



OFFICE OF THE ASSOCIATE VICE-PRESIDENT, ACADEMIC

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<b>ATTENTION</b>	Senate	<b>DATE</b>	July 4, 2014
<b>FROM</b>	Gordon Myers, Chair	<b>PAGES</b>	1/1
	Senate Committee on		
	Undergraduate Studies		
<b>RE:</b>	Faculty of Science (SCUS 14-03f)		

A handwritten signature in black ink, appearing to read 'Gordon Myers', written over a horizontal line.

For information:

Acting under delegated authority at its meeting of July 3, 2014 SCUS approved the following curriculum revision effective Summer 2015.

1. Department of Mathematics

(i) Requirement changes to the Applied Mathematics Honours Program



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**MEMORANDUM**

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<b>ATTENTION</b>	Senate	<b>DATE</b>	August 8, 2014
<b>FROM</b>	Gordon Myers, Chair Senate Committee on Undergraduate Studies	<b>PAGES</b>	1/1
<b>RE:</b>	Faculty of Science (SCUS 14-33)		

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**For information:**

Acting under delegated authority at its meeting of August 7, 2014 SCUS approved the following curriculum revisions.

1. Department of Earth Sciences (SCUS 14-33a) effective Summer 2015

- (i) Prerequisite change to EASC 404
- (ii) Minimum grade requirement for the EASC Minor

2. Department of Molecular Biology and Biochemistry (SCUS 14-33b) effective Summer 2015

- (i) Description, change to MBB 308
- (ii) Description, prerequisite and title change to MBB 323, 402, 423
- (iii) Lower division requirement changes to the MBB & Chem Major and Honours Joint programs
- (iv) Upper division requirement changes to the MBB Honours and Major programs

3. Department of Physics (SCUS 14-33c) effective Summer 2015

- (i) Prerequisite change to PHYS 344
- (ii) Upper division requirement changes to the Applied Physics Honours program
- (iii) Lower division requirements changes in the:
  - Applied Physics
  - Biological Physics
  - Chemical Physics

- Physics
- Applied Physics Honours
- Biological Physics Honours
- Chemical Physics
- Mathematical Physics Honours
- Physics Honours programs

#### 4. Special Topics (SCUS 14-33d) effective Summer 2015

##### (i) New Course Proposals:

- SCI 190-3, Special Topics in Science Interdisciplinarity
- SCI 390-3, Special Topics in Science Interdisciplinarity



Dr. Michael Monagan, Chair, Undergraduate Studies Committee  
Department of Mathematics

REVISED SCUS 14-03f

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June 23, 2014

Attention:  
Jo Hinchliffe  
Associate Registrar, Senate and Academic Services  
Simon Fraser University  
Burnaby Campus

Re. Correction to SCUS 14-03(f)/ S.14-49  
Requirement Changes to Applied Mathematics Honours Program

Please find enclosed a correction to the submitted change for the Applied Mathematics Honours program SCUS 14-03(f)/S.14-49. This correction is requested for inclusion in the Fall 2014 Calendar. The requested change was approved by the Faculty of Science Undergraduate Curriculum Committee, however, the correct current calendar entry was not submitted. Enclosed is the correct calendar entry and summary of changes for the Applied Mathematics Honours program.

Please contact me if further information is required.

Yours sincerely

*MB Monagan June 23, 2014*

Michael Monagan  
Professor and Chair, Undergraduate Studies Committee

c. George Agnes  
Associate Dean, Academic  
and Chair, Faculty of Science UG Curriculum Committee

**To change the Physics requirements for the Applied Mathematics Honours Program**

**From (current description – Applied Mathematics Honours):**

and all of

CMPT 225 - Data Structures and Programming (3)  
MATH 242 - Introduction to Analysis I (3)  
MATH 251 - Calculus III (3)  
MATH 252 - Vector Calculus (3)  
~~PHYS 125 - Mechanics and Special Relativity (3)~~  
~~PHYS 126 - Electricity, Magnetism and Light (3)~~  
PHYS 211 - Intermediate Mechanics (3)  
STAT 270 - Introduction to Probability and Statistics (3)

**To (new description – Applied Mathematics Honours):**

and all of

CMPT 225 - Data Structures and Programming (3)  
MATH 242 - Introduction to Analysis I (3)  
MATH 251 - Calculus III (3)  
MATH 252 - Vector Calculus (3)  
PHYS 211 - Intermediate Mechanics (3)  
STAT 270 - Introduction to Probability and Statistics (3)

and one of

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 121 - Optics, Electricity and Magnetism (3)  
PHYS 126 - Electricity, Magnetism and Light (3)  
PHYS 141 – Studio Physics – Optics, Electricity and Magnetism (4)

**Rationale:**

PHYS 140 and 141 are first year Surrey Physics offerings and they both include a lab. Reorganization of Physics courses and addition of PHYS 120/121 and PHYS 140/141 to ensure consistency with Applied Mathematics Major program.

