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**MEMORANDUM**

<b>ATTENTION</b>	Senate	<b>DATE</b>	December 7, 2018
<b>FROM</b>	Wade Parkhouse, Chair Senate Committee on Undergraduate Studies	<b>PAGES</b>	1/2
<b>RE:</b>	Program Changes		

**For information:**

Acting under delegated authority at its meeting of December 6, 2018 SCUS approved the following curriculum revisions effective Fall 2019.

**a. Faculty of Applied Sciences (SCUS 18-82)**1. Mechatronic Systems Engineering

- (i) Requirement changes to the MSE Major, MSE Honours and the BUS/MSE Double Degree programs

**b. Faculty of Environment (SCUS 18-83)**1. School of Resource and Environmental Management

- (i) Requirement changes to the REM Major program
- (ii) Adding new BENV Resource and Environmental Management Honours program

**c. Faculty of Science (SCUS 18-84)**1. Department of Chemistry

- (i) Upper and Lower division requirement changes to the Chemistry honours Program

2. Data Science Program

- (i) Upper and Lower division requirement changes to the DATA honours program

3. Department of Statistics and Actuarial Science

- (i) Requirement changes to the STAT 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>.



**Calendar Entry Change**

**Name of Program or Name of Faculty**

**Mechatronic Systems Engineering, Faculty of Applied Sciences**

Rationale for change: The requirement of having a minimum C- in prerequisites courses are already in place. We plan to extend this requirement to all courses as a quality control measure.
Effective term and year: Fall 2019
The following program(s) will be affected by these changes: Mechatronic Systems Engineering Major  <a href="http://www.sfu.ca/students/calendar/2019/spring/programs/mechatronic-systems-engineering/major/bachelor-of-applied-science.html">http://www.sfu.ca/students/calendar/2019/spring/programs/mechatronic-systems-engineering/major/bachelor-of-applied-science.html</a>

**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**.

Minimum Grade Requirement  A <b>minimum</b> grade of C- <del>or better in prerequisite courses</del> is required to register in <b>all courses that are used to fulfill</b> mechatronic systems engineering <del>courses</del> <b>program requirements</b> .
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**Calendar Entry Change**

**Name of Program or Name of Faculty**

**Mechatronic Systems Engineering, Faculty of Applied Sciences**

Rationale for change:

The requirement of having a minimum C- in prerequisites courses are already in place. We plan to extend this requirement to all courses as a quality control measure.

Effective term and year:

Fall 2019

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

Mechatronic Systems Engineering Honours

<http://www.sfu.ca/students/calendar/2019/spring/programs/mechatronic-systems-engineering/honours/bachelor-of-applied-science.html>

**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**.

Minimum Grade Requirement

A **minimum** grade of C- ~~or better in prerequisite courses~~ is required to register in **all courses that are used to fulfill** mechatronic systems engineering courses **program requirements**.



### Calendar Entry Change

Name of Program or Name of Faculty

**Mechatronic Systems Engineering, Faculty of Applied Sciences**

Rationale for change:

The requirement of having a minimum C- in prerequisites courses are already in place. We plan to extend this requirement to all courses as a quality control measure.

Effective term and year:

Fall 2019

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

Mechatronic Systems Engineering Double Degree – Bus/MSE

<https://www.sfu.ca/students/calendar/2019/spring/programs/mechatronic-systems-engineering-and-business-double-degree-program/major/bachelor-of-applied-science-and-bachelor-of-business-administration.html>

**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**.

#### Minimum Grade Requirements

A **minimum** grade of C- ~~or better in prerequisite courses~~ is required to register in **all courses that are used to fulfill** mechatronic systems engineering courses **program requirements**.



