DECLARING A MAJOR
Before you can declare a MATH major, you must first be accepted into the Faculty of Science.

The Faculty of Science is comprised of the following eight departments:

- Biological Sciences
- Chemistry
- Biomedical Physiology & Kinesiology
- Earth Sciences
- Mathematics
- Molecular Biology & Biochemistry
- Physics
- Statistics & Actuarial Science
1. Minimum SFU CGPA of 2.00.
2. Minimum SFU UD CGPA of 2.00 
   *If you have taken upper division units at SFU.*
3. Minimum 12 units completed at SFU.
4. Minimum of 3 Faculty of Science courses taken at SFU, with a minimum C+ in each of the three courses (one must be Math 150, 151, or 154).
Once you have met the Faculty of Science requirements, contact Nadia Williams to discuss transferring into the Faculty of Science: science_advisor@sfu.ca

Include your full name, SFU student number, and intended science major/double minor subject(s) in your correspondence.
STEP 2: Complete LOWER DIVISION Program Requirements

Before you can apply to declare a MATH, APMA, MACM, or OPRES major, you must first complete all lower division program requirements with an average GPA of 2.00.

Students with high grades (A-B+ range) can apply before completing all lower division requirements.
STEP 3: Contact the **Math Advisor** to officially declare your major.

Once you have completed all lower division program requirements, email the information below to **math_advice@sfu.ca**

1. **Full legal name**
2. **Student number**
3. **Computing ID**
4. **Current program and faculty**
5. **Program you wish to declare (join)**
6. **Confirmation of whether or not you would like your current program/faculty discontinued if you are successfully admitted to your program of choice in the Department of Mathematics** (only needed for major and honours applicants).
MATH MAJOR
MATHEMATICS MAJOR

APMA
APPLIED MATHEMATICS MAJOR

MACM JOINT MAJOR
MATHEMATICS AND COMPUTING SCIENCE JOINT MAJOR

OPRES MAJOR
OPERATIONS RESEARCH MAJOR

MATH MINOR
MATHEMATICS MINOR
## Lower Division Program Requirements

There are 8 LD courses required for all program majors.

- 1x MACM
- 1x STATS
- 2x CMPT
- 4x MATH

### Computing Science

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<th>MACM</th>
<th>OPRES</th>
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### Mathematics and Computing Science

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### Mathematics

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### Statistics

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</table>
## LOWER DIVISION REQUIREMENTS

**Course 1/2:**
- CMPT 120 (3)
  Intro to Computing Science and Programming I
- CMPT 130 (3)
  Intro to Computer Programming I

**Course 1/2:**
- CMPT 125 (3)
  Intro to Computing Science and Programming II
- CMPT 135 (3)
  Intro to Computer Programming II
- MACM 203 (2)
  Computing with Linear Algebra**
- MACM 204 (2)
  Computing with Calculus**

**Course 1/4:**
- MATH 150 (4)
  Calculus I With Review
- MATH 154 (3)
  Calculus I - Life Sciences*
- MATH 155 (3)
  Calculus II
- MATH 157 (3)
  Calculus II - Life Sciences* - Calculus II - Social Sciences*

**Course 1/2:**
- MATH 232 (3)
  Applied Linear Algebra
- MATH 240 (3)
  Algebra I: Linear Algebra
- MATH 242 (3)
  Introduction to Analysis
- MATH 251 (3)
  Calculus III
- MATH 252 (3)
  Vector Calculus
- MATH 260 (3)
  Intro to Ordinary Differential Equations
- STAT 270 (3)
  Intro to Probability and Statistics

**Course 1/7:**
- MACM 201 (3)
  Discrete Mathematics II
- ENSC 220 (3)
  Electric Circuits I
- MSE 250 (3)
  Electric Circuits
- CMPT 225 (3)
  Data Structures + Programming
- PHYS 211 (3)
  Intermediate Mechanics
- PHYS 285 (3)
  Quantum I
- STAT 285 (3)
  Intermediate Probability + Statistics

**Faculty of Science Course outside MATH/STATS (3)**
- Excluding PHYS 100, BISC 100, and CHEM 110/111

**Faculty of Science Course outside MATH/STATS (3)**
- Excluding PHYS 100, BISC 100, and CHEM 110/111

## UPPER DIVISION REQUIREMENTS

**Course 1/4:**
- MACM 316 (3)
  Numerical Analysis I
- MATH 314 (3)
  Intro to Fourier Methods and Partial Differential Equations
- MATH 320 (3)
  Intro to Analysis II
- MATH 322 (3)
  Complex Variables
- MATH 418 (3)
  Partial Differential Equations

