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**MEMORANDUM**

ATTENTION	Senate	DATE	April 3, 2020
FROM	Wade Parkhouse, Chair Senate Committee on Undergraduate Studies	PAGES	1/2
RE:	Program Changes		

**For information:**

Acting under delegated authority at its meeting of April 2, 2020 SCUS approved the following curriculum revisions effective Spring 2021.

**a. Faculty of Applied Sciences (SCUS 20-32)****1. School of Engineering Sciences**

(i) Requirement changes for internal transfers from another Simon Fraser University program for the:

- Major, Engineering Science, Computer Engineering Option Bachelor of Applied Science
- Major, Engineering Science, Electronics Engineering Option Bachelor of Applied Science
- Major, Engineering Science, Systems Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Biomedical Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Computer Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Electronics Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Engineering Physics Option Bachelor of Applied Science
- Honours, Engineering Science, Systems Engineering Option Bachelor of Applied Science

(ii) Core course requirement changes (**effective Fall 2020**) for the:

- Major, Engineering Science, Computer Engineering Option Bachelor of Applied Science
- Major, Engineering Science, Electronics Engineering Option Bachelor of Applied Science
- Major, Engineering Science, Systems Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Biomedical Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Computer Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Electronics Engineering Option Bachelor of Applied Science
- Honours, Engineering Science, Engineering Physics Option Bachelor of Applied Science
- Honours, Engineering Science, Systems Engineering Option Bachelor of Applied Science

## 2. School of Mechatronic Systems Engineering

- (i) Requirement changes to the Mechatronic Systems Engineering Major and Honours programs (**effective Fall 2020**)
- (ii) Requirement changes to the Mechatronic Systems Engineering and Business Double Degree program (**effective Fall 2020**)

## 3. School of Sustainable Energy Engineering

- (i) Requirement changes to the Sustainable Energy Engineering Major program (**effective Fall 2020**)

## **b. Faculty of Environment (SCUS 20-33)**

### 1. School of Environmental Science

- (i) Upper division requirement changes to the:
  - Environmental Science Major
    - Environmental Earth Systems Concentration
    - Environmetrics Concentration
    - Water Science Concentration
  - Environmental Science Honours
    - Applied Biology concentration
    - Environmental Earth Systems Concentration
    - Environmetrics Concentration
    - Water Science Concentration

### 2. Department of Geography

- (i) Upper division requirement changes to the Global Environmental Systems Major and Honours Programs

Senators wishing to consult a more detailed report of curriculum revisions may do so on the Senate Docushare repository at <https://docushare.sfu.ca/dsweb/View/Collection-12682>.



<b>Name of Program or Name of Faculty</b> School of Engineering Science
<b>Rationale for change:</b> Admitting internal transfer applicants based on CGPA, rather than Term GPA, is more relevant in demonstrating the applicants' potential and in predicting overall future success in the program. There is rewording for a stronger emphasis on the selection criteria and to emphasize that meeting the minimum requirements does not guarantee admission.
<b>Effective term and year:</b> Spring 2021
<b>The following program(s) will be affected by these changes:</b>  Major: Engineering Science, Computer Engineering Option Bachelor of Applied Science Engineering Science, Electronics Engineering Option Bachelor of Applied Science Engineering Science, Systems Engineering Option Bachelor of Applied Science  Honours: Engineering Science, Biomedical Engineering Option Bachelor of Applied Science Engineering Science, Computer Engineering Option Bachelor of Applied Science Engineering Science, Electronics Engineering Option Bachelor of Applied Science Engineering Science, Engineering Physics Option Bachelor of Applied Science Engineering Science, Systems Engineering Option Bachelor of Applied Science

**Calendar Change:** "to" and "from" sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.



Simon Fraser University students who wish to transfer to Engineering Science from another program must have an engineering-related grade point average (ERGPA) at Simon Fraser University of at least 2.5 with fewer than 6 repeated courses. **should formally apply for an internal transfer.** In addition, in the term prior to requesting the transfer to the School of Engineering Science, the student must have been enrolled in at least 12 Simon Fraser University credits and earned a term GPA of 2.5 or higher. **The qualification for internal transfer will be calculated based on the following four criteria: CGPA, engineering related grade point average (ERGPA) at Simon Fraser University, no more than 5 repeated courses, and the course load during the semester prior to the application deadline. In regards to the course load, we require the term prior to requesting the transfer to the School of Engineering Science, that the student must have been enrolled in at least 12 Simon Fraser University Course load Units and earned an overall CGPA of 2.5 or higher. Further, Simon Fraser University students applying for admission to the School of Engineering Science are competitively selected for admission on the basis of an engineering-related grade point average (ERGPA). Typically, we expect the ERGPA to be as high as 2.8, and the ERGPA is determined based on the number of seats available. Therefore meeting the minimum requirements does not guarantee admission.** The ERGPA is calculated over all courses the student has taken from this list, where a minimum of 3 courses from this list is required, such that:

- at least one mathematics course chosen from MATH 151 (or 150), MATH 152, MATH 232 (or 240), MACM 101, MACM 201
- at least one computing course chosen from CMPT 128 or 135 or (125 and 127), 225 and 275
- at least one physics course chosen from PHYS 120 (or 140), PHYS 121 (or 141), PHYS 221, PHYS 321, PHYS 365
- additional courses may include: CHEM 121

All three courses must be completed prior to application. For complete information, contact an Applied Sciences Advisor. If a course is a duplicate of any previous course completed at Simon Fraser University or elsewhere, only the last attempt will be included in the average. Admission is competitive and the admission average is established on a per term basis, depending on the number of spaces available.

## Calendar Entry Change Engineering, Faculty of Applied Sciences

<p>Rationale for change: The Department of Mathematics is renumbering the course MATH 310 (3) as MATH 260 (3). This program change is submitted for consistency with the new course number, while recognizing credit for students that have already completed MATH 310 as part of their engineering degree requirements.</p>
<p>Effective term and year: Fall 2020</p>
<p>The following program(s) will be affected by these changes:</p> <p>Major, Engineering Science, Computer Engineering Option Bachelor of Applied Science Major, Engineering Science, Electronics Engineering Option Bachelor of Applied Science Major, Engineering Science, Systems Engineering Option Bachelor of Applied Science Honours, Engineering Science, Biomedical Engineering Option Bachelor of Applied Science Honours, Engineering Science, Computer Engineering Option Bachelor of Applied Science Honours, Engineering Science, Electronics Engineering Option Bachelor of Applied Science Honours, Engineering Science, Engineering Physics Option Bachelor of Applied Science Honours, Engineering Science, Systems Engineering Option Bachelor of Applied Science</p>

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.

<p>Major, Engineering Science, Computer Engineering Option Bachelor of Applied Science</p> <p>Core Course Requirements</p> <p>The following core courses are required for the Engineering Science Major in Computer Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. "Equivalent" courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.</p> <p>CHEM 121 - General Chemistry and Laboratory I (4) CMPT 128 - Introduction to Computing Science and Programming for Engineers (3) CMPT 225 - Data Structures and Programming (3) CMPT 275 - Software Engineering I (4) CMPT 300 - Operating Systems I (3) ECON 103 - Principles of Microeconomics (4) ENSC 100W - Engineering, Science and Society (3) ENSC 105W - Process, Form, and Convention in Professional Genres (3)</p>
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ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)  
ENSC 180 - Introduction to Engineering Analysis (3)  
ENSC 204 - Graphical Communication for Engineering (1)  
ENSC 220 - Electric Circuits I (4)  
ENSC 225 - Microelectronics I (4)  
ENSC 251 - Software Design and Analysis for Engineers (4)  
ENSC 252 - Fundamentals of Digital Logic & Design (4)  
ENSC 254 - Introduction to Computer Organization (4)  
ENSC 280 - Engineering Measurement and Data Analysis (4)  
ENSC 320 - Electric Circuits II (4)  
ENSC 324 - Electronic Devices (3)  
ENSC 327 - Communication Systems (4)  
ENSC 350 - Digital Systems Design (4)  
ENSC 351 - Embedded and Real Time System Software (4)  
ENSC 380 - Linear Systems (3)  
ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)  
ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)  
ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)  
ENSC 429 - Digital Signal Processing (4)  
ENSC 440 - Capstone B: Engineering Design Project (3)  
ENSC 450 - VLSI Systems Design (4) or ENSC 452 - Advanced Digital System Design (4)  
MACM 201 - Discrete Mathematics II (3)  
MACM 316 - Numerical Analysis I (3)  
MATH 151 - Calculus I (3) \*  
MATH 152 - Calculus II (3)  
MATH 232 - Applied Linear Algebra (3)  
MATH 251 - Calculus III (3)  
~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~  
**MATH 260 - Introduction to Ordinary Differential Equations (3)**  
PHYS 120 - Mechanics and Modern Physics (3)  
PHYS 121 - Optics, Electricity and Magnetism (3)

\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites



Major, Engineering Science, Electronics Engineering Option Bachelor of Applied Science

Core Course Requirements

The following core courses are required for the Engineering Science Major in Electronics Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.

CHEM 121 - General Chemistry and Laboratory I (4)

CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

ECON 103 - Principles of Microeconomics (4)

ENSC 100W - Engineering, Science and Society (3)

ENSC 105W - Process, Form, and Convention in Professional Genres (3)

ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)

ENSC 180 - Introduction to Engineering Analysis (3)

ENSC 204 - Graphical Communication for Engineering (1)

ENSC 220 - Electric Circuits I (4)

ENSC 225 - Microelectronics I (4)

ENSC 251 - Software Design and Analysis for Engineers (4)

ENSC 252 - Fundamentals of Digital Logic & Design (4)

ENSC 254 - Introduction to Computer Organization (4)

ENSC 280 - Engineering Measurement and Data Analysis (4)

ENSC 316 - Engineering Electromagnetics I (3)

ENSC 320 - Electric Circuits II (4)

ENSC 324 - Electronic Devices (3)

ENSC 325 - Microelectronics II (4)

ENSC 327 - Communication Systems (4)

ENSC 350 - Digital Systems Design (4)

ENSC 351 - Embedded and Real Time System Software (4)

ENSC 380 - Linear Systems (3)

ENSC 383 - Feedback Control Systems (4)

ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)

ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)

ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)

ENSC 416 - Engineering Electromagnetics II: Design (4)

ENSC 425 - Electronic System Design (4)

ENSC 426 - High Frequency Electronics (4)

ENSC 427 - Communication Networks (4) or ENSC 428 - Digital Communications (4)

ENSC 440 - Capstone B: Engineering Design Project (3)

MATH 151 - Calculus I (3) \*



MATH 152 - Calculus II (3)

MATH 232 - Applied Linear Algebra (3)

MATH 251 - Calculus III (3)

MATH 254 - Vector and Complex Analysis for Applied Sciences (3)

~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~

**MATH 260 - Introduction to Ordinary Differential Equations (3)**

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

\* or Math 150-Calculus I with Review(4) if you do not meet the MATH 151 prerequisites



Major, Engineering Science, Systems Engineering Option Bachelor of Applied Science

Core Course Requirements

The following core courses are required for the Engineering Science Major in Systems Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.

CHEM 121 - General Chemistry and Laboratory I (4)

CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

CMPT 225 - Data Structures and Programming (3)

ECON 103 - Principles of Microeconomics (4)

ENSC 100W - Engineering, Science and Society (3)

ENSC 105W - Process, Form, and Convention in Professional Genres (3)

ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)

ENSC 180 - Introduction to Engineering Analysis (3)

ENSC 204 - Graphical Communication for Engineering (1)

ENSC 220 - Electric Circuits I (4)

ENSC 225 - Microelectronics I (4)

ENSC 251 - Software Design and Analysis for Engineers (4)

ENSC 252 - Fundamentals of Digital Logic & Design (4)

ENSC 254 - Introduction to Computer Organization (4)

ENSC 280 - Engineering Measurement and Data Analysis (4)

ENSC 316 - Engineering Electromagnetics I (3)

ENSC 320 - Electric Circuits II (4)

ENSC 350 - Digital Systems Design (4)

ENSC 351 - Embedded and Real Time System Software (4)

ENSC 380 - Linear Systems (3)

ENSC 383 - Feedback Control Systems (4)

ENSC 385 - Statics and Strength of Materials (3)

ENSC 386 - Introduction to Mechanical Design (4)

ENSC 387 - Introduction to Electro-Mechanical Sensors and Actuators (4)

ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)

ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)

ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)

ENSC 440 - Capstone B: Engineering Design Project (3)

ENSC 482 - Introduction to Decision Making in Engineering (4)

ENSC 488 - Introduction to Robotics (4)

MACM 316 - Numerical Analysis I (3)

MATH 151 - Calculus I (3) \*

MATH 152 - Calculus II (3)



MATH 232 - Applied Linear Algebra (3)

MATH 251 - Calculus III (3)

~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~

**MATH 260 - Introduction to Ordinary Differential Equations (3)**

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites

Honours, Engineering Science, Biomedical Engineering Option Bachelor of Applied Science

Core Course Requirements

The following core courses are required by the Engineering Science Honours program in Biomedical Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.

BPK 201 - Biomechanics (3)

BPK 208 - Introduction to Physiological Systems (3)

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

CHEM 121 - General Chemistry and Laboratory I (4)

CHEM 180 - The Chemistry of Life (3)

CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

ECON 103 - Principles of Microeconomics (4)

ENSC 100W - Engineering, Science and Society (3)

ENSC 105W - Process, Form, and Convention in Professional Genres (3)

ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)

ENSC 180 - Introduction to Engineering Analysis (3)

ENSC 204 - Graphical Communication for Engineering (1)

ENSC 220 - Electric Circuits I (4)

ENSC 225 - Microelectronics I (4)

ENSC 251 - Software Design and Analysis for Engineers (4)

ENSC 252 - Fundamentals of Digital Logic & Design (4)

ENSC 254 - Introduction to Computer Organization (4)

ENSC 280 - Engineering Measurement and Data Analysis (4)

ENSC 316 - Engineering Electromagnetics I (3)

ENSC 320 - Electric Circuits II (4)

ENSC 327 - Communication Systems (4)

ENSC 351 - Embedded and Real Time System Software (4)

ENSC 370 - Biomedical Engineering Directions (3)

ENSC 380 - Linear Systems (3)

ENSC 383 - Feedback Control Systems (4)

ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)

ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)

ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)

ENSC 440 - Capstone B: Engineering Design Project (3)

ENSC 472 - Orthopaedic and Rehabilitation Engineering (4) or ENSC 476 - Biophotonics and Microscopy Techniques (4)

ENSC 474 - Digital/Medical Image Processing (4)

ENSC 475 - Biomedical Instrumentation (4)



ENSC 477 - Biomedical Image Acquisition (4)  
ENSC 498 - Engineering Science Thesis Proposal (1)  
ENSC 499 - Engineering Science Undergraduate Thesis (9)  
MATH 151 - Calculus I (3) \*\*  
MATH 152 - Calculus II (3)  
MATH 232 - Applied Linear Algebra (3)  
MATH 251 - Calculus III (3)  
MATH 254 - Vector and Complex Analysis for Applied Sciences (3)  
~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~  
**MATH 260 - Introduction to Ordinary Differential Equations (3)**  
PHYS 120 - Mechanics and Modern Physics (3)  
PHYS 121 - Optics, Electricity and Magnetism (3)

\*\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites

## Honours, Engineering Science, Computer Engineering Option Bachelor of Applied Science Core Course Requirements

The following core courses are required for the Engineering Science Honours program in Computer Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.

- CHEM 121 - General Chemistry and Laboratory I (4)
- CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)
- CMPT 225 - Data Structures and Programming (3)
- CMPT 275 - Software Engineering I (4)
- CMPT 300 - Operating Systems I (3)
- ECON 103 - Principles of Microeconomics (4)
- ENSC 100W - Engineering, Science and Society (3)
- ENSC 105W - Process, Form, and Convention in Professional Genres (3)
- ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)
- ENSC 180 - Introduction to Engineering Analysis (3)
- ENSC 204 - Graphical Communication for Engineering (1)
- ENSC 220 - Electric Circuits I (4)
- ENSC 225 - Microelectronics I (4)
- ENSC 251 - Software Design and Analysis for Engineers (4)
- ENSC 252 - Fundamentals of Digital Logic & Design (4)
- ENSC 254 - Introduction to Computer Organization (4)
- ENSC 280 - Engineering Measurement and Data Analysis (4)
- ENSC 320 - Electric Circuits II (4)
- ENSC 324 - Electronic Devices (3)
- ENSC 327 - Communication Systems (4)
- ENSC 350 - Digital Systems Design (4)
- ENSC 351 - Embedded and Real Time System Software (4)
- ENSC 380 - Linear Systems (3)
- ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)
- ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)
- ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)
- ENSC 429 - Digital Signal Processing (4)
- ENSC 440 - Capstone B: Engineering Design Project (3)
- ENSC 450 - VLSI Systems Design (4) or ENSC 452 - Advanced Digital System Design (4)
- ENSC 498 - Engineering Science Thesis Proposal (1)
- ENSC 499 - Engineering Science Undergraduate Thesis (9)
- MACM 201 - Discrete Mathematics II (3)
- MACM 316 - Numerical Analysis I (3)



MATH 151 - Calculus I (3) \*

MATH 152 - Calculus II (3)

MATH 232 - Applied Linear Algebra (3)

MATH 251 - Calculus III (3)

~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~

**MATH 260 - Introduction to Ordinary Differential Equations (3)**

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites

Honours, Engineering Science, Electronics Engineering Option Bachelor of Applied Science

### Core Course Requirements

The following core courses are required for the Engineering Science Honours program in Electronics Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details in obtaining permission.

- CHEM 121 - General Chemistry and Laboratory I (4)
- CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)
- ECON 103 - Principles of Microeconomics (4)
- ENSC 100W - Engineering, Science and Society (3)
- ENSC 105W - Process, Form, and Convention in Professional Genres (3)
- ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)
- ENSC 180 - Introduction to Engineering Analysis (3)
- ENSC 204 - Graphical Communication for Engineering (1)
- ENSC 220 - Electric Circuits I (4)
- ENSC 225 - Microelectronics I (4)
- ENSC 251 - Software Design and Analysis for Engineers (4)
- ENSC 252 - Fundamentals of Digital Logic & Design (4)
- ENSC 254 - Introduction to Computer Organization (4)
- ENSC 280 - Engineering Measurement and Data Analysis (4)
- ENSC 316 - Engineering Electromagnetics I (3)
- ENSC 320 - Electric Circuits II (4)
- ENSC 324 - Electronic Devices (3)
- ENSC 325 - Microelectronics II (4)
- ENSC 327 - Communication Systems (4)
- ENSC 350 - Digital Systems Design (4)
- ENSC 351 - Embedded and Real Time System Software (4)
- ENSC 380 - Linear Systems (3)
- ENSC 383 - Feedback Control Systems (4)
- ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)
- ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)
- ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)
- ENSC 416 - Engineering Electromagnetics II: Design (4)
- ENSC 425 - Electronic System Design (4)
- ENSC 426 - High Frequency Electronics (4)
- ENSC 427 - Communication Networks (4) or ENSC 428 - Digital Communications (4)
- ENSC 440 - Capstone B: Engineering Design Project (3)
- ENSC 498 - Engineering Science Thesis Proposal (1)



ENSC 499 - Engineering Science Undergraduate Thesis (9)  
MATH 151 - Calculus I (3) \*  
MATH 152 - Calculus II (3)  
MATH 232 - Applied Linear Algebra (3)  
MATH 251 - Calculus III (3)  
MATH 254 - Vector and Complex Analysis for Applied Sciences (3)  
~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~  
**MATH 260 - Introduction to Ordinary Differential Equations (3)**  
PHYS 120 - Mechanics and Modern Physics (3)  
PHYS 121 - Optics, Electricity and Magnetism (3)

\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites



Honours, Engineering Science, Engineering Physics Option Bachelor of Applied Science

Core Course Requirements

The following core courses are required for the Engineering Science Honours program in Engineering Physics and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.

CHEM 121 - General Chemistry and Laboratory I (4)

CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

ECON 103 - Principles of Microeconomics (4)

ENSC 100W - Engineering, Science and Society (3)

ENSC 105W - Process, Form, and Convention in Professional Genres (3)

ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)

ENSC 180 - Introduction to Engineering Analysis (3)

ENSC 204 - Graphical Communication for Engineering (1)

ENSC 220 - Electric Circuits I (4)

ENSC 225 - Microelectronics I (4)

ENSC 251 - Software Design and Analysis for Engineers (4)

ENSC 252 - Fundamentals of Digital Logic & Design (4)

ENSC 254 - Introduction to Computer Organization (4)

ENSC 280 - Engineering Measurement and Data Analysis (4)

ENSC 320 - Electric Circuits II (4)

ENSC 324 - Electronic Devices (3)

ENSC 325 - Microelectronics II (4)

ENSC 351 - Embedded and Real Time System Software (4)

ENSC 380 - Linear Systems (3)

ENSC 383 - Feedback Control Systems (4)

ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)

ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)

ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)

ENSC 440 - Capstone B: Engineering Design Project (3)

ENSC 470 - Optical and Laser Engineering Applications (4)

ENSC 495 - Introduction to Microelectronic Fabrication (4)

ENSC 498 - Engineering Science Thesis Proposal (1)

ENSC 499 - Engineering Science Undergraduate Thesis (9)

MATH 151 - Calculus I (3) \*

MATH 152 - Calculus II (3)

MATH 232 - Applied Linear Algebra (3)

MATH 251 - Calculus III (3)

MATH 254 - Vector and Complex Analysis for Applied Sciences (3)



~~MATH 310 – Introduction to Ordinary Differential Equations (3)~~  
**MATH 260 - Introduction to Ordinary Differential Equations (3)**  
PHYS 120 - Mechanics and Modern Physics (3)  
PHYS 121 - Optics, Electricity and Magnetism (3)  
PHYS 211 - Intermediate Mechanics (3)  
PHYS 233 - Physics Laboratory IV (3)  
PHYS 321 - Intermediate Electricity and Magnetism (3)  
PHYS 344 - Thermal Physics (3)  
PHYS 384 - Methods of Theoretical Physics I (3)  
PHYS 385 - Quantum Mechanics I (3)  
PHYS 421 - Electromagnetic Waves (3)

\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites



## Honours, Engineering Science, Systems Engineering Option Bachelor of Applied Science

### Core Course Requirements

The following core courses are required for the Engineering Science Honours program in Systems Engineering and cannot be substituted for "equivalent" courses in other areas without prior approval by the School. 'Equivalent' courses taken without prior approval will not be applied to graduation requirements. Students should consult an academic advisor within their program for details on obtaining permission.

CHEM 121 - General Chemistry and Laboratory I (4)

CMPT 128 - Introduction to Computing Science and Programming for Engineers (3)

CMPT 225 - Data Structures and Programming (3)

ECON 103 - Principles of Microeconomics (4)

ENSC 100W - Engineering, Science and Society (3)

ENSC 105W - Process, Form, and Convention in Professional Genres (3)

ENSC 120 - Introduction to Electronics Laboratory Instruments Operation and Measurement Techniques (2)

ENSC 180 - Introduction to Engineering Analysis (3)

ENSC 204 - Graphical Communication for Engineering (1)

ENSC 220 - Electric Circuits I (4)

ENSC 225 - Microelectronics I (4)

ENSC 251 - Software Design and Analysis for Engineers (4)

ENSC 252 - Fundamentals of Digital Logic & Design (4)

ENSC 254 - Introduction to Computer Organization (4)

ENSC 280 - Engineering Measurement and Data Analysis (4)

ENSC 316 - Engineering Electromagnetics I (3)

ENSC 320 - Electric Circuits II (4)

ENSC 350 - Digital Systems Design (4)

ENSC 351 - Embedded and Real Time System Software (4)

ENSC 380 - Linear Systems (3)

ENSC 383 - Feedback Control Systems (4)

ENSC 385 - Statics and Strength of Materials (3)

ENSC 386 - Introduction to Mechanical Design (4)

ENSC 387 - Introduction to Electro-Mechanical Sensors and Actuators (4)

ENSC 405W - Capstone A: Project Design, Management, and Documentation (3)

ENSC 406 - Engineering Ethics, Law, and Professional Practice (2)

ENSC 410 - The Business of Engineering (3) or ENSC 411 - The Business of Entrepreneurial Engineering (4)

ENSC 440 - Capstone B: Engineering Design Project (3)

ENSC 482 - Introduction to Decision Making in Engineering (4)

ENSC 488 - Introduction to Robotics (4)

ENSC 498 - Engineering Science Thesis Proposal (1)

ENSC 499 - Engineering Science Undergraduate Thesis (9)

MACM 316 - Numerical Analysis I (3)



MATH 151 - Calculus I (3) \*

MATH 152 - Calculus II (3)

MATH 232 - Applied Linear Algebra (3)

MATH 251 - Calculus III (3)

~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~

**MATH 260 - Introduction to Ordinary Differential Equations (3)**

PHYS 120 - Mechanics and Modern Physics (3)

PHYS 121 - Optics, Electricity and Magnetism (3)

\* or MATH 150 Calculus I with Review if you do not meet the MATH 151 prerequisites



## Calendar Entry Change Mechatronic Systems Engineering, Faculty of Applied Sciences

Rationale for change: The Department of Mathematics is renumbering the course MATH 310 (3) as MATH 260 (3). This program change is submitted for consistency with the new course number, while recognizing credit for students that have already completed MATH 310 as part of their engineering degree requirements.
Effective term and year: Fall 2020
The following program(s) will be affected by these changes:  Major, Mechatronic Systems Engineering Bachelor of Applied Science Mechatronic Systems Engineering and Business Double Degree Program Bachelor of Applied Science and Bachelor of Business Administration Honours, Mechatronic Systems Engineering Bachelor of Applied Science

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.

Major, Mechatronic Systems Engineering Bachelor of Applied Science  Students complete all of  CMPT 130 - Introduction to Computer Programming I (3) MATH 152 - Calculus II (3) MATH 251 - Calculus III (3) MATH 232 - Applied Linear Algebra (3) <del>MATH 310 - Introduction to Ordinary Differential Equations (3)</del> <b>MATH 260 - Introduction to Ordinary Differential Equations (3)</b> MSE 100 - Engineering Graphics and Design (3) MSE 101W - Process, Form, and Convention in Professional Genres (3) MSE 102 - Applied Science, Technology and Society (3) MSE 110 - Mechatronics Design I (3) MSE 210 - Engineering Measurement and Data Analysis (3) MSE 211 - Computational Methods for Engineers (3) MSE 220 - Engineering Materials (3) MSE 221 - Statics and Strength of Materials (4) MSE 222 - Kinematics and Dynamics of Rigid Bodies and Mechanisms (4) MSE 223 - Introduction to Fluid Mechanics (4) MSE 250 - Electric Circuits I (4) MSE 251 - Electronic Circuits (4) MSE 280 - Linear Systems (3)
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MSE 300 - The Business of Engineering I (3)  
MSE 310 - Introduction to Electro-Mechanical Sensors and Actuators (4)  
MSE 311 - Introduction to Microelectromechanical Systems (3)  
MSE 312 - Mechatronics Design II (4) \*  
MSE 320 - Machine Design (4)  
MSE 321 - Engineering Thermodynamics and Heat Transfer (4)  
MSE 352 - Digital Logic and Microcontrollers (4)  
MSE 353 - Power Electronics and Electric Machinery (4)  
MSE 380 - Systems Modeling and Simulation (3)  
MSE 381 - Feedback Control Systems (4) \*  
MSE 402 - Engineering Ethics, Law, and Professional Practice (2)  
MSE 405W - The Business of Engineering II, Entrepreneurship for Engineers (4)  
MSE 410 - Capstone Design Technical Project I (3)  
MSE 411 - Capstone Design Technical Project II (3)  
PHYS 140 - Studio Physics - Mechanics and Modern Physics (4)  
PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4)

and one of

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

and one of

CHEM 120 - General Chemistry I (3)  
CHEM 121 - General Chemistry and Laboratory I (4)

Prior approval by the director of the school is required if the student plans a term with fewer than 12 course units.

\* strongly recommended to be completed concurrently



Mechatronic Systems Engineering and Business Double Degree Program Bachelor of Applied Science and Bachelor of Business Administration

Students complete all of

- BUS 251 - Financial Accounting I (3)
- BUS 254 - Managerial Accounting I (3) \*\*
- BUS 272 - Behaviour in Organizations (3)
- BUS 312 - Introduction to Finance (4)
- BUS 336 - Data and Decisions II (4)
- BUS 343 - Introduction to Marketing (3)
- BUS 360W - Business Communication (4) †
- BUS 381 - Introduction to Human Resource Management (3)
- BUS 393 - Commercial Law (3)
- BUS 478 - Strategy (3) \*\*
- BUS 232 - Data and Decisions I (4)
- CHEM 120 - General Chemistry I (3)
- CMPT 130 - Introduction to Computer Programming I (3)
- ECON 103 - Principles of Microeconomics (4)
- ECON 105 - Principles of Macroeconomics (4)
- MATH 151 - Calculus I (3)
- MATH 152 - Calculus II (3)
- MATH 232 - Applied Linear Algebra (3)
- MATH 251 - Calculus III (3)
- ~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~
- MATH 260 - Introduction to Ordinary Differential Equations (3)**
- MSE 100 - Engineering Graphics and Design (3)
- MSE 101W - Process, Form, and Convention in Professional Genres (3)
- MSE 102 - Applied Science, Technology and Society (3)
- MSE 110 - Mechatronics Design I (3)
- MSE 210 - Engineering Measurement and Data Analysis (3)
- MSE 211 - Computational Methods for Engineers (3)
- MSE 220 - Engineering Materials (3)
- MSE 221 - Statics and Strength of Materials (4)
- MSE 222 - Kinematics and Dynamics of Rigid Bodies and Mechanisms (4)
- MSE 223 - Introduction to Fluid Mechanics (4)
- MSE 250 - Electric Circuits I (4)
- MSE 251 - Electronic Circuits (4)
- MSE 280 - Linear Systems (3)
- MSE 310 - Introduction to Electro-Mechanical Sensors and Actuators (4)
- MSE 311 - Introduction to Microelectromechanical Systems (3)
- MSE 312 - Mechatronics Design II (4) \*
- MSE 320 - Machine Design (4)
- MSE 321 - Engineering Thermodynamics and Heat Transfer (4)
- MSE 352 - Digital Logic and Microcontrollers (4)



MSE 353 - Power Electronics and Electric Machinery (4)  
MSE 380 - Systems Modeling and Simulation (3)  
MSE 381 - Feedback Control Systems (4) \*  
MSE 402 - Engineering Ethics, Law, and Professional Practice (2)  
MSE 410 - Capstone Design Technical Project I (3)  
MSE 411 - Capstone Design Technical Project II (3)  
PHYS 140 - Studio Physics - Mechanics and Modern Physics (4)  
PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4)

and one of

BUS 207 - Managerial Economics (3)  
ECON 201 - Microeconomic Theory I: Competitive Behavior (4)

Prior approval by the director of the school is required if the student plans a term with fewer than 12 course units.

\* Strongly recommended to be completed concurrently.

\*\* To be completed at Simon Fraser University.

† To be completed before the student's 75th unit and at Simon Fraser University in accordance with the WQB requirements.





Honours, Mechatronics Systems Engineering Bachelor of Applied Science

Students complete all of

CMPT 130 - Introduction to Computer Programming I (3)

MATH 152 - Calculus II (3)

MATH 251 - Calculus III (3)

MATH 232 - Applied Linear Algebra (3)

~~MATH 310 - Introduction to Ordinary Differential Equations (3)~~

**MATH 260 - Introduction to Ordinary Differential Equations (3)**

MSE 100 - Engineering Graphics and Design (3)

MSE 101W - Process, Form, and Convention in Professional Genres (3)

MSE 102 - Applied Science, Technology and Society (3)

MSE 110 - Mechatronics Design I (3)

MSE 210 - Engineering Measurement and Data Analysis (3)

MSE 211 - Computational Methods for Engineers (3)

MSE 220 - Engineering Materials (3)

MSE 221 - Statics and Strength of Materials (4)

MSE 222 - Kinematics and Dynamics of Rigid Bodies and Mechanisms (4)

MSE 223 - Introduction to Fluid Mechanics (4)

MSE 250 - Electric Circuits I (4)

MSE 251 - Electronic Circuits (4)

MSE 280 - Linear Systems (3)

MSE 300 - The Business of Engineering I (3)

MSE 310 - Introduction to Electro-Mechanical Sensors and Actuators (4)

MSE 311 - Introduction to Microelectromechanical Systems (3)

MSE 312 - Mechatronics Design II (4) \*

MSE 320 - Machine Design (4)

MSE 321 - Engineering Thermodynamics and Heat Transfer (4)

MSE 352 - Digital Logic and Microcontrollers (4)

MSE 353 - Power Electronics and Electric Machinery (4)

MSE 380 - Systems Modeling and Simulation (3)

MSE 381 - Feedback Control Systems (4) \*

MSE 402 - Engineering Ethics, Law, and Professional Practice (2)

MSE 405W - The Business of Engineering II, Entrepreneurship for Engineers (4)

MSE 410 - Capstone Design Technical Project I (3)

MSE 411 - Capstone Design Technical Project II (3)

MSE 498 - Mechatronics Systems Engineering Thesis Proposal (3)

MSE 499 - Mechatronics Systems Engineering Undergraduate Thesis (9)

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

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

and one of

MATH 150 - Calculus I with Review (4)



MATH 151 - Calculus I (3)

and one of

CHEM 120 - General Chemistry I (3)

CHEM 121 - General Chemistry and Laboratory I (4)

Prior approval by the director of the school is required if the student plans a term with fewer than 12 course units.

\* strongly recommended to be completed concurrently

**Calendar Entry Change**  
**Sustainable Energy Engineering, Faculty of Applied Sciences**

<p>Rationale for change: The Department of Mathematics is renumbering the course MATH 310 (3) as MATH 260 (3). This program change is submitted for consistency with the new course number, while recognizing credit for students that have already completed MATH 310 as part of their engineering degree requirements.</p>
<p>Effective term and year: Fall 2020</p>
<p>The following program(s) will be affected by these changes:</p> <p>Major, Sustainable Energy Engineering</p>

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.

<p>Students complete all of</p> <p>BUS 238 - Introduction to Entrepreneurship and Innovation (3)          CHEM 121 - General Chemistry and Laboratory I (4)          CMPT 130 - Introduction to Computer Programming I (3)          CMPT 135 - Introduction to Computer Programming II (3)          MATH 152 - Calculus II (3)          MATH 232 - Applied Linear Algebra (3)          MATH 251 - Calculus III (3)  <del>MATH 310 - Introduction to Ordinary Differential Equations (3)</del>  <b>MATH 260 - Introduction to Ordinary Differential Equations (3)</b>          PHYS 140 - Studio Physics - Mechanics and Modern Physics (4)          PHYS 141 - Studio Physics - Optics, Electricity and Magnetism (4)          REM 321 - Ecological Economics (4)          SEE 100 - Engineering Graphics and Software for Design (3)          SEE 101W - Process, Form and Convention in Professional Genres (3)          SEE 110 - Energy, Environment and Society (3)          SEE 111 - Integrated Energy Solution I (4)          SEE 221 - Statics and Mechanics of Materials (4)          SEE 222 - Engineering Materials for Energy Systems (3)          SEE 224 - Thermodynamics for Energy Engineering (3)          SEE 225 - Fluid Mechanics (4)          SEE 230 - Electric Circuits (4)</p>
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SEE 231 - Electronic Devices and Systems (4)  
SEE 241 - Measurement, Analysis and Forecasting (3)  
SEE 242 - Computational Methods for Engineers (3)  
SEE 251 - Electric Machines and Energy Conversion (3)  
SEE 300 - The Business of Engineering (3)  
SEE 310 - Integrated Energy Solution II (4)  
SEE 324 - Heat and Mass Transfer for Energy Engineering (3)  
SEE 331 - Power Electronics (4)  
SEE 332 - Power Systems Analysis and Design (3)  
SEE 341 - Signals and Systems (3)  
SEE 342 - Feedback Control Systems (4)  
SEE 351 - Bioprocess Engineering Systems (3)  
SEE 352 - Power Generation and Conversion (3)  
SEE 354 - Energy Storage (3)  
SEE 402 - Professional Engineering Ethics and Practice (2)  
SEE 410W - Sustainable Energy Design Project I (3)  
SEE 411 - Sustainable Energy Systems Design Project (3)

and one of

SEE 325 - Mechanical Design and Finite Element Analysis (3)  
SEE 333 - Network and Communication Systems (3)

and one of

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



## Calendar Entry Change Environmental Science

Rationale for change:

There are two changes:

- Addition of EVSC 334 or REM 334, and REM 431 to the Environmental Earth Systems concentration and EASC 415 to the Water Science concentration as these courses are suitable for these programs.
- Removal of STAT 341-2 and STAT 342-2 from the Environmetrics concentration as STAT 341-2 is being discontinued.

Effective term and year:

Spring 2021

The following program(s) will be affected by these changes:

Environmental Science Major  
Environmental Earth Systems Concentration  
Environmetrics Concentration  
Water Science Concentration

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.

### **Environmental Science Major**

#### Environmental Earth Systems Area of Concentration

##### UPPER DIVISION REQUIREMENTS

Students complete all of

EVSC 300 - Seminar in Environmental Science (3)  
EVSC 305 - Methods in Environmental Science (4)  
EVSC 400 - Environmental Science Capstone (4)



and two of

~~ENV~~ **REM 320W - Ethics and the Environment (3)**  
REM 319 - Environmental and Planning Law (3)  
REM 321 - Ecological Economics (4)  
REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and six of, with at least one from the 400 division

BISC 414 - Limnology (3)  
EASC 209W - Environmental Geoscience (4) \*  
EASC 304 - Hydrogeology (3)  
EASC 314 - Principles of Glaciology (3)  
**EVSC 334 - Earth's Past Climates (3) or REM 334 - Earth's Past Climates**  
GEOG 310 - Physical Geography Field Course (4)  
GEOG 311 - Hydrology (4)  
GEOG 313 - River Geomorphology (4)  
GEOG 314 - The Climate System (4)  
GEOG 315 - World Ecosystems (4)  
GEOG 316 - Global Biogeochemical and Water Cycles (4)  
GEOG 317 - Soil Science (4)  
GEOG 411 - Advanced Hydrology (4)  
GEOG 412W - Glacial Processes and Environments (4)  
GEOG 414 - Climate Change (4)  
GEOG 417W - Advanced Soil Science (4)

and one of

BISC 309 - Conservation Biology (3)  
BISC 420 - Community Ecology (3)  
REM 311 - Applied Ecology and Sustainable Environments (3)  
REM 370 - Global Resource Issues in Oceanography (4)  
REM 375 - Ecology and Conservation of Coastal BC (3)  
REM 423 - Research Methods in Fisheries Assessment (4)  
**REM 431 - Climate Change and Environmental Management**  
REM 445 - Environmental Risk Assessment (4)  
REM 471 - Forest Ecosystem Management (4)

and one of

EASC 305 - Quantitative Methods for the Earth Sciences (3)  
GEOG 351 - Multimedia Cartography (4)  
GEOG 352 - Spatial Analysis (4)



GEOG 353 - Advanced Remote Sensing (4)  
GEOG 355 - Geographical Information Science II (4)  
GEOG 356 - 3D Geovisualization (4)  
REM 412 - Environmental Modeling (4)  
STAT 302 - Analysis of Experimental and Observational Data (3)

\* Students who select this course may be required to complete additional upper division units to meet their degree requirements. Please see the Environmental Science Advisor.

## Environmetrics Area of Concentration

(...)

### UPPER DIVISION REQUIREMENTS

Students complete all of

EVSC 300 - Seminar in Environmental Science (3)  
EVSC 305 - Methods in Environmental Science (4)  
EVSC 400 - Environmental Science Capstone (4)  
STAT 350 - Linear Models in Applied Statistics (3)  
STAT 410 - Statistical Analysis of Sample Surveys (3)  
STAT 430 - Statistical Design and Analysis of Experiments (3)

and two of

~~ENV~~ **REM 320W** - Ethics and the Environment (3)  
REM 319 - Environmental and Planning Law (3)  
REM 321 - Ecological Economics (4)  
REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and one of

~~STAT 341 - Introduction to Statistical Computing and Exploratory Data Analysis - R (2)~~  
~~STAT 342 - Introduction to Statistical Computing and Exploratory Data Analysis - SAS (2)~~

and one of

STAT 445 - Applied Multivariate Analysis (3)  
STAT 475 - Applied Discrete Data Analysis (3)  
STAT 485 - Applied Time Series Analysis (3)



plus 12 upper division units from the Faculty of Environment or the Faculty of Science with approval from the Director.

## Water Science Area of Concentration

### UPPER DIVISION REQUIREMENTS

Students complete all of

BISC 414 - Limnology (3)  
EASC 304 - Hydrogeology (3)  
EASC 315W - Geochemistry of Natural Waters (3)  
EVSC 300 - Seminar in Environmental Science (3)  
EVSC 305 - Methods in Environmental Science (4)  
EVSC 400 - Environmental Science Capstone (4)  
GEOG 311 - Hydrology (4)  
GEOG 313 - River Geomorphology (4)  
GEOG 316 - Global Biogeochemical and Water Cycles (4)

and two of

~~ENV~~ **REM 320W** - Ethics and the Environment (3)  
REM 319 - Environmental and Planning Law (3)  
REM 321 - Ecological Economics (4)  
REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and three of, with at least one from the 400 division

EASC 314 - Principles of Glaciology (3)  
EASC 405 - Water, Environment, and Climate Change (3)  
EASC 410 - Groundwater Contamination and Transport (3)  
**EASC 415 - Groundwater Modeling (3)**  
EASC 416 - Field and Lab Techniques in Hydrogeology (3)  
GEOG 310 - Physical Geography Field Course (4)  
GEOG 314 - The Climate System (4)  
GEOG 317 - Soil Science (4)  
GEOG 411 - Advanced Hydrology (4)  
GEOG 412W - Glacial Processes and Environments (4)  
GEOG 414 - Climate Change (4)  
GEOG 417W - Advanced Soil Science (4)  
REM 370 - Global Resource Issues in Oceanography (4)  
REM 375 - Ecology and Conservation of Coastal BC (3)  
REM 412 - Environmental Modeling (4)





REM 423 - Research Methods in Fisheries Assessment (4)

REM 445 - Environmental Risk Assessment (4)



## Calendar Entry Change Environmental Science

Rationale for change:

There are four changes:

- Addition of new honours courses (EVSC 489 and EVSC 490W) to all concentrations. Previously students took EVSC 490W twice and this caused system issues.
- Removal of BISC 490, 491, 492W from Applied Biology concentration due to request from Biology.
- Addition of new courses, EVSC 334 or REM 334, REM 431, to the Environmental Earth Systems concentrations and EASC 415 to the Water Science concentration. These courses are suitable for these concentrations.
- Removal of STAT 341-2 and STAT 342-2 from Environmetrics as STAT 341-2 is being discontinued.

Effective term and year:

Spring 2021

The following program(s) will be affected by these changes:

Environmental Science Honours  
Applied Biology Concentration  
Environmental Earth Systems Concentration  
Envirometrics Concentration  
Water Science Concentration

**Calendar Change:** "to" and "from" sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.

## **Environmental Science Honours**

Applied Biology Concentration

UPPER DIVISION REQUIREMENTS



Students complete all of

BISC 316 - Vertebrate Biology (4)  
BISC 337 - Plant Biology (4)  
EVSC 300 - Seminar in Environmental Science (3)  
EVSC 305 - Methods in Environmental Science (4)  
EVSC 400 - Environmental Science Capstone (4)  
**EVSC 489 – Environmental Science Thesis I (4)**  
**EVSC 490W – Environmental Science Thesis II (4)**  
GEOG 316 - Global Biogeochemical and Water Cycles (4)  
REM 311 - Applied Ecology and Sustainable Environments (3)  
REM 445 - Environmental Risk Assessment (4)

and either all of

BISC 490 Research Design (5)  
BISC 491 Research Technique (5)  
BISC 492W Research Reporting (5)

EVSC 490 Environmental Science Thesis (4)

and one of

STAT 302 - Analysis of Experimental and Observational Data (3)  
STAT 305 - Introduction to Biostatistical Methods for Health Sciences (3)

and two of

~~ENV~~ **REM 320W - Ethics and the Environment (3)**  
REM 319 - Environmental and Planning Law (3)  
REM 321 - Ecological Economics (4)  
REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and two from the following

BISC 300 - Evolution (3)  
BISC 306 - Invertebrate Biology (4)  
BISC 309 - Conservation Biology (3)  
BISC 326 - Biology of Algae and Fungi (3)  
BISC 366 - Plant Physiology (3)  
BISC 407 - Population Dynamics (3)  
BISC 414 - Limnology 3



BISC 420 - Community Ecology (3)  
 REM 412 - Environmental Modeling (4)  
 REM 471 - Forest Ecosystem Management (4)  
 STAT 403 - Intermediate Sampling and Experimental Design (3)

## Environmental Earth Systems Area of Concentration

### UPPER DIVISION REQUIREMENTS

Students complete all of

EVSC 300 - Seminar in Environmental Science (3)  
 EVSC 305 - Methods in Environmental Science (4)  
 EVSC 400 - Environmental Science Capstone (4)  
**EVSC 489 - Environmental Science Thesis I (4)**  
**EVSC 490W - Environmental Science Thesis II (4)**  
~~EVSC 490 - Environmental Science Thesis (4) or GEOG 491 - Honours Essay (4)~~

and two of

~~ENV~~ **REM 320W - Ethics and the Environment (3)**  
 REM 319 - Environmental and Planning Law (3)  
 REM 321 - Ecological Economics (4)  
 REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and six of, with at least one from the 400 division

BISC 414 - Limnology (3)  
 EASC 209W - Environmental Geoscience (4) \*  
 EASC 304 - Hydrogeology (3)  
 EASC 314 - Principles of Glaciology (3)  
**EVSC 334 - Earth's Past Climates (3) or REM 334 - Earth's Past Climates**  
 GEOG 310 - Physical Geography Field Course (4)  
 GEOG 311 - Hydrology (4)  
 GEOG 313 - River Geomorphology (4)  
 GEOG 314 - The Climate System (4)  
 GEOG 315 - World Ecosystems (4)  
 GEOG 316 - Global Biogeochemical and Water Cycles (4)  
 GEOG 317 - Soil Science (4)  
 GEOG 411 - Advanced Hydrology (4)  
 GEOG 412W - Glacial Processes and Environments (4)  
 GEOG 414 - Climate Change (4)  
 GEOG 417W - Advanced Soil Science (4)

and one of

BISC 309 - Conservation Biology (3)  
 BISC 420 - Community Ecology (3)  
 REM 311 - Applied Ecology and Sustainable Environments (3)  
 REM 370 - Global Resource Issues in Oceanography (4)  
 REM 375 - Ecology and Conservation of Coastal BC (3)  
 REM 423 - Research Methods in Fisheries Assessment (4)  
**REM 431 - Climate Change and Environmental Management**  
 REM 445 - Environmental Risk Assessment (4)  
 REM 471 - Forest Ecosystem Management (4)

and one of

EASC 305 - Quantitative Methods for the Earth Sciences (3)  
 GEOG 351 - Multimedia Cartography (4)  
 GEOG 352 - Spatial Analysis (4)  
 GEOG 353 - Advanced Remote Sensing (4)  
 GEOG 355 - Geographical Information Science II (4)  
 GEOG 356 - 3D Geovisualization (4)  
 REM 412 - Environmental Modeling (4)  
 STAT 302 - Analysis of Experimental and Observational Data (3)

\* Students who select this course may be required to complete additional upper division units to meet their degree requirements. Please see the Environmental Science Advisor.

## Environmetrics Area of Concentration

### UPPER DIVISION REQUIREMENTS

Students complete all of

EVSC 300 - Seminar in Environmental Science (3)  
 EVSC 305 - Methods in Environmental Science (4)  
 EVSC 400 - Environmental Science Capstone (4)  
**EVSC 489 - Environmental Science Thesis I (4)**  
**EVSC 490W - Environmental Science Thesis II (4)**  
~~EVSC 490 - Environmental Science Thesis (4)~~  
 STAT 350 - Linear Models in Applied Statistics (3)  
 STAT 410 - Statistical Analysis of Sample Surveys (3)  
 STAT 430 - Statistical Design and Analysis of Experiments (3)



and two of

~~ENV~~ **REM 320W - Ethics and the Environment (3)**

REM 319 - Environmental and Planning Law (3)

REM 321 - Ecological Economics (4)

REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and one of

~~STAT 341 - Introduction to Statistical Computing and Exploratory Data Analysis - R (2)~~

~~STAT 342 - Introduction to Statistical Computing and Exploratory Data Analysis - SAS (2)~~

and one of

STAT 445 - Applied Multivariate Analysis (3)

STAT 475 - Applied Discrete Data Analysis (3)

STAT 485 - Applied Time Series Analysis (3)

plus 12 upper division units from the Faculty of Environment or the Faculty of Science with approval from the Director.

## Water Science Area of Concentration

### UPPER DIVISION REQUIREMENTS

Students complete all of

BISC 414 - Limnology (3)

EASC 304 - Hydrogeology (3)

EASC 315W - Geochemistry of Natural Waters (3)

EVSC 300 - Seminar in Environmental Science (3)

EVSC 305 - Methods in Environmental Science (4)

EVSC 400 - Environmental Science Capstone (4)

**EVSC 489 - Environmental Science Thesis I (4)**

**EVSC 490W - Environmental Science Thesis II (4)**

~~EVSC 490 - Environmental Science Thesis (4)~~

GEOG 311 - Hydrology (4)

GEOG 313 - River Geomorphology (4)

GEOG 316 - Global Biogeochemical and Water Cycles (4)



and two of

- ~~ENV~~ **REM 320W** - Ethics and the Environment (3)
- REM 319 - Environmental and Planning Law (3)
- REM 321 - Ecological Economics (4)
- REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

and three of, with at least one from the 400 division

- EASC 314 - Principles of Glaciology (3)
- EASC 405 - Water, Environment, and Climate Change (3)
- EASC 410 - Groundwater Contamination and Transport (3)
- EASC 415 – Groundwater Modeling (3)**
- EASC 416 - Field and Lab Techniques in Hydrogeology (3)
- GEOG 310 - Physical Geography Field Course (4)
- GEOG 314 - The Climate System (4)
- GEOG 317 - Soil Science (4)
- GEOG 411 - Advanced Hydrology (4)
- GEOG 412W - Glacial Processes and Environments (4)
- GEOG 414 - Climate Change (4)
- GEOG 417W - Advanced Soil Science (4)
- REM 370 - Global Resource Issues in Oceanography (4)
- REM 375 - Ecology and Conservation of Coastal BC (3)
- REM 412 - Environmental Modeling (4)
- REM 423 - Research Methods in Fisheries Assessment (4)
- REM 445 - Environmental Risk Assessment (4)



### Calendar Entry Change

#### Name of Program or Name of Faculty **Global Environmental Systems Major/Honours**

Rationale for change:

The Geography of Tourism (GEOG 327) is a suitable course as an option within the Socio-Economic and Political Systems list in the Global Environmental Systems BEnv Major and Honours Programs.

Effective term and year:

Fall 2020

The following program(s) will be affected by these changes:

Global Environmental Systems Major and Honours Programs

**Calendar Change:** “to” and “from” sections are not required. All deletions should be crossed out as follows: ~~sample~~. All additions should be marked by a **bold**.

Global Environmental Systems Major

(...)

Upper Division Requirements

(...)

Socio-economic and Political Systems (choose one)

ARCH 389 - Ethnoecology (3)

GEOG 321 - Geographies of Global Capitalism (4)

GEOG 322W - World Resources (4)

GEOG 325 - Geographies of Consumption (4)

**GEOG327 - Geography of Tourism (4)**

GEOG 362W - Geography of Urban Built Environments (4)

GEOG 363 - Urban Planning and Policy (4)

GEOG 377 - Environmental History (4)

GEOG 381W - Territory, Power, State (4)

GEOG 382 - World on the Move (4)

GEOG 386 - Health Geography (4)

GEOG 387 - Geography and Gender (4)

GEOG 423 - Capitalist Natures (4)

GEOG 432 - Problems in Environmental History (4)

GEOG 449 - City and Environment (4)

GSWS 314 - Race, Class and Gender (4)

REM 319 - Environmental and Planning Law (3)

REM 321 - Ecological Economics (4)





REM 350 - Sustainable Energy and Materials Management (4)  
REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)  
REM 454 - Water Security (4)

(...)

Global Environmental Systems Honours

(...)

Upper Division Requirements

(...)

Socio-economic and Political Systems (choose one)

ARCH 389 - Ethnoecology (3)

GEOG 321 - Geographies of Global Capitalism (4)

GEOG 322W - World Resources (4)

GEOG 325 - Geographies of Consumption (4)

**GEOG327 - Geography of Tourism (4)**

GEOG 362W - Geography of Urban Built Environments (4)

GEOG 363 - Urban Planning and Policy (4)

GEOG 377 - Environmental History (4)

GEOG 381W - Territory, Power, State (4)

GEOG 382 - World on the Move (4)

GEOG 386 - Health Geography (4)

GEOG 387 - Geography and Gender (4)

GEOG 423 - Capitalist Natures (4)

GEOG 432 - Problems in Environmental History (4)

GEOG 449 - City and Environment (4)

GSWS 314 - Race, Class and Gender (4)

REM 319 - Environmental and Planning Law (3)

REM 321 - Ecological Economics (4)

REM 350 - Sustainable Energy and Materials Management (4)

REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)

REM 454 - Water Security (4)