Structural Geology II</p>	<p><b>Geology Stream</b>  Students who choose this stream will complete a minimum of 45 units, including</p> <p>all of  EASC 301-3 Igneous Petrology  EASC 302-3 Sedimentary Petrology  EASC 306-3 Field Geology II  EASC 308-3 Field Geology III  EASC 309-3 Global Tectonics  EASC 310W-3 Paleontology  EASC 311-3 Metamorphic Petrology</p> <p>and at least one of  EASC 304-3 Hydrogeology  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 403-3 Quaternary Geology</p> <p>and at least 21 units chosen from  EASC 300-3 Selected Topics in Earth Sciences  EASC 304-3 Hydrogeology  EASC 305-3 Quantitative Methods for the Earth Sciences  EASC 307-3 Applied Geophysics  EASC 312-3 Stratigraphy  EASC 313-3 Introduction to Soil and Rock Engineering  EASC 314-3 Principles of Glaciology  EASC 315W-3 Geochemistry of Natural Waters  EASC 317-3 Global Geophysics  EASC 400-3 Selected Topics in Earth Sciences  EASC 401-3 Mineral Deposits  EASC 402-3 Sedimentology  EASC 403-3 Quaternary Geology  EASC 404-3 Structural Geology II</p>

EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology EASC 421-3 Volcanology EASC 491-1 Directed Reading* EASC 492-2 Directed Reading* EASC 493-3 Directed Reading*	EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology EASC 421-3 Volcanology EASC 491-1 Directed Reading* EASC 492-2 Directed Reading* EASC 493-3 Directed Reading*
<b>Environmental Geoscience Stream</b> Students who choose this stream will complete a minimum of 45 units, including  all of EASC 304-3 Hydrogeology EASC 306-3 Field Geology II EASC 308-3 Field Geology III EASC 313-3 Introduction to Soil and Rock Engineering EASC 315W-3 Geochemistry of Natural Waters EASC 403-3 Quaternary Geology  and at least one of EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 309-3 Global Tectonics EASC 310W-3 Paleontology  and a minimum of 24 units chosen from EASC 300-3 Selected Topics in Earth Sciences EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 305-3 Quantitative Methods for the Earth Sciences EASC 307-3 Applied Geophysics EASC 309-3 Global Tectonics EASC 310W-3 Paleontology EASC 311-3 Metamorphic Petrology EASC 312-3 Stratigraphy EASC 314-3 Principles of Glaciology EASC 317-3 Global Geophysics EASC 400-3 Selected Topics in Earth Sciences EASC 401-3 Mineral Deposits EASC 402-3 Sedimentology EASC 404-3 Structural Geology II EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology EASC 421-3 Volcanology EASC 491-1 Directed Readings* EASC 492-2 Directed Readings* EASC 493-3 Directed Readings* GEOG 311-4 Hydrology GEOG 313-4 River Geomorphology GEOG 317-4 Soil Science	<b>Environmental Geoscience Stream</b> Students who choose this stream will complete a minimum of 45 units, including  all of EASC 304-3 Hydrogeology EASC 306-3 Field Geology II EASC 308-3 Field Geology III EASC 313-3 Introduction to Soil and Rock Engineering EASC 315W-3 Geochemistry of Natural Waters EASC 403-3 Quaternary Geology  and at least one of EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 309-3 Global Tectonics EASC 310W-3 Paleontology  and a minimum of 24 units chosen from EASC 300-3 Selected Topics in Earth Sciences EASC 301-3 Igneous Petrology EASC 302-3 Sedimentary Petrology EASC 305-3 Quantitative Methods for the Earth Sciences EASC 307-3 Applied Geophysics EASC 309-3 Global Tectonics EASC 310W-3 Paleontology EASC 311-3 Metamorphic Petrology EASC 312-3 Stratigraphy EASC 314-3 Principles of Glaciology EASC 317-3 Global Geophysics EASC 400-3 Selected Topics in Earth Sciences EASC 401-3 Mineral Deposits EASC 402-3 Sedimentology EASC 404-3 Structural Geology II EASC 405-3 Water, Environment, and Climate Change EASC 408-3 Regional Geology of Western Canada EASC 410-3 Groundwater Contamination and Transport EASC 411-3 Terrain Analysis EASC 413-3 Resource Geotechnics EASC 416-3 Field Techniques in Hydrogeology EASC 420-3 Petroleum Geology EASC 421-3 Volcanology EASC 491-1 Directed Readings* EASC 492-2 Directed Readings* EASC 493-3 Directed Readings* GEOG 311-4 Hydrology GEOG 313-4 River Geomorphology GEOG 317-4 Soil Science