July 15, 2014

**Memo:** Science Undergraduate Curriculum Business for SCUS

**From:** George Agnes, Associate Dean, Academic, Science

The following undergraduate curriculum business was approved by the meeting of the Faculty of Science Undergraduate Curriculum that took place on July 10, 2014.

**Motions;**

**Earth Science (EASC)**

- EASC 404, prerequisite changes
- Calendar language change for the Minor program, minimum grade requirement of C- for consistency with all other Earth Science programs

**Molecular Biology and Biochemistry (MBB)**

- MBB 308, description change
- MBB 323, description and prerequisite change
- MBB 402, title, description, and prerequisite change
- MBB 423, description and prerequisite change
- Calendar language changes to Lower Division requirements for the joint Major and Honors Programs between MBB & Chem
- Calendar language change to upper division requirements of the major in MBB
- Calendar language change to upper division requirements of the Honors in MBB

**Physics (Phys)**

- Phys 344, prerequisite change
- Calendar language change to the Applied Physics Honors program, upper division minimum credits from 52 to 53
- Calendar language changes to all physics programs, lower division, new Math options of Math 125 and 126 are corequisites for Phys 125 & 126; Applied Physics, Biological Physics, Chemical Physics, Applied Physics Honors, Biological Physics Honors, Chemical Physics Honors, Mathematical Physics Honors, and Physics Honors

**Science (Sci)**

- New course proposals, Sci 190 and Sci 390



**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 2   Seminar \_\_\_\_\_   Tutorial \_\_\_\_\_   Lab 3

**FROM** Course Subject/Number EASC 404   **TO** Course Subject/Number \_\_\_\_\_

Credits 3   Credits \_\_\_\_\_

**TITLE**

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

**FROM:**   **TO:**

Structural Geology II

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

**FROM:**   **TO:**

**DESCRIPTION**

**FROM:**   **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:** Prerequisite: EASC 204  
Pre/Corequisite: EASC 301 and 309

**PREREQUISITE**

**TO:** Pre/Corequisite: EASC 301 and 309

**LEARNING OUTCOMES**

**RATIONALE**

EASC 204 is already a prerequisite for EASC 309 and it is therefore redundant here.

Effective term and year : SUMMER 2015

Faculty of Science, Earth Science

**Motion:**

Change the Calendar Description to add a Minimum Grade Requirement of C- for the Earth Sciences Minor

**Rationale:** To be consistent with wording of other EASC program descriptions.

Deletions in ~~STRIKETHROUGH~~ font, additions in **BOLD** font

**Minimum Grade Requirement**

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

Program Requirements

Students are subject to the general regulations of the faculty in which they are enrolled, and will complete a minimum of 15 upper division units in 300 and 400 division EASC courses, together with all prerequisites.









**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 3   Seminar \_\_\_\_\_   Tutorial 1   Lab \_\_\_\_\_

**FROM** Course Subject/Number MBB402   **TO** Course Subject/Number \_\_\_\_\_

Credits \_\_\_\_\_   Credits \_\_\_\_\_

**TITLE**

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

**FROM:** Molecular and Developmental Genetics   **TO:** Developmental Biology of Cell Signalling

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

**FROM:**   **TO:** Dev. Biol. of Cell Signalling

**DESCRIPTION**

**FROM:** Selected aspects of developmental biology with an emphasis on genetic and molecular analyses in model systems such as Drosophila, C. elegans and mice. The focus will be on signal transduction pathways and their regulation of developmental processes.

**DESCRIPTION**

**TO:** Aspects of developmental and cellular biology in the context of signal transduction pathways. The diverse mechanisms used in cell signaling and how the various approaches to the study of signal transduction in organismal development complement each other will be examined with an emphasis on current literature.

**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**

**FROM:** BISC 333 and MBB 331, with a minimum grade of C   **TO:** MBB 331 with a minimum grade of C.

**LEARNING OUTCOMES**

**RATIONALE**

The course title and description have been updated to better reflect the content of the course. Bisc333 is no longer required as a pre-requisite so has been removed.