**Course 1/2:**
- MATH 426 (3)
  Probability
- MATH 467 (3)
  Dynamical Systems
- MATH 475 (3)
  Mathematical Topics in Data Science

**Course 2/3:**
- MATH 401 (3)
  Intro to Computer Algebra
- MATH 308 (3)
  Linear Optimization
- MATH 343 (3)
  Applied Discrete Mathematics
- MATH 419 (3)
  Linear Analysis
- MATH 462 (3)
  Fluid Dynamics
- PHIL 345W (3)
  Philosophy of Mathematics
- PHYS 413 (3)
  Advanced Mechanics
- MACM 409 (3)
  Numerical Linear Algebra
- MATH 309 (3)
  Continuous Optimization
- MATH 345 (3)
  Intro to Graph Theory
- MATH 425 (3)
  Real Analysis
- MATH 467 (3)
  Dynamical Systems
- STAT 380 (3)
  Intro to Stochastic Processes
- MACM 416 (3)
  Numerical Analysis II
- MATH 338 (3)
  Advanced Linear Algebra
- MATH 348 (3)
  Intro to Probabilistic Models
- MATH 426 (3)
  Probability
- MATH 475 (3)
  Mathematical Topics in Data Science
- MATH 495 (3)
  Mathematical Topics in Science
- MACM 409 (3)
  Numerical Linear Algebra
- MATH 309 (3)
  Continuous Optimization
- MATH 338 (3)
  Advanced Linear Algebra
- MATH 348 (3)
  Intro to Probabilistic Models
- MATH 426 (3)
  Probability
- MATH 475 (3)
  Mathematical Topics in Data Science
- MATH 495 (3)
  Mathematical Topics in Science

**Course 2/3:**
- MATH 300 (3)
  300 or 400 level MATH/MACM course
- MATH 300 (3)
  300 or 400 level MATH/MACM course

### 10 COURSES 30 UNITS

**BREADTH REQUIREMENTS**

- B-HUM (3)
- B-SOC (3)
- B-SCI (3)

### 6 COURSES 18 UNITS

**WRITING REQUIREMENTS**

- Lower Division W (3)
- Upper Division W (3)

**DEGREE UNIT REQUIREMENT**

- 120 TOTAL UNITS
- 44 UPPER DIVISION UNITS

* Minimum B grade required.
**MACM 409 can serve as a substitute for MACM 203.
**MACM 401, and MACM 442 can serve as substitutes for MACM 204.

9 UNITS MUST BE AT THE 400 LEVEL.

*Up to 6 units can be from PHIL 345W, PHYS 413, or any UD STAT course
Excluding: STAT 382, STAT 385, STAT 310, STAT 311, STAT 320, and STAT 403.

**Faculty of Science Course outside MATH/STATS (3)**
- Excluding PHYS 100, BISC 100, and CHEM 110/111

**Faculty of Science Course outside MATH/STATS (3)**
- Excluding PHYS 100, BISC 100, and CHEM 110/111

**15 COURSES 43 UNITS**
# APPLIED MATHEMATICS MAJOR

## Lower Division Program Requirements (43 UNITS)

| ☐ CMPT 120 or CMPT 130 (3) | ☐ MATH 150(4), 151, 154*, or 157* (3) |
| ☐ CMPT 125 or CMPT 135 (3) | ☐ MATH 152, 155*, or 158* (3) |
| ☐ MACM 203*(2) | ☐ MATH 232* or MATH 240 (3) |
| ☐ MACM 204*(2) | ☐ MATH 242 (3) |
| ☐ STAT 270 (3) | ☐ MATH 251 (3) |
| | ☐ MATH 252 (3) |
| | ☐ MATH 260 (3) |

*With a B grade or higher.

*MACM 409 can substitute MACM 203.

*MACM 401 or MACM 442 can substitute MACM 204.