**Calendar Entry Change**

**Name of Program or Name of Faculty**

<p>Rationale for change:</p> <p>To add a REM Honours option to the REM major. This will enhance the appeal of the REM undergraduate program and help in attracting good students. It also allows more proficient undergraduates with the opportunity to work on closely with REM’s diverse research faculty via the Honours thesis requirement. In addition, we are using this opportunity to condense and clean up the preamble language for the REM Major.</p>
<p>Effective term and year:</p> <p>Fall 2019</p>
<p>The following program(s) will be affected by these changes:</p> <p>None</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**.

<h1>Resource and Environmental Management Major</h1> <p>Bachelor of Environment</p> <p><del>This major takes full advantage of the expertise existing across FENV units, characteristic of BEnv majors. It</del> <b>The Resource and Environmental Management Major</b> <del>will</del> prepares students to <b>seek employment</b> <del>enter positions</del> or continue in graduate studies in the broadly defined area of resource <b>and environmental</b> management., <del>including fisheries, agriculture, forestry, cultural resources, energy and tourism. REM program requirements, directed by educational goals, provide students with a solid understanding of the interplay of historical, biophysical and socio-cultural factors; Indigenous/First Nations Perspectives; resource use and sustainability; geospatial, statistical and modeling methodologies; decision making, communication, conflict resolution, and legislative/regulatory frameworks as they relate to resource management.</del></p>
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~~The REM program requirements include courses from each of the areas of study in the BEnv core (i.e. earth systems, ecology, biology, human role in nature, the social and built environments, environmental stewardship and governance, and the global scale).~~

~~Resource and Environmental Management Bachelor of Environment students are not eligible for the REM Minor.~~

## Minimum Grades Requirements

The minimum cumulative grade point average (CGPA) for continuation and graduation is 2.00.

## Program Requirements

Students complete 120 units, including at least 45 upper division units, as specified below.

Note: Some of the courses below have prerequisites not included in the REM major requirements. Students are responsible for satisfying the prerequisites for all courses in their program. Students should review the upper division program requirements in advance to determine any lower division prerequisites they should complete.

### Course Substitutions

Substitutions of program requirements, including courses deemed equivalent to these required courses, are not allowed without written permission from the program. Such courses taken without approval will not be applied to graduation requirements. Students should consult their academic advisor for details on obtaining permission for substitutions.

### Lower Division Requirements

Complete all of

FNST 101 - Introduction to First Nations Studies (3)

GEOG 111 - Earth Systems (3)

POL 253 - Introduction to Public Policy (3)

REM 100 - Global Change (3)

REM 200 - Introduction to Resource and Environmental Management in Canada (3)

Choose one of

GEOG 215 - Biogeography (3)

BISC 204 - Introduction to Ecology (3)

Choose one of

GEOG 251 - Quantitative Geography (3)  
 STAT 201 - Statistics for the Life Sciences (3)  
 STAT 203 - Introduction to Statistics for the Social Sciences (3)  
 STAT 205 - Introduction to Statistics (3)

Choose one of

REM 221 - Systems Thinking and the Environment (3)  
 GEOG 253 - Introduction to Remote Sensing (3)  
 GEOG 255 - Geographical Information Science I (3)

Choose one of

ARCH 201 - Reconstructing the Human Past (4)  
 ARCH 286 - Cultural Heritage Management (4)  
 FNST 212 - Indigenous Perceptions of Landscape (3)

Choose one of

GEOG 221 - Economic Geography (3)  
 GEOG 241 - Social Geography (3)  
 REM 281 - Sustainable Communities, Sustainable World (3) or SD 281 - Sustainable Communities, Sustainable World (3)

### Upper Division Requirements

Complete all of

REM 311 - Applied Ecology and Sustainable Environments (3)  
 REM 321 - Ecological Economics (4)  
 REM 356W - Institutional Arrangements for Sustainable Environmental Management\_(3)

### Biophysical Perspectives on Resource and Environmental Management

Choose one of

ARCH 363 - Landscape Archaeology (3)  
 GEOG 315 - World Ecosystems (4)  
 GEOG 317 - Soil Science (4)  
 REM 370 - Global Resource Issues in Oceanography (3)  
 REM 375 - Ecology and Conservation of Coastal BC (3)