## Faculty of Science, Molecular Biology and Biochemistry

### **Motion:**

Change the Calendar Description to the Lower Division requirements Major and Honors Programs that are joint between MBB and Chem

Rationale: Update course list regarding options for Physics requirements

Deletions in ~~STRIKETHROUGH~~ font, additions in **BOLD** font

### **Lower Division Requirements**

Students complete 65-66 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 281 - Organic Chemistry I (4)  
CHEM 283 - Organic Chemistry IIb (3)  
CHEM 286 - Organic Chemistry Laboratory II (2)  
MATH 152 - Calculus II (3)  
BISC 101 - General Biology (4)  
BISC 102 - General Biology (4)  
BISC 202 - Genetics (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)

and one of

STAT 201 - Statistics for the Life Sciences (3)  
STAT 270 - Introduction to Probability and Statistics (3)

and all of

PHYS 120 - Mechanics and Modern Physics (3)  
PHYS 121 - Optics, Electricity and Magnetism (3)  
PHYS 131 - Physics Laboratory I (2)

or all of

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

or all of

PHYS 101 - Physics for the Life Sciences I (3)  
PHYS 102 - Physics for the Life Sciences II (3)

~~PHYS 131 - Physics Laboratory (2)~~

**PHYS 130 - Physics Laboratory for the Life Sciences (2)**

or both of

**PHYS 140 - Studio Physics - Mechanics and Modern Physics (4)**  
**PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4)**

Faculty of Science, Molecular Biology and Biochemistry

**Motion:**

Change the Calendar Description to the upper division requirements for the Honors Program in MBB.

Rationale: Two new courses, MBB324 (Protein Biochemistry) and MBB342 (Intro to Genomics and Bioinformatics) have been added to the list of courses that students can choose to fulfill their UD program requirements. Graduate directed reading and research courses have been removed as electives for undergrads. MBB471, a new course, has been added to the research and/or directed readings course list (it is already on the list for a major)

Deletions in ~~STRIKETHROUGH~~ font, additions in **BOLD** font

Molecular Biology and Biochemistry – upper division requirements

and a minimum of five courses chosen from the following list. There is no upper limit on the quantity in this list that can be completed.

MBB 323 - Introduction to Physical Biochemistry (3)

**MBB 324 – Protein Biochemistry (3)**

**MBB 342 – Introduction to Genomics and Bioinformatics (3)**

MBB 402 - Molecular and Developmental Genetics (3)

MBB 420 - Selected Topics in Contemporary Biochemistry (3)

MBB 421 - Nucleic Acids (3)

MBB 422 - Biomembranes (3)

MBB 423 - Protein Structure and Function (3)

MBB 424 - Membrane Transport Mechanisms (3)

MBB 426 - Immune System I: Basis of Innate and Adaptive Immunity (4)

MBB 427 - Immune System II: Immune Responses in Health and Disease (3)

MBB 428 - Molecular Mechanisms of Microbial Pathogenesis (3)

MBB 430 - Mechanisms of Secretory Transport (3)

MBB 431 - Cells and Disease (3)

MBB 432 - Advanced Molecular Biology Techniques (3)

MBB 435 - Genome Biology (3)

MBB 436 - Gene Expression (3)

MBB 437 - Signal Transduction (3)

MBB 438 - Human Molecular Genetics (3)

MBB 440 - Selected Topics in Contemporary Molecular Biology (3)

MBB 441 - Bioinformatics (3)

MBB 442 - Proteomics (3)

MBB 443 - Protein Biogenesis and Degradation (3)

MBB 444 - Developmental Neurobiology (3)  
MBB 446 - Cell Death and Cell Survival (3)  
MBB 461 - Comparative Genomics (3)  
MBB 462 - Human Genomics (3)  
PHYS 433 - Biological Physics Laboratory (3)

### **Research and Directed Reading Courses**

For an MBB honors, students are limited to 18 undergraduate (~~or graduate~~) research courses and/or directed reading units. These include courses such as MBB 471, 481, 482, 483, 490, 491, 492, ~~871, 872, 873~~ and corresponding courses offered by other departments (e.g. BISC 490, 491, 492, 498, 499, ~~888, 889, 890~~). If students complete more than 18 units of these courses, they may not apply the extra units toward the degree total (132 for honours). In addition, honours students may not complete more than 15 research and/or reading units in one term.



## Faculty of Science, Molecular Biology and Biochemistry

### **Motion:**

Change the Calendar Description to the upper division requirements for the Major in MBB.