## Upper Division Program Requirements (30 UNITS – 9 UNITS MUST BE 400 LEVEL)

| ALL OF: | ONE OF: | ONE OF: |
| ☐ MACM 316 (3) | ☐ MATH 426 (3) | Upper division MATH or MACM course, or any pre-approved UD Q course. |
| ☐ MATH 314 (3) | ☐ MATH 462 (3) | ☐ PHIL 345W (3) |
| ☐ MATH 320 (3) | ☐ MATH 467 (3) | ☐ PHYS 413 (3) |
| ☐ MATH 322 (3) | ☐ MATH 475 (3) | ☐ STAT 380 (3) |
| ☐ MATH 418 (3) | | |

TWO OF:

| ☐ MACM 401 (3) | ☐ MATH 308 (3) | ☐ MATH 419 (3) | ☐ PHIL 345W (3) |
| ☐ MACM 409 (3) | ☐ MATH 309 (3) | ☐ MATH 425 (3) | ☐ PHYS 413 (3) |
| ☐ MACM 416 (3) | ☐ MATH 338 (3) | ☐ MATH 426 (3) | ☐ STAT 380 (3) |
| | ☐ MATH 343 (3) | ☐ MATH 462 (3) | |
| | ☐ MATH 345 (3) | ☐ MATH 467 (3) | |
| | ☐ MATH 348 (3) | ☐ MATH 475 (3) | |
| | ☐ MATH 495 (3) | |

*Up to 6 units can be from PHIL 345W, PHYS 413, or any UD STAT course (except for STAT 302, STAT 305, STAT 310, STAT 311, STAT 320, and STAT 403).

## Breadth + W Requirements (21 UNITS)

| B-HUM (6 UNITS) | B-SOC (6 UNITS) | B-SCI (6 UNITS) | Lower Division W course (3 UNITS) |
| ☐ | ☐ | ☐ | ☐ |

*UD W requirement is included above in program requirements.*

## Elective Courses

120 units (minimum) are required to graduate. Of the 120 units, 44 units must be upper division.

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
## Fixed Requirements

<table>
<thead>
<tr>
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<th>Fall</th>
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## Flexible Requirements

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LOWER DIVISION REQUIREMENTS

**CHOOSE 1/2:**
- CMPT 120 (3)
  Intro to Computing Science and Programming I
- CMPT 130 (3)
  Intro to Computer Programming I

**CHOOSE 1/2:**
- CMPT 125 (3)
  Intro to Computing Science and Programming II
- CMPT 135 (3)
  Intro to Computer Programming II

MACM 101 (3)
Discrete Mathematics I

MACM 201 (3)
Discrete Mathematics II

MACM 203 (2)
Computing with Linear Algebra**

MACM 204 (2)
Computing with Calculus**

**CHOOSE 1/4:**
- MATH 150 (4)
  Calculus I With Review
- MATH 154 (3)
  Calculus I - Life Sciences*
- MATH 155 (3)
  Calculus II - Life Sciences*
- MATH 157 (3)
  Calculus II - Social Sciences*

**CHOOSE 1/2:**
- MATH 152 (3) MATH 155 (3) MATH 158 (3)
  Calculus II - Life Sciences*  Calculus II - Social Sciences*

**CHOOSE 1/2:**
- MATH 232 (3)
  Applied Linear Algebra*
- MATH 242 (3)
  Introduction to Analysis
- MATH 251 (3)
  Calculus III
- STAT 270 (3)
  Intro to Probability and Statistics

Faculty of Science Course outside MATH/STATS (3)
Excluding PHYS 100, BISC 100, and CHEM 110/111

Faculty of Science Course outside MATH/STATS (3)
Excluding PHYS 100, BISC 100, and CHEM 110/111

14 COURSES
40 UNITS

UPPER DIVISION REQUIREMENTS

**CHOOSE 1/2:**
- MATH 320 (3)
  Introduction to Analysis II
- MATH 322 (3)
  Complex Variables

**CHOOSE 1/2:**
- MATH 338 (3)
  Advanced Linear Algebra
- MATH 341 (3)
  Algebra III: Groups
- MATH 342 (3)
  Elementary Number Theory

**CHOOSE 1/4:**
- MACM 316 (3)
  Numerical Analysis I
- MATH 309 (3)
  Continuous Optimization
- MATH 348 (3)
  MATH 360 (3)
  Intro to Probabilistic Models
  Modeling with Ordinary Differential Equations