<p><b>GEOG 412W-4 Glacial Processes and Environments</b></p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493</p>	<p><b>GEOG 412W-4 Glacial Processes and Environments</b></p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493</p>
<p><b>General Earth Sciences Stream</b> Students who choose this stream will complete a minimum of 45 units, including all of</p> <p>EASC 306-3 Field Geology II EASC 308-3 Field Geology III</p> <p>and one of EASC 310W-3 Paleontology EASC 315W-3 Geochemistry of Natural Waters</p> <p>and at least 36 units of upper division EASC or related courses that are approved by the department.*</p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493.</p>	<p><b>General Earth Sciences Stream</b> Students who choose this stream will complete a minimum of 45 units, including all of</p> <p>EASC 306-3 Field Geology II EASC 308-3 Field Geology III</p> <p>and one of EASC 310W-3 Paleontology EASC 315W-3 Geochemistry of Natural Waters</p> <p>and at least 36 units of upper division EASC or related courses that are approved by the department.*</p> <p>*students may only complete a maximum of 3 units from a combination of EASC 491, 492, or 493.</p>
<p><b>Faculty of Science Requirements</b> In addition to the above requirements, students must also satisfy Faculty of Science major program requirements to complete a total of 120 units including</p> <p>additional upper division units to total a minimum of 44 upper division units (excluding EDUC 401, 406)</p> <p>students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (excluding EDUC 401 to 406) including six units minimum to be completed in the Faculty of Arts and Social Sciences</p>	<p><b>Faculty of Science Requirements</b> In addition to the above requirements, students must also satisfy Faculty of Science major program requirements to complete a total of 120 units including</p> <p>additional upper division units to total a minimum of 44 upper division units (<del>excluding EDUC 401-406</del>)</p> <p>students who were enrolled at Simon Fraser University between fall 1991 and summer 2006 are required to complete a minimum of 12 units in subjects outside the Faculty of Science (<del>excluding EDUC 401-406</del>) including six units minimum to be completed in the Faculty of Arts and Social Sciences</p>
<p><b>Writing, Quantitative, and Breadth Requirements</b> Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>	<p><b>Writing, Quantitative, and Breadth Requirements</b> Students admitted to Simon Fraser University beginning in the fall 2006 term must meet writing, quantitative and breadth requirements as part of any degree program they may undertake. See Writing, Quantitative, and Breadth Requirements for university-wide information.</p>
<p><b>Residency Requirements and Transfer Credit</b> The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.</p>	<p><b>Residency Requirements and Transfer Credit</b> The University's residency requirement stipulates that, in most cases, total transfer and course challenge credit may not exceed 60 units, and may not include more than 15 units as upper division work.</p>

**Rationale:**

These changes reflect the increase in units to EASC 209W, and the change in first year PHYS labs approved in the FOS UCC on Jan. 7, 2015. The removal of "(excluding EDUC 401-406)" from "Faculty of Science Requirements" reflects the fact that this wording is no longer required, and is being removed by all departments in science. EDUC 401 and/or 402 are pre-requisites 403 to 406, and 401/402 can only be taken with admission into the Professional Development Program. The one unit increase in the lower level associated with 209W is offset by a one unit decrease in undeclared electives.