Rationale: Two new courses, MBB324 (Protein Biochemistry) and MBB342 (Intro to Genomics and Bioinformatics) have been added to the list of courses that students can choose to fulfill their UD program requirements. Also, graduate directed reading and research courses have been removed as electives for undergrads.

Deletions in ~~STRIKETHROUGH~~ font, additions in **BOLD** font

### Molecular Biology and Biochemistry

and a minimum of five courses chosen from the following list. There is no upper limit on the quantity in this list that can be completed.

MBB 323 - Introduction to Physical Biochemistry (3)

**MBB 324 – Protein Biochemistry (3)**

**MBB 342 – Introduction to Genomics and Bioinformatics (3)**

MBB 402 - Molecular and Developmental Genetics (3)

MBB 420 - Selected Topics in Contemporary Biochemistry (3)

MBB 421 - Nucleic Acids (3)

MBB 422 - Biomembranes (3)

MBB 423 - Protein Structure and Function (3)

MBB 424 - Membrane Transport Mechanisms (3)

MBB 426 - Immune System I: Basis of Innate and Adaptive Immunity (4)

MBB 427 - Immune System II: Immune Responses in Health and Disease (3)

MBB 428 - Molecular Mechanisms of Microbial Pathogenesis (3)

MBB 430 - Mechanisms of Secretory Transport (3)

MBB 431 - Cells and Disease (3)

MBB 432 - Advanced Molecular Biology Techniques (3)

MBB 435 - Genome Biology (3)

MBB 436 - Gene Expression (3)

MBB 437 - Signal Transduction (3)

MBB 438 - Human Molecular Genetics (3)

MBB 440 - Selected Topics in Contemporary Molecular Biology (3)

MBB 441 - Bioinformatics (3)

MBB 442 - Proteomics (3)

MBB 443 - Protein Biogenesis and Degradation (3)

MBB 444 - Developmental Neurobiology (3)

MBB 446 - Cell Death and Cell Survival (3)

MBB 461 - Comparative Genomics (3)  
MBB 462 - Human Genomics (3)  
PHYS 433 - Biological Physics Laboratory (3)

### **Research and Directed Reading Courses**

For degree credit, students are limited to nine undergraduate (~~or graduate~~) research and/or directed reading units. These include MBB 471, 481, 482, 483, 490, 491, 492, ~~871, 872, 873~~ and corresponding courses offered by other departments (e.g. BISC 490, 491, 492, 498, 499, ~~888, 889, 890~~). If students complete more than nine units of these courses, they may not apply the extra units toward the degree total (120 units).



**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 3   Seminar \_\_\_\_\_   Tutorial \_\_\_\_\_   Lab \_\_\_\_\_

**FROM** Course Subject/Number PHYS 344   **TO** Course Subject/Number \_\_\_\_\_

Credits 3   Credits \_\_\_\_\_

**TITLE**

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

**FROM:** Thermal Physics   **TO:**

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

**FROM:** Thermal Physics   **TO:**

**DESCRIPTION**

**FROM:** Heat, temperature, heat transfer, kinetic theory, laws of thermodynamics, entropy, heat engines, applications of thermodynamics to special systems, phase transitions

**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:** Prerequisite: PHYS 126 or 121, MATH 251, with a minimum grade of C-. Quantitative.

**PREREQUISITE**

**TO:** Prerequisite: PHYS 126 or 121 or 141, MATH 251.

**LEARNING OUTCOMES**

**RATIONALE**

PHYS 121, 126, and 141 are all equivalent introductory Physics courses, and PHYS 141 was omitted from this prerequisite.

Faculty of Science, Physics

**Motion:**

To change the required number of upper division credits for the Applied Physics Honours program from 52 to 53.

**Rationale:** PHYS 432 – Undergraduate Honours Thesis was recently increased from 5 credits to 6, and the minimum total credits was not adjusted accordingly.

Deletions in ~~STRIKETHROUGH~~ font, additions in **BOLD** font

**Upper Division Requirements**

Students have the option of various specialized upper division courses, as shown below.