**CHOOSE 1/5:**
- MATH 343 (3)
  Applied Discrete Math
- MATH 344 (3)
  Combinatorial Theory
- MATH 345 (3)
  Intro to Graph Theory
- MATH 443 (3)
  Coding Theory
- MATH 447 (3)
  Discrete Optimization

MATH ____ (3)
300 or 400 level MATH/MACM course

MATH ____ (3)
300 or 400 level MATH/MACM course

MATH ____ (3)
300 or 400 level MATH/MACM course

MATH ____ (3)
300 or 400 level MATH/MACM course

MATH ____ (3)
300 or 400 level MATH/MACM course

BREADTH REQUIREMENTS

- B-HUM (3)
- B-SOC (3)
- B-SCI (3)

6 COURSES
18 UNITS

**CHOOSE 1/2:**
- Lower Division W (3)
  Any department.
- Upper Division W (3)
  Must be within program major.

DEGREE UNIT REQUIREMENT

120 TOTAL UNITS
44 UPPER DIVISION UNITS

*Minimum B grade required.

**MACM 409 can serve as a substitute for MACM 203.

**MACM 401, and MATH 442 can serve as substitutes for MACM 204.
MATHEMATICS MAJOR

Lower Division Program Requirements (40 UNITS)

☐ CMPT 120 or CMPT 130 (3)
☐ CMPT 125 or CMPT 135 (3)
☐ MACM 101 (3)
☐ MACM 201 (3)
☐ MACM 203* (2)
☐ MACM 204* (2)
☐ MATH 150 (4), 151, 154*, or 157* (3)
☐ STAT 270 (3)
☐ MATH 152, 155*, or 158* (3)
☐ MATH 232* or MATH 240 (3)
☐ MATH 242 (3)
☐ MATH 251 (3)

6 UNITS - Faculty of Science Courses
(Outside of MATH/STATS. Excluding PHYS 100, BISC 100, and CHEM 110/111.)
☐ __________
☐ __________

Upper Division Program Requirements (30 UNITS – 9 UNITS MUST BE 400 LEVEL)

☐ MATH 340 (3)

ONE OF: ONE OF: ONE OF: ONE OF: 15 MATH/MACM UNITS*
☐ MATH 343 (3) ☐ MATH 320 (3) ☐ MATH 338 (3) ☐ MACM 316 (3) ☐ __________
☐ MATH 345 (3) ☐ MATH 322 (3) ☐ MATH 341 (3) ☐ MATH 309 (3) ☐ __________
☐ MATH 408 (3) ☐ MATH 342 (3) ☐ MATH 348 (3) ☐ MATH 360 (3) ☐ __________
☐ MATH 443 (3) ☐ MATH 347 (3) ☐ ☐ ☐
☐ MATH 447 (3) ☐ ☐ ☐ ☐

Breadth Requirements (18 UNITS)

B-HUM (6 UNITS) B-SOC (6 UNITS) B-SCI (6 UNITS)
☐ __________
☐ __________
☐ __________

Writing and Quantitative Requirements (6 UNITS)

Lower Division W course (3 UNITS) Upper Division W course (3 UNITS – INSIDE PROGRAM MAJOR)
☐ __________
☐ __________

Elective Courses

120 units (minimum) are required to graduate. Of the 120 units, 44 units must be upper division.
☐ __________
☐ __________
☐ __________
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☐ __________
## SFU I Department of Mathematics
### Annual Course Offerings:
#### Math Major