### Quantitative Methods in Resource and Environmental Management



Choose one of

- GEOG 352 - Spatial Analysis (4)
- GEOG 353 - Advanced Remote Sensing (4)
- GEOG 355 - Geographical Information Science II (4)
- REM 412 - Environmental Modeling (3)
- REM 423 - Research Methods in Fisheries Assessment (4)

Indigenous Perspectives on Resource and Environmental Management

Choose one of

- FNST 332 - Ethnobotany of British Columbia First Nations (3)
- FNST 353W - First Nations Heritage Stewardship (3)
- FNST 433 - Indigenous Environmental Justice and Activism (4)
- REM 406 - Indigenous People and Co-management (4)
- REM 407 - Indigenous Governance and Resource Relationships (4)

Social and Community Perspectives on Resource and Environmental Management

Choose one of

- ARCH 365 - Archaeological Perspectives on Human Ecology (3)
- GEOG 377 - Environmental History (4) or HIST 377 - Environmental History (4)
- GEOG 389W - Nature and Society (4)
- REM 381 - Building Sustainable Communities: Concepts and Cases (4) or SD 381 - Building Sustainable Communities: Concepts and Cases (4)
- SD 401 - Sustainable Development Goals Studio (4)

Communication and Conflict Resolution

Choose one of

- CMNS 342 - Science and Public Policy: Risk Communication (4)
- CMNS 349 - Environment, Media and Communication (4)
- DIAL 460 - Seminar in Dialogue and Public Issues (4)
- ENV 320W - Ethics and the Environment (3)
- ENV 452 - Environmental Education (8) or EDUC 452 - Environmental Education (8)
- EVSC 300 - Seminar in Environmental Science (3)

Policy, Planning and Regulation

Choose one of

- ARCH 386 - Archaeological Resource Management (3)

REM 319 - Environmental Law (3)  
 FNST 401 - Aboriginal Peoples and Public Policy (3)  
 REM 446 - Environmental and Social Impact Assessment (4)

Resource and Environmental Management Sectors

Choose two of (one must be at the 400 level)

GEOG 327 - Geography of Tourism (4)  
 GEOG 385 - Agriculture and the Environment (4)  
 REM 350 - Sustainable Energy and Materials Management (4)  
 REM 355 - Sustainable Transportation Management (3)  
 REM 427 - Avalanche Risk Management (4)  
 REM 445 - Environmental Risk Assessment (3)  
 REM 454 - Water Security (4)  
 REM 471 - Forest Ecosystem Management (3)  
 REM 481 - Sustainable Communities Leadership Lab (4) or SD 481 - Sustainable Communities Leadership Lab (4)

Upper Division Electives

Any other two REM courses from the full list of 300 and 400 level REM courses.

Capstone Experience

Complete the following

REM 495 - Resource and Environmental Management Capstone (4)

## **Resource and Environmental Management Honours**

### **Bachelor of Environment**

**The Resource and Environmental Management Honours prepares students to seek employment or continue in graduate studies in the broadly defined area of resource and environmental management with more intensive study than the Major.**

### **Admission Requirements**

Students must apply to enter the REM Honours program and must meet the following conditions to qualify:

- A minimum of 45 units completed
- A minimum CGPA of 3.33
- Completion of REM 200 with a minimum grade of B+
- Departmental approval

## Minimum Grade Requirements

The minimum cumulative grade point average (CGPA) for continuation and graduation is 3.00.

## Program Requirements

Students complete 120 units, including at least 60 upper division units. In addition, a minimum of 48 upper division units must be taken from the REM Honours program. Students also complete an Honours Thesis under the supervision of a REM faculty member.