Students complete a minimum total of ~~52~~ **53** units, including all of  
MATH 310 - Introduction to Ordinary Differential Equations (3)  
PHYS 321 - Intermediate Electricity and Magnetism (3)  
PHYS 326 - Electronics and Instrumentation (4)  
PHYS 332W - Optics Laboratory (4)  
PHYS 344 - Thermal Physics (3)  
PHYS 384 - Methods of Theoretical Physics I (3)  
PHYS 385 - Quantum Mechanics I (3)  
PHYS 421 - Electromagnetic Waves (3)  
PHYS 431 - Advanced Physics Laboratory I (4)  
PHYS 432 - Undergraduate Honours Thesis (6) ++  
PHYS 455 - Modern Optics (3)  
PHYS 465 - Solid State Physics (3)

and a minimum of 11 additional units chosen from

CHEM 340 - Materials Chemistry (3)  
ENSC 426 - High Frequency Electronics (4)  
ENSC 495 - Introduction to Microelectronic Fabrication (4) \*\*  
PHYS 365 - Semiconductor Device Physics (3)  
PHYS 395 - Computational Physics (3) \* or MACM 316 - Numerical Analysis I (3)

**Students considering physics graduate programs should also complete**

**PHYS 413 - Advanced Mechanics (3)**

**PHYS 415 - Quantum Mechanics II (3)**

**PHYS 445 - Statistical Physics (3)**

**\* recommended**

**\*\* the prerequisite ENSC 222 can be replaced by PHYS 326**

**++ should be based on an industrially motivated project**

Faculty of Science, Physics

**Motion:**

Changes the Calendar Description to Lower Division requirements in the Applied Physics, Biological Physics, Chemical Physics, Physics, Applied Physics Honors, Biological Physics Honors, Chemical Physics, Mathematical Physics Honors, and Physics Honors Programs

**Rationale:** Updates based on recent changes to course offerings in the Faculty of Science.

Deletions in ~~STRIKETHROUGH~~ font, additions in **BOLD** font

Applied Physics Program Lower Division Requirements

Students complete a minimum total of 54 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)
- CMPT 102 - Introduction to Scientific Computer Programming (3)
- CMPT 150 - Introduction to Computer Design (3)
- CMPT 250 - Introduction to Computer Architecture (3)
- ~~MATH 152 - Calculus II (3)~~
- MATH 251 - Calculus III (3)
- MATH 252 - Vector Calculus (3)
- PHYS 131 - Physics Laboratory I (2) \*
- PHYS 211 - Intermediate Mechanics (3)
- PHYS 231 - Physics Laboratory II (3)
- PHYS 233 - Physics Laboratory III (2)
- PHYS 255 - Vibrations and Waves (3)
- PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

- MATH 125 - Math methods for Phys.Sci.-I (3)**
- MATH 150 - Calculus I with Review (4)
- MATH 151 - Calculus I (3)

and one of

- MATH 126 - Math methods for Phys.Sci.-II (3)**
- MATH 152 - Calculus II (4)**

and one of

MATH 232 - Applied Linear Algebra (3)

MATH 240 - Algebra I: Linear Algebra (3)

and one of

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 121 - Optics, Electricity and Magnetism (3)

PHYS 126 - Electricity, Magnetism and Light (3) +

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

\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131

+ recommended

## Biological Physics Program Lower Division Requirements

Students complete a minimum total of 64 units, including all of

BISC 101 - General Biology (4)  
BISC 102 - General Biology (4)  
BISC 202 - Genetics (3)  
CHEM 121 - General Chemistry and Laboratory I (4)  
CHEM 122 - General Chemistry II (2)  
CHEM 281 - Organic Chemistry I (4)  
CHEM 282 - Organic Chemistry II (2)  
~~MATH 152 - Calculus II (3)~~  
MATH 251 - Calculus III (3)  
MATH 252 - Vector Calculus (3)  
MBB 222 - Molecular Biology and Biochemistry (3)  
MBB 231 - Cellular Biology and Biochemistry (3)  
PHYS 211 - Intermediate Mechanics (3)  
PHYS 231 - Physics Laboratory II (3)  
PHYS 255 - Vibrations and Waves (3)

and one of

**MATH 125 - Math methods for Phys.Sci.-I (3)**  
MATH 150 - Calculus I with Review (4)  
MATH 151 - Calculus I (3)

and one of

**MATH 126 - Math methods for Phys.Sci.-II (3)**  
**MATH 152 - Calculus II (4)**

and one of

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

and one of

CHEM 260 - Atoms, Molecules, Spectroscopy (4)  
PHYS 285 - Introduction to Relativity and Quantum Mechanics (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) \*



and one of

PHYS 130 - Physics for the Life Sciences Laboratory (2)

PHYS 131 - Physics Laboratory I (2) \*

\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131

+ recommended

## Chemical Physics Program Lower Division Requirements

Students are strongly encouraged to complete at least three lower division computing science units, in addition to the following requirements.