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<th>Summer</th>
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<th>Spring</th>
<th>Summer</th>
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<td>MACM 203 - Computing with Linear Algebra</td>
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<td>MACM 204 - Computing with Calculus</td>
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<td>√</td>
<td></td>
</tr>
<tr>
<td>MATH 232 - Applied Linear Algebra</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>MATH 240 - Algebra I: Linear Algebra</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>MATH 242 - Introduction to Analysis</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>MATH 251 - Calculus III</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
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<table>
<thead>
<tr>
<th>300 Level Courses</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 340 - Algebra III: Rings and Fields</td>
<td></td>
<td>√</td>
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<tr>
<td>MATH 320 - Introduction to Analysis II</td>
<td></td>
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<tr>
<td>MATH 322 - Complex Variables</td>
<td></td>
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<table>
<thead>
<tr>
<th>Flexible Requirements</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>MACM 316 - Numerical Analysis I</td>
<td>√</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>MATH 309 - Continuous Optimization</td>
<td>√</td>
<td>√</td>
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</tr>
<tr>
<td>MATH 338 - Advanced Linear Algebra</td>
<td></td>
<td></td>
<td>ODD YEARS</td>
</tr>
<tr>
<td>MATH 341 - Algebra III: Groups</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>MATH 342 - Elementary Number Theory</td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>MATH 343 - Applied Discrete Mathematics</td>
<td>EVEN YEARS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 345 - Introduction to Graph Theory</td>
<td></td>
<td></td>
<td>ODD YEARS</td>
</tr>
<tr>
<td>MATH 348 - Introduction to Probabilistic Models</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>MATH 360 - Modeling with Ordinary Differential Equations</td>
<td></td>
<td></td>
<td>EVEN YEARS</td>
</tr>
<tr>
<td>MATH 408 - Discrete Optimization</td>
<td>EVEN YEARS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 443 - Combinatorial Theory</td>
<td></td>
<td></td>
<td>EVEN YEARS</td>
</tr>
<tr>
<td>MATH 447 - Coding Theory</td>
<td>EVEN YEARS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## LOWER DIVISION REQUIREMENTS

**Course 1/2:**
- CMPT 120 (3) Intro to Computing Science and Programming I
- CMPT 130 (3) Intro to Computer Programming I

**Course 1/2:**
- CMPT 125 (3) Intro to Computing Science and Programming II
- CMPT 135 (3) Intro to Computer Programming II

- CMPT 225 (3) Data Structures and Programming
- CMPT 295 (3) Intro to Computer Systems
- MACM 101 (3) Discrete Mathematics I
- MACM 201 (3) Discrete Mathematics II

**Course 1 or 2:**
- CMPT 276 (3) Introduction to Software Engineering
- MACM 203 (2) Computing with Linear Algebra**
- MACM 204 (2) Computing with Calculus**

**Course 1/4:**
- MATH 150 (4) Calculus I With Review
- MATH 154 (3) Calculus I
- MATH 157 (3) Calculus I - Life Sciences*
- Calculus I - Social Sciences*

**Course 1/3:**
- MATH 152 (3) Calculus II
- MATH 155 (3) Calculus II - Life Sciences*
- MATH 158 (3) Calculus II - Social Sciences*

**Course 1/2:**
- MATH 232 (3) Applied Linear Algebra*
- MATH 240 (3) Algebra I: Linear Algebra
- MATH 242 (3) Introduction to Analysis
- MATH 251 (3) Calculus III
- STAT 270 (3) Intro to Probability and Statistics

**Course 1/4:**
- MATH 308 (3) Linear Optimization
- MATH 345 (3) Intro to Graph Theory

13 COURSES 40 UNITS

* Minimum B grade required.

**MACM 403 can serve as a substitute for MACM 201.

**MACM 401, and MACM 442 can serve as substitutes for MACM 204.

## UPPER DIVISION REQUIREMENTS

**Course 1/4:**
- MATH 340 (3) Algebra II: Rings and Fields
- MACM 308 (3) Linear Optimization
- MACM 345 (3) Intro to Graph Theory
- MATH 309 (3) Continuous Optimization
- MATH 348 (3) Intro to Probabilistic Models

**Course 1/2:**
- MATH ___ (3) 300 or 400 level course of your choosing.
- MATH ___ (3) 300 or 400 level course of your choosing.
- MATH ___ (3) 300 or 400 level course of your choosing.
- MATH ___ (3) 400 level course of your choosing.

**Course 1/3:**
- CMPT 307 (3) Data Structures and Algorithms
- CMPT 300 (3) Operating Systems I
- CMPT 371 (3) Data Communications and Networking Principles of Compiler Design
- CMPT 379 (3) Numerical Analysis I

**Course 1/2:**
- CMPT 300 (3) 300 or 400 level course of your choosing.
- CMPT 300 (3) 300 or 400 level course of your choosing.
- CMPT 300 (3) 300 or 400 level course of your choosing.
- CMPT 300 (3) 300 or 400 level course of your choosing.

15 COURSES 45 UNITS

BREADTH REQUIREMENTS

- B-HUM (3) 4 COURSES 12 UNITS
- B-SOC (3) 4 COURSES 12 UNITS

WRITING REQUIREMENTS

- Lower Division W (3) Any department.
- Upper Division W (3) Must be within program major.