**Note:** Some of the courses below have prerequisites not included in the REM Honours requirements. Students are responsible for satisfying the prerequisites for all courses in their program. Students should review the upper division program requirements in advance to determine any lower division prerequisites they should complete.

### Course Substitutions

Substitutions of program requirements, including courses deemed equivalent to these required courses, are not allowed without written permission from the program. Such courses taken without approval will not be applied to graduation requirements. Students should consult their academic advisor for details on obtaining permission for substitutions.

### Lower Division Requirements

Complete all of

FNST 101 - Introduction to First Nations Studies (3)

GEOG 111 - Earth Systems (3)

POL 253 - Introduction to Public Policy (3)

REM 100 - Global Change (3)

REM 200 - Introduction to Resource and Environmental Management in Canada (3)



**Choose one of**

**GEOG 215 - Biogeography (3)**  
**BISC 204 - Introduction to Ecology (3)**

**Choose one of**

**GEOG 251 - Quantitative Geography (3)**  
**STAT 201 - Statistics for the Life Sciences (3)**  
**STAT 203 - Introduction to Statistics for the Social Sciences (3)**  
**STAT 205 - Introduction to Statistics (3)**

**Choose one of**

**REM 221 - Systems Thinking and the Environment (3)**  
**GEOG 253 - Introduction to Remote Sensing (3)**  
**GEOG 255 - Geographical Information Science I (3)**

**Choose one of**

**ARCH 201 - Reconstructing the Human Past (4)**  
**ARCH 286 - Cultural Heritage Management (4)**  
**FNST 212 - Indigenous Perceptions of Landscape (3)**

**Choose one of**

**GEOG 221 - Economic Geography (3)**  
**GEOG 241 - Social Geography (3)**  
**REM 281 - Sustainable Communities, Sustainable World (3) or SD 281 - Sustainable Communities, Sustainable World (3)**

### **Upper Division Requirements**

**Complete all of**

**REM 311 - Applied Ecology and Sustainable Environments (3)**  
**REM 321 - Ecological Economics (4)**  
**REM 356W - Institutional Arrangements for Sustainable Environmental Management (3)**

### **Biophysical Perspectives on Resource and Environmental Management**

**Choose one of**



**ARCH 363 - Landscape Archaeology (3)**  
**GEOG 315 - World Ecosystems (4)**  
**GEOG 317 - Soil Science (4)**  
**REM 370 - Global Resource Issues in Oceanography (3)**  
**REM 375 - Ecology and Conservation of Coastal BC (3)**

**Quantitative Methods in Resource and Environmental Management**

Choose one of

**GEOG 352 - Spatial Analysis (4)**  
**GEOG 353 - Advanced Remote Sensing (4)**  
**GEOG 355 - Geographical Information Science II (4)**  
**REM 412 - Environmental Modeling (3)**  
**REM 423 - Research Methods in Fisheries Assessment (4)**

**Indigenous Perspectives on Resource and Environmental Management**

Choose one of

**FNST 332 - Ethnobotany of British Columbia First Nations (3)**  
**FNST 353W - First Nations Heritage Stewardship (3)**  
**FNST 433 - Indigenous Environmental Justice and Activism (4)**  
**REM 406 - Indigenous People and Co-management (4)**  
**REM 407 - Indigenous Governance and Resource Relationships (4)**

**Social and Community Perspectives on Resource and Environmental Management**

Choose one of

**ARCH 365 - Archaeological Perspectives on Human Ecology (3)**  
**GEOG 377 - Environmental History (4) or HIST 377 - Environmental History (4)**  
**GEOG 389W - Nature and Society (4)**  
**REM 381 - Building Sustainable Communities: Concepts and Cases (4) or SD 381 - Building Sustainable Communities: Concepts and Cases (4)**  
**SD 401 - Sustainable Development Goals Studio (4)**

**Communication and Conflict Resolution**

Choose one of

**CMNS 342 - Science and Public Policy: Risk Communication (4)**  
**CMNS 349 - Environment, Media and Communication (4)**  
**DIAL 460 - Seminar in Dialogue and Public Issues (4)**  
**ENV 320W - Ethics and the Environment (3)**

**ENV 452 - Environmental Education (8) or EDUC 452 - Environmental Education (8)**  
**EVSC 300 - Seminar in Environmental Science (3)**

**Policy, Planning and Regulation**

Choose one of

**ARCH 386 - Archaeological Resource Management (3)**  
**REM 319 - Environmental Law (3)**  
**FNST 401 - Aboriginal Peoples and Public Policy (3)**  
**REM 446 - Environmental and Social Impact Assessment (4)**

**Resource and Environmental Management Sectors**

Choose two of (one must be at the 400 level)

**GEOG 327 - Geography of Tourism (4)**  
**GEOG 385 - Agriculture and the Environment (4)**  
**REM 350 - Sustainable Energy and Materials Management (4)**  
**REM 355 - Sustainable Transportation Management (3)**  
**REM 427 - Avalanche Risk Management (4)**  
**REM 445 - Environmental Risk Assessment (3)**  
**REM 454 - Water Security (4)**  
**REM 471 - Forest Ecosystem Management (3)**  
**REM 481 - Sustainable Communities Leadership Lab (4) or SD 481 - Sustainable Communities Leadership Lab (4)**

**Upper Division Electives**

Any other two REM courses from the full list of 300 and 400 level REM courses.

**Capstone Experience**

Complete the following

**REM 495 - Resource and Environmental Management Capstone (4)**

**Honours Thesis**

Complete the following

**REM 499 - Resource and Environmental Management Honours Thesis (4)**

## Proposed changes to the Chemistry Honours Program

1. Remove the current PHYS 231/255 requirement (6 units).
2. Increase the upper-division CHEM/MBB/NUSC non-specified requirements by 5-6 units, which includes an increased portion of 4xx CHEM units, as detailed in the calendar entry below.
3. Change CHEM 464-3 (Quantum Chem.) to CHEM 364-3 (separate documentation was also filed).
4. Add CHEM 462-3 (Molecular Spectroscopy) to the list of permitted specified UD Physical Chemistry courses, along with the re-numbered CHEM 364-3.

PROPOSED NEW CALENDAR ENTRY (Revised portions highlighted)

### Lower Division Requirements

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

CHEM 121 - General Chemistry and Laboratory I (4)  
 CHEM 122 - General Chemistry II (2)  
 CHEM 126 - General Chemistry Laboratory II (2)  
 CHEM 215 - Introduction to Analytical Chemistry (4)  
 CHEM 230 - Inorganic Chemistry (3)  
 CHEM 236W - Inorganic Chemistry Laboratory (3)  
 CHEM 260 - Atoms, Molecules, Spectroscopy (4)  
 CHEM 266 - Physical Chemistry Laboratory I (2)  
 CHEM 281 - Organic Chemistry I (4)  
 CHEM 283 - Organic Chemistry IIb (3)  
 CHEM 286 - Organic Chemistry Laboratory II (2)  
 MATH 152 - Calculus II (3)  
 MATH 251 - Calculus III (3)  
 MBB 222 - Molecular Biology and Biochemistry (3)  
~~PHYS 231 - Physics Laboratory III (3)~~  
~~PHYS 255 - Vibrations and Waves (3)~~

and one of

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

and one of

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

and all of

PHYS 120 - Mechanics and Modern Physics (3)  
 PHYS 121 - Optics, Electricity and Magnetism (3)



PHYS 132 - Physics Laboratory I (1)  
PHYS 133 - Physics Laboratory II (1)

or all of

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

or both of

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

### Upper Division Requirements

Students complete ~~48~~ at least 53 units, including all of

CHEM 316 - Introductory Instrumental Analysis (4)  
CHEM 332 - The Chemistry of Transition Metals (3)  
CHEM 336 - Advanced Inorganic Chemistry Laboratory (2)  
CHEM 360 - Thermodynamics and Chemical Kinetics (3)  
CHEM 366W - Physical Chemistry Laboratory II (3)  
CHEM 380 - Chemical and Instrumental Methods of Identification of Organic Compounds (4)  
NUSC 341 - Introduction to Radiochemistry (3)

and one of

CHEM 364 - Quantum Chemistry (3)  
CHEM 460 - Advanced Physical Chemistry (3)  
CHEM 462 - Molecular Spectroscopy (3)  
CHEM 464 - Quantum Chemistry (3)

and one of

CHEM 481 - Undergraduate Research (5)  
and an additional ~~18-24~~ upper division units in CHEM, MBB or NUSC courses, including at least ~~nine twelve~~ units of 400 division CHEM courses.

Or

CHEM 481 - Undergraduate Research (5)  
CHEM 483 - Undergraduate Research II (5)  
and an additional 18 upper division units in CHEM, MBB or NUSC courses, including at least six units of 400 division CHEM courses.

Or

CHEM 484 - Two-Semester Undergraduate Research in Chemistry (10)  
and an additional ~~13~~ 18 upper division units in CHEM, MBB or NUSC courses, including at least ~~four-six~~ units of 400 division CHEM courses.

Students are required to complete additional upper division units to total a minimum of 60 upper division units.





### Calendar Entry Change

Name of Program or Name of Faculty: **DATA honours (Faculty of Science)**

Rationale for change:

The DATA honours program currently has two concentrations (Open and Statistics) that are intended to strengthen depth and provide students with prerequisites for graduate school admission in different fields. The present change concerns the addition of a Mathematics concentration, which will enhance theoretical foundations in that field.

#### Differences Between Concentrations

##### **Open Concentration vs. Mathematics Concentration**

Mathematics Concentration adds MACM 203, MACM 204, MATH 242, and MATH 251.  
Mathematics Concentration replaces 'complete one of a list of courses' with STAT 270.  
Mathematics Concentration removes BUS 439 and BUS 445.  
Mathematics Concentration adds choose one from a list of MATH courses.  
Mathematics Concentration adds MATH 402W and a 400 level MATH course.  
Mathematics Concentration removes 'choose 9 units from a long list'.

Effective term and year: Fall 2019

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

DATA honours



**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**.

#### BACHELOR OF SCIENCE

The Department of Statistics and Actuarial Science and its partners, the Department of Mathematics, the Beedie School of Business, and the School of Computing Science, offer an honours program in Data Science (DATA) leading to a bachelor of science (BSc) with honours degree. This is a highly structured program providing a multidisciplinary approach to quantitative methods for business and industry in an environment of rapid changes in technology. The honours program offers specialization in one of ~~23~~ concentrations: **Mathematics**, Statistics, or Open Concentration.

[...]

## Program Requirements

~~Students complete 132 units, as specified below.~~

Under University regulations, an honours degree requires **the completion of a minimum of 120 units, including** a minimum of 60 upper division units. Honours program students require a graduation cumulative grade point average of not less than 3.00.

## Mathematics Concentration Requirements

### Lower Division Requirements

Students complete a **minimum total of 52-54-62** units.

#### BUSINESS ADMINISTRATION

Students complete all of

- BUS 200 - Business Fundamentals (3)
- BUS 217W - Critical Thinking in Business (3)
- BUS 251 - Financial Accounting I (3)
- BUS 272 - Behavior in Organizations (3)

#### COMPUTING SCIENCE

Students complete all of

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

CMPT 125 - Introduction to Computing Science and Programming II (3)  
 CMPT 127 - Computing Laboratory (3)  
 CMPT 225 - Data Structures and Programming (3)  
 CMPT 276 - Introduction to Software Engineering (3)

MATHEMATICS AND COMPUTING SCIENCE

Students complete ~~both~~ **all** of

MACM 101 - Discrete Mathematics I (3)  
 MACM 201 - Discrete Mathematics II (3)  
**MACM 203 - Computing with Linear Algebra (2)**  
**MACM 204 - Computing with Calculus (2)**

DATA SCIENCE

Students complete

DATA 180 - Undergraduate Seminar in Data Science (1) †

MATHEMATICS

Students complete one of

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

and all of

MATH 152 - Calculus II (3)  
 MATH 208W - Introduction to Operations Research (3)  
**MATH 242 - Introduction to Analysis (3)**  
**MATH 251 - Calculus III (3)**

and one of

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

STATISTICS

Students complete ~~one~~ **both** of

STAT 240 - Introduction to Data Science (3)



~~and one of~~

~~BUEG 232 - Data and Decisions I (4)~~

~~STAT 201 - Statistics for the Life Sciences (3)~~

~~STAT 203 - Introduction to Statistics for the Social Sciences (3)~~

~~STAT 205 - Introduction to Statistics (3)~~

STAT 270 - Introduction to Probability and Statistics (3)

**\* Recommended.**

## Upper Division Requirements

Students complete a minimum of ~~52-54~~**53** units.

BUSINESS ADMINISTRATION, ECONOMICS

Students complete all of

BUS 343 - Introduction to Marketing (3)

BUS 360W - Business Communication (4)

~~BUS 439 - Analytics Project (3)~~

~~BUS 445 - Customer Analytics (3)~~

COMPUTING SCIENCE

Students complete all of

CMPT 300 - Operating Systems I (3)

CMPT 307 - Data Structures and Algorithms (3)

CMPT 353: Computational Data Science (3)

CMPT 354 - Database Systems I (3)

CMPT 454 - Database Systems II (3)

~~and one of~~

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

~~CMPT 417 - Intelligent Systems (3)~~

DATA SCIENCE

Students complete

DATA 481 - Undergraduate Seminar in Data Science (1) †

MATHEMATICS AND COMPUTING SCIENCE



**MACM 316 - Numerical Analysis I (3)**

MATHEMATICS

Students complete one of

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

and one of

**MATH 310 - Introduction to Ordinary Differential Equations (3)**  
**MATH 320 - Introduction to Analysis II (3)**  
**MATH 340 - Algebra II: Rings and Fields (3)**  
**MATH 343 - Applied Discrete Mathematics (3)**  
**MATH 345 - Introduction to Graph Theory (3)**  
**MATH 348 - Probabilistic Models in Operations Research (3)**  
**MACM 409 - Numerical Linear Algebra: Algorithms, Implementation and Applications (3)**

and

**MATH 402W - Operations Research Clinic (4)**

and

**One additional 400-level MATH course**

STATISTICS

Students complete one of

BUEC 333 - Statistical Analysis of Economic Data (4)  
STAT 302 - Analysis of Experimental and Observational Data (3)  
STAT 305 - Introduction to Biostatistical Methods for Health Sciences (3)  
STAT 350 - Linear Models in Applied Statistics (3)

and all of

STAT 341 - Introduction to Statistical Computing and Exploratory Data Analysis - R (2)  
STAT 403 - Intermediate Sampling and Experimental Design (3)  
STAT 452 - Statistical Learning and Prediction (3)

and one of

STAT 445 - Applied Multivariate Analysis (3)



STAT 475 - Applied Discrete Data Analysis (3)

STAT 485 - Applied Time Series Analysis (3)

† DATA 180 and DATA 481 cannot be completed concurrently



### Calendar Entry Change

Name of Program or Name of Faculty: **STAT major (Faculty of Science)**

Rationale for change:

- The continuation requirement has been updated to be consistent with a recent change to the STAT major admission and continuation requirements.
- The description of STAT courses has been updated to reflect recent changes (renumbering of STAT 101 to STAT 205, creation of STAT 310 and STAT 311).

Effective term and year: Fall 2019

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

STAT major

**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**.

## GPA Required for Continuation

To continue in the program, students must maintain at least a 2.25 grade point average in MATH, STAT, MACM, and **ACMACMPT** courses (~~excluding ACMA 210 if doing so results in a higher GPA~~).

## Credit for Statistics Courses

There are three kinds of STAT courses:

**Breadth-Science** ~~Introductory~~ course (STAT 100)

Service courses (STAT ~~101~~, 201, 203, **205**, 302, 305, **310, 311**, 403)

Mainstream courses (STAT 240, 270, 285, 300W, 330, 341, 342, 350, 380, 410, 430, 440, 445, 450, 452, 460, 475, 485)

**Calendar Entry Change**

**Name of Program or Name of Faculty:** STAT honours (Faculty of Science)

Rationale for change:

- The continuation requirement has been updated to be consistent with a recent change to the STAT honours admission and continuation requirements.
- The description of STAT courses has been updated to reflect recent changes (renumbering of STAT 101 to STAT 205, creation of STAT 310 and STAT 311).
- The total number of required units is now 120, which brings the program in line with many other honours programs at SFU (without removing any required courses).
- The total number of required upper division units is now 48 (as required by university policy).

Effective term and year: Fall 2019

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

STAT honours

**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**.

## GPA Required for Continuation

To continue in the program, students must maintain at least a 3.00 grade point average (GPA) in MATH, STAT, MACM and **ACMACMPT** courses (~~excluding ACMA 210 if doing so results in a higher GPA~~).

## Credit for Statistics Courses

There are three kinds of STAT courses:

**Breadth-Science** ~~Introductory~~ course (STAT 100)

Service courses (STAT ~~101, 201, 203, 205, 302, 305, 310, 311, 403~~)

Mainstream courses (STAT 240, 270, 285, 300W, 330, 341, 342, 350, 380, 410, 430, 440, 445, 450, 452, 460, 475, 485)



## Program Requirements

Students complete ~~132~~**120** units, including the lower division, upper division, and additional upper division requirements specified below.

### Upper Division Requirements

Students complete all of

MATH 320 - Introduction to Analysis II (3)  
 MATH 322 - Complex Variables (3)  
 STAT 330 - Introduction to Mathematical Statistics (3)  
 STAT 341 - Introduction to Statistical Computing and Exploratory Data Analysis - R (2)  
 STAT 342 - Introduction to Statistical Computing and Exploratory Data Analysis - SAS (2)  
 STAT 350 - Linear Models in Applied Statistics (3)  
 STAT 380 - Introduction to Stochastic Processes (3)  
 STAT 410 - Statistical Analysis of Sample Surveys (3)  
 STAT 430 - Statistical Design and Analysis of Experiments (3)  
 STAT 450 - Statistical Theory (3)  
 STAT 460 - Bayesian Statistics (3)  
 STAT 475 - Applied Discrete Data Analysis (3)

and **9a minimum of 14** units in additional upper division ACMA, MACM, MATH or STAT courses (excluding STAT 302, 305, **310, 311, and 403**). The following are recommended.

MACM 316 - Numerical Analysis I (3)  
 STAT 300W - Statistics Communication (3)  
 STAT 440 - Learning from Big Data (3)  
 STAT 445 - Applied Multivariate Analysis (3)  
 STAT 452 - Statistical Learning and Prediction (3)  
 STAT 485 - Applied Time Series Analysis (3)  
 STAT 490 - Selected Topics in Probability and Statistics (3)  
 STAT 495 - Directed Studies in Probability and Statistics (3)

### Additional Upper Division Requirements

Students must complete ~~17~~**12** additional upper division units to satisfy university requirements. Any upper division courses other than STAT 302, STAT 305, **STAT 310, STAT 311,** or STAT 403 may be used to complete these units.