Students complete a minimum total of 59 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 266 - Physical Chemistry Laboratory I (2)
- CHEM 281 - Organic Chemistry I (4)
- ~~MATH 152 - Calculus II (3)~~
- MATH 251 - Calculus III (3)
- MATH 252 - Vector Calculus (3)
- PHYS 131 - Physics Laboratory I (2) \*
- PHYS 211 - Intermediate Mechanics (3)
- PHYS 231 - Physics Laboratory II (3)
- PHYS 255 - Vibrations and Waves (3)

and one of

- MATH 125 - Math methods for Phys.Sci.-I (3)**
- MATH 150 - Calculus I with Review (4)
- MATH 151 - Calculus I (3)

and one of

- MATH 126 - Math methods for Phys.Sci.-II (3)**
- MATH 152 - Calculus II (4)**

and one of

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

and one of

- CHEM 260 - Atoms, Molecules, Spectroscopy (4)
- PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

- 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 121 - Optics, Electricity and Magnetism (3)
- PHYS 126 - Electricity, Magnetism and Light (3) +
- PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) \*

**\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131  
+ recommended**

## Physics Program Lower Division Requirements

Students complete a minimum total of 46 units, including all of

- CHEM 121 - General Chemistry and Laboratory I (4)
- CHEM 122 - General Chemistry II (2)
- CMPT 102 - Introduction to Scientific Computer Programming (3)
- ~~MATH 152 - Calculus II (3)~~
- MATH 251 - Calculus III (3)
- MATH 252 - Vector Calculus (3)
- PHYS 131 - Physics Laboratory I (2) \*
- PHYS 211 - Intermediate Mechanics (3)
- PHYS 231 - Physics Laboratory II (3)
- PHYS 233 - Physics Laboratory III (2)
- PHYS 255 - Vibrations and Waves (3)
- PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

- MATH 125 - Math methods for Phys.Sci.-I (3)**
- MATH 150 - Calculus I with Review (4)
- MATH 151 - Calculus I (3)

and one of

- MATH 126 - Math methods for Phys.Sci.-II (3)**
- MATH 152 - Calculus II (4)**

and one of

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

and one of

- 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 121 - Optics, Electricity and Magnetism (3)
- PHYS 126 - Electricity, Magnetism and Light (3) +
- PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) \*

\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131  
+ recommended

## Applied Physics Honours Program Lower Division Requirements

Students complete a minimum total of 54 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)
- CMPT 102 - Introduction to Scientific Computer Programming (3)
- CMPT 150 - Introduction to Computer Design (3)
- CMPT 250 - Introduction to Computer Architecture (3)
- ~~MATH 152 - Calculus II (3)~~
- MATH 251 - Calculus III (3)
- MATH 252 - Vector Calculus (3)
- PHYS 131 - Physics Laboratory I (2) \*
- PHYS 211 - Intermediate Mechanics (3)
- PHYS 231 - Physics Laboratory II (3)
- PHYS 233 - Physics Laboratory III (2)
- PHYS 255 - Vibrations and Waves (3)
- PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

- MATH 125 - Math methods for Phys.Sci.-I (3)**
- MATH 150 - Calculus I with Review (4)
- MATH 151 - Calculus I (3)

and one of

- MATH 126 - Math methods for Phys.Sci.-II (3)**
- MATH 152 - Calculus II (4)**

and one of

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

and one of

- 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 121 - Optics, Electricity and Magnetism (3)
- PHYS 126 - Electricity, Magnetism and Light (3) +
- PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) \*

An additional second year CMPT course, such as CMPT 212, is recommended.

\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131  
+ recommended

## Biological Physics Honours Program Lower Division Requirements

Students complete a minimum total of 64 units, including all of

BISC 101 - General Biology (4)  
BISC 102 - General Biology (4)  
BISC 202 - Genetics (3)  
CHEM 121 - General Chemistry and Laboratory I (4)  
CHEM 122 - General Chemistry II (2)  
CHEM 281 - Organic Chemistry I (4)  
CHEM 282 - Organic Chemistry II (2)  
~~MATH 152 - Calculus II (3)~~  
MATH 251 - Calculus III (3)  
MATH 252 - Vector Calculus (3)  
MBB 222 - Molecular Biology and Biochemistry (3)  
MBB 231 - Cellular Biology and Biochemistry (3)  
PHYS 211 - Intermediate Mechanics (3)  
PHYS 231 - Physics Laboratory II (3)  
PHYS 255 - Vibrations and Waves (3)