DEGREE UNIT REQUIREMENT

120 TOTAL UNITS 45 UPPER DIVISION UNITS
# MATHEMATICS AND COMPUTING SCIENCE JOINT MAJOR

## Lower Division Program Requirements (39-40 UNITS)

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>CMPT 120 or CMPT 130</td>
<td>(3)</td>
</tr>
<tr>
<td>CMPT 125 or CMPT 135</td>
<td>(3)</td>
</tr>
<tr>
<td>CMPT 225</td>
<td>(3)</td>
</tr>
<tr>
<td>CMPT 295</td>
<td>(3)</td>
</tr>
<tr>
<td>MACM 101</td>
<td>(3)</td>
</tr>
<tr>
<td>MACM 201</td>
<td>(3)</td>
</tr>
<tr>
<td>MATH 150, 151, 154* or 157*</td>
<td>(3)</td>
</tr>
<tr>
<td>STAT 270</td>
<td>(3)</td>
</tr>
<tr>
<td>MATH 152, 155*, or 158*</td>
<td>(3)</td>
</tr>
<tr>
<td>MATH 232* or MATH 240</td>
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</tr>
<tr>
<td>MATH 242</td>
<td>(3)</td>
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<tr>
<td>MATH 251</td>
<td>(3)</td>
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</table>

EITHER: CMPT 276 or (MACM 203* + MACM 204* )

*With a B grade or higher.

*MACM 409 can sub MACM 203. MACM 401/442 can sub MACM 204.

## Upper Division Program Requirements (45 UNITS – 12 UNITS MUST BE 400 LEVEL)

### MACM Units are counted in alternating fashion towards CMPT/MATH.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CMPT 307</td>
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<tr>
<td>MATH 340</td>
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</tr>
<tr>
<td>MACM 316</td>
<td>(3)</td>
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ONE OF:

<table>
<thead>
<tr>
<th>Requirement</th>
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<tbody>
<tr>
<td>CMPT 300</td>
<td>(3)</td>
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<tr>
<td>CMPT 371</td>
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<tr>
<td>CMPT 379</td>
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18 UD CMPT UNITS:

<table>
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<tr>
<th>Requirement</th>
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<tbody>
<tr>
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</table>

15 MATH/MACM UNITS*:

<table>
<thead>
<tr>
<th>Requirement</th>
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<tbody>
<tr>
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</table>

24 UD CMPT UNITS REQUIRED

### Breadth + W Requirements (18 UNITS)

<table>
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<th>Requirement</th>
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<table>
<thead>
<tr>
<th>Requirement</th>
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</thead>
<tbody>
<tr>
<td>B-SOC (6 UNITS)</td>
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<table>
<thead>
<tr>
<th>Requirement</th>
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<tbody>
<tr>
<td>LD W course (3 UNITS)</td>
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<tr>
<td>___________</td>
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<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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<tbody>
<tr>
<td>UD W course (3 UNITS – INSIDE PROGRAM MAJOR)</td>
<td></td>
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<tr>
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</table>

### Elective Courses

120 units (minimum) are required to graduate. Of the 120 units, **44 units must be upper division.**

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>___________</td>
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</tbody>
</table>
# SFU I Department of Mathematics

## Annual Course Offerings: MACM Joint Major

<table>
<thead>
<tr>
<th>Fixed Requirements</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
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</thead>
<tbody>
<tr>
<td><strong>100 Level Courses</strong></td>
<td></td>
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</tr>
<tr>
<td>MATH 150 - Calculus I with Review</td>
<td>√</td>
<td></td>
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</tr>
<tr>
<td>MATH 151 - Calculus I</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 152 - Calculus II</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>200 Level Courses</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MACM 201 - Discrete Mathematics II</td>
<td>√</td>
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</tr>
<tr>
<td>MACM 203 - Computing with Linear Algebra</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MACM 204 - Computing with Calculus</td>
<td>√</td>
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<td></td>
</tr>
<tr>
<td>MATH 232 - Applied Linear Algebra</td>
<td>√</td>
<td></td>
<td></td>
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<tr>
<td>MATH 240 - Algebra I: Linear Algebra</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 242 - Introduction to Analysis</td>
<td>√</td>
<td></td>
<td></td>
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<tr>
<td>MATH 251 - Calculus III</td>
<td>√</td>
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<td></td>
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<tr>
<td><strong>300 Level Courses</strong></td>
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<td></td>
</tr>
<tr>
<td>MACM 316 – Numerical Analysis I</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 340 – Algebra III: Rings and Fields</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Flexible Requirements</th>
<th>Fall</th>
<th>Spring</th>
<th>Summer</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 308 – Linear Optimization</td>
<td>√</td>
<td></td>
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</tr>
<tr>
<td>MATH 309 – Continuous Optimization</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 345 – Introduction to Graph Theory</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH 348 – Introduction to Probabilistic Models</td>
<td>ODD YEARS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
OPERATIONS RESEARCH MAJOR
LOWER DIVISION REQUIREMENTS

**COURSE 1/2:**

CMPT 120 (3)
Intro to Computing Science and Programming I
CMPT 130 (3)
Intro to Computer Programming I

**COURSE 1/2:**

CMPT 125 (3)
Intro to Computing Science and Programming II
CMPT 135 (3)
Intro to Computer Programming II

CMPT 225(3)
Data Structures and Programming
MACM 101 (3)
Discrete Mathematics I
MACM 201 (3)
Discrete Mathematics II

**COURSE 1/4:**

MATH 150 (4)
Calculus I With Review
MATH 154 (3)
Calculus I - Life Sciences*
MATH 152 (3) MATH 155 (3) MATH 158 (3)
Calculus II - Calculus II - Calculus II - Life Sciences* - Social Sciences*

**COURSE 1/2:**

MATH 232 (3) MATH 240 (3)
Applied Linear Algebra* Algebra I, Linear Algebra
MATH 208W (3)
Vector Calculus
MATH 251 (3)
Calculus III
STAT 270 (3)
Intro to Probability and Statistics
STAT 285 (3)
Intermediate Probability and Statistics

12 COURSES
36 UNITS

* Minimum B grade required.

INTERDISCIPLINARY REQUIREMENTS

15 UNITS FROM ANY ACMA, BUCB, BUS, ECON, MACM, MATH, REM or STAT COURSE.

UPPER DIVISION REQUIREMENTS

**COURSE 1/3:**

MATH 308 (3)
Linear Optimization
MATH 348 (3)
Intro to Probabilistic Models
MATH 402W (4)
Operations Research Clinic

**COURSE 1/3:**

MACM 316 (3) MATH 343 (3) MATH 345 (3)
Numerical Analysis I Applied Discrete Mathematics Intro to Graph Theory
CMPT 305 (3) CMPT 307 (3)
Computer Simulation and Modelling Data Structures and Algorithms

**COURSE 4/6:**

MATH 308 (3)
Continuous Optimization
MATH 408 (3)
Discrete Optimization
MATH 448 (3)
Network Flows
STAT 350 (3) STAT 380 (3)
Linear Models in Applied Statistics Intro to Stochastic Processes

6 UNITS FROM:

ECON 345 (5)
International Finance
STAT ____ (3) 300 or 400 level STAT*

10 COURSES
31 UNITS

BREADTH REQUIREMENTS

B-HUM (3) B-HUM (3)
B-SOC (3) B-SOC (3)
B-SCI (3) B-SCI (3)

6 COURSES
18 UNITS

WRITING REQUIREMENTS

Lower Division W (3)
Any department.
Upper Division W (3)
Must be within program major.

DEGREE UNIT REQUIREMENT

120 TOTAL UNITS
44 UPPER DIVISION UNITS
OPERATIONS RESEARCH MAJOR

Lower Division Program Requirements (36 UNITS)
- ☐ CMPT 120 or CMPT 130 (3)
- ☐ CMPT 125 or CMPT 135 (3)
- ☐ CMPT 225 (3)
- ☐ MACM 101 (3)
- ☐ MACM 201 (3)
- ☐ MATH 150, 151, 154*, or 157* (3)
- ☐ MATH 152, 155*, or 158* (3)
- ☐ MATH 208W (3)
- ☐ MATH 232* or MATH 240 (3)
- ☐ MATH 251 (3)

*With a B grade or higher.

Upper Division Program Requirements (28 UNITS)
- ALL OF:
  - ☐ MATH 308 (3)
  - ☐ MATH 348 (3)
  - ☐ MATH 402W (4)
- FOUR OF:
  - ☐ MATH 309 (3)
  - ☐ MATH 408 (3)
  - ☐ MATH 448 (3)
  - ☐ STAT 350 (3)
  - ☐ STAT 380 (3)
- ONE OF:
  - ☐ CMPT 305 (3)
  - ☐ CMPT 307 (3)
  - ☐ MACM 316 (3)
  - ☐ MATH 343 (3)
  - ☐ MATH 345 (3)
- 6 UNITS FROM:
  - ☐ ECON 345 (3)
  - ☐ ANY UD STAT*

* Except for STAT 302, STAT 305, STAT 310, STAT 311, STAT 320, and STAT 403.

Interdisciplinary Program Requirements (15 UNITS)
Courses must be from: ACMA, BUEC, BUS, ECON, MACM, MATH, REM or STAT.
- ☐ ___________
- ☐ ___________
- ☐ ___________

Breadth Requirements (24 UNITS)
- B-HUM (6 UNITS)
  - ☐ ___________
  - ☐ ___________
- B-SOC (6 UNITS)
  - ☐ ___________
  - ☐ ___________
- B-SCI (6 UNITS)
  - ☐ ___________
  - ☐ ___________
- UNDESIGNATED* (6 UNITS)
  - ☐ ___________
  - ☐ ___________

Courses must be from outside program major (MATH, MACM, STATS).
* Must be outside major. B-designation is not required.

Writing and Quantitative Requirements - *(Satisfied by program requirements.)*

Elective Courses
The requirements above total 103 units. Roughly 6 additional courses (17 units from any discipline) are required to meet SFU’s 120 unit minimum. Of the 120 units required to graduate, 44 units must be at the upper division level.
- ☐ ___________
- ☐ ___________
- ☐ ___________
- ☐ ___________
- ☐ ___________
READ THE FINE PRINT
THE DIFFERENCE BETWEEN: **CALCULUS I COURSES**

**MATH 150**
- **CALCULUS I WITH REVIEW**
- **PREREQUISITES**
  - B+: PRE-CALCULUS 12
  - B: MATH 100, CALCULUS READINESS TEST
  - 20/30, 24/30 CALCULUS READINESS TEST
- **MATHEMATICS, PHYSICS, CHEMISTRY, COMPUTING SCIENCE, AND ENGINEERING MAJORS**
- **FALL, SPRING, SUMMER**

**MATH 151**
- **CALCULUS I**
- **PREREQUISITES**
  - A: PRE-CALCULUS 12
  - B: MATH 100
  - 20/30, 24/30 CALCULUS READINESS TEST
- **MATHEMATICS, PHYSICS, CHEMISTRY, COMPUTING SCIENCE, AND ENGINEERING MAJORS**
- **FALL, SPRING, SUMMER**

**MATH 154**
- **CALCULUS I FOR THE LIFE SCIENCES**
- **PREREQUISITES**
  - B: PRE-CALCULUS 12
  - C-: MATH 100
  - 20/30, 24/30 CALCULUS READINESS TEST
- **BIOLOGY, HEALTH SCIENCE, BEHAVIORAL NEUROSCIENCE, AND BIOMEDICAL PHYSIOLOGY MAJORS**
- **FALL, SPRING**

**MATH 157**
- **CALCULUS I FOR THE SOCIAL SCIENCES**
- **PREREQUISITES**
  - B: PRE-CALCULUS 12
  - C: MATH 100
  - 20/30, 24/30 CALCULUS READINESS TEST
- **BUSINESS, ECONOMICS, AND SOCIAL SCIENCE MAJORS**
- **FALL, SPRING, SUMMER**

**MINIMUM GRADE REQUIREMENTS**
**MATH, APMA, MACM, and OPRES MAJORS:**

**MATH 150, 151**
- **MINIMUM C- GRADE REQUIRED TO PROCEED WITH PROGRAM.**

**MATH 154, 157**
- **MINIMUM B GRADE REQUIRED TO PROCEED WITH PROGRAM.**
MATH 232 and MATH 240 are equivalent courses. MATH 232 and MATH 240 count as repeats of one another. Students can only have credit for one.

MATH 232 (3)
Applied Linear Algebra
- Designed for students in the Faculty of Applied Sciences.
- APPLIED.
- NOT RECOMMENDED FOR MATH