and one of

**MATH 125 - Math methods for Phys.Sci.-I (3)**  
MATH 150 - Calculus I with Review (4)  
MATH 151 - Calculus I (3)

and one of

**MATH 126 - Math methods for Phys.Sci.-II (3)**  
**MATH 152 - Calculus II (4)**

and one of

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

and one of

CHEM 260 - Atoms, Molecules, Spectroscopy (4)  
PHYS 285 - Introduction to Relativity and Quantum Mechanics (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) \*

and one of

PHYS 130 - Physics for the Life Sciences Laboratory (2)

PHYS 131 - Physics Laboratory I (2) \*

\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131

+ recommended

## Chemical Physics Honours Program Lower Division Requirements

Students are strongly encouraged to complete at least three lower division CMPT units, in addition to the following requirements.

Students complete a minimum total of 59 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 266 - Physical Chemistry Laboratory I (2)
- CHEM 281 - Organic Chemistry I (4)
- ~~MATH 152 - Calculus II (3)~~
- MATH 251 - Calculus III (3)
- MATH 252 - Vector Calculus (3)
- PHYS 131 - Physics Laboratory I (2) \*
- PHYS 211 - Intermediate Mechanics (3)
- PHYS 231 - Physics Laboratory II (3)
- PHYS 255 - Vibrations and Waves (3)

and one of

- MATH 125 - Math methods for Phys.Sci.-I (3)**
- MATH 150 - Calculus I with Review (4)
- MATH 151 - Calculus I (3)

and one of

- MATH 126 - Math methods for Phys.Sci.-II (3)**
- MATH 152 - Calculus II (4)**

and one of

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

and one of

- CHEM 260 - Atoms, Molecules, Spectroscopy (4)
- PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

- 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 121 - Optics, Electricity and Magnetism (3)
- PHYS 126 - Electricity, Magnetism and Light (3) +
- PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) \*



**\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131  
+ recommended**

## Mathematical Physics Honours Program Lower Division Requirements

Students complete a minimum total of 46 units, including all of

~~MATH 152 - Calculus II (3)~~  
MATH 242 - Introduction to Analysis I (3)  
MATH 251 - Calculus III (3)  
MATH 252 - Vector Calculus (3)  
PHYS 131 - Physics Laboratory I (2) \*  
PHYS 211 - Intermediate Mechanics (3)  
PHYS 231 - Physics Laboratory II (3)  
PHYS 233 - Physics Laboratory III (2)  
PHYS 255 - Vibrations and Waves (3)  
PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)  
STAT 270 - Introduction to Probability and Statistics (3)

and either both of

CMPT 120 - Introduction to Computing Science and Programming I (3)  
CMPT 125 - Introduction to Computing Science and Programming II (3)

or one of

CMPT 102 - Introduction to Scientific Computer Programming (3)  
CMPT 126 - Introduction to Computing Science and Programming (3)

and one of

**MATH 125 - Math methods for Phys.Sci.-I (3)**  
MATH 150 - Calculus I with Review (4)  
MATH 151 - Calculus I (3)

and one of

**MATH 126 - Math methods for Phys.Sci.-II (3)**  
**MATH 152 - Calculus II (4)**

and one of

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

and one of

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 121 - Optics, Electricity and Magnetism (3)  
PHYS 126 - Electricity, Magnetism and Light (3) +  
PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) \*

It is recommended that students also complete CHEM 121 and 122.

**\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131  
+ recommended**

## Physics Honours Program Lower Division Requirements

Students complete a minimum total of 46 units, including all of

- CHEM 121 - General Chemistry and Laboratory I (4)
- CHEM 122 - General Chemistry II (2)
- CMPT 102 - Introduction to Scientific Computer Programming (3)
- ~~MATH 152 - Calculus II (3)~~
- MATH 251 - Calculus III (3)
- MATH 252 - Vector Calculus (3)
- PHYS 131 - Physics Laboratory I (2) \*
- PHYS 211 - Intermediate Mechanics (3)
- PHYS 231 - Physics Laboratory II (3)
- PHYS 233 - Physics Laboratory III (2)
- PHYS 255 - Vibrations and Waves (3)
- PHYS 285 - Introduction to Relativity and Quantum Mechanics (3)

and one of

- MATH 125 - Math methods for Phys.Sci.-I (3)**
- MATH 150 - Calculus I with Review (4)
- MATH 151 - Calculus I (3)

and one of

- MATH 126 - Math methods for Phys.Sci.-II (3)**
- MATH 152 - Calculus II (4)**

and one of

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

and one of

- 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 121 - Optics, Electricity and Magnetism (3)
- PHYS 126 - Electricity, Magnetism and Light (3) +
- PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4) \*

\* students with credit for PHYS 140 and 141 are not required to complete PHYS 131  
+ recommended


**COURSE SUBJECT/NUMBER** SCI190

**COURSE TITLE**

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

Special Topics in Science Interdisciplinarity

**AND**

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

Science Interdisciplinarity

**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.**

Subject matter normally spans the expertise of at least two departments/units.

**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.

Library report status

**RATIONALE FOR INTRODUCTION OF THIS COURSE**

Intended to facilitate the offering of subject material in emerging or existing topics that exceed the normal curricular offerings of a single department/unit. Ideally, offerings of this course will investigate new pedagogy. The success of these course offerings may be used to assess the merit of developing a new University credential.

**SCHEDULING AND ENROLLMENT INFORMATION**

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

SUMMER 2015

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

What is the probable enrollment when offered? Estimate: 5-250



**CREDITS**

Indicate number of credits (units): 3

Indicate number of hours for:	Lecture	Seminar	Tutorial	Lab	Other
					X

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

All are eligible.

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

None anticipated in the short term.

**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**.

Permission of the instructional team.

**COREQUISITE**

None.

**STUDENT LEARNING OUTCOMES**

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

Students will be exposed to current and emerging topics in interdisciplinary studies. By way of examples, the intent of this course encompasses demonstration of critical thinking skills that appropriately merge numerous factors from two or more disciplines, and broad-degree level skill development learning within the context of the scholarly inquiry.

**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:

No new resources anticipated. However, an instructional team is expected to identify in advance of the course being offered any special infrastructure required, and demonstrate to their respective chairpersons that there is appropriate access to any such infrastructure. An instructional team must have a proposed future interdisciplinary offering, and specifically their teaching assignments, approved by their respective chairpersons. Further, the course structure, content, marking scheme, and learning objectives are to be approved by the relevant departmental undergraduate curriculum committees as well as the Faculty of Science undergraduate curriculum committee.

**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.

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Chair, Department/School Date

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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.

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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 \_\_\_\_\_



**COURSE SUBJECT/NUMBER** SCI390

**COURSE TITLE**

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

Special Topics in Science Interdisciplinarity

**AND**

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

Science Interdisciplinarity

**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.**

Subject matter spans the expertise of at least two departments/units. An experiential capstone in this course, as part of the assessment of student performance, is a requirement.

**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.

Library report status

**RATIONALE FOR INTRODUCTION OF THIS COURSE**

Intended to facilitate the offering of subject material in emerging or existing topics that exceed the normal curricular offerings of a single department/unit. Ideally, offerings of this course will investigate new pedagogy. The success of these course offerings may be used to assess the merit of developing a new University credential.

**SCHEDULING AND ENROLLMENT INFORMATION**

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

SUMMER 2015

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

What is the probable enrollment when offered? Estimate: 5-250





**CREDITS**

Indicate number of credits (units): 3

Indicate number of hours for:	Lecture	Seminar	Tutorial	Lab	Other
					X

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

**WQB DESIGNATION** (attach approval from Curriculum Office)  
None anticipated in the short term.

**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**.  
Permission of the instructional team.

**COREQUISITE**  
None.

**STUDENT LEARNING OUTCOMES**  
Upon satisfactory completion of the course students will be able to:  
Students will be exposed to current and emerging topics in interdisciplinary studies. By way of examples, the intent of this course encompasses demonstration of critical thinking skills that appropriately merge numerous factors from two or more disciplines, and broad-degree level skill development learning within the context of the scholarly inquiry.

**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:

No new resources anticipated. However, an instructional team is expected to identify in advance of the course being offered any special infrastructure required, and demonstrate to their respective chairpersons that there is appropriate access to any such infrastructure. An instructional team must have a proposed future interdisciplinary offering, and specifically there teaching assignments, approved by their respective chairpersons. Further, the course structure, content, marking scheme, and learning objectives are to be approved by the relevant departmental undergraduate curriculum committees as well as the Faculty of Science undergraduate curriculum committee.

**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.

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

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

Chair, Faculty Curriculum Committee

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.

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

Dean or designate

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 \_\_\_\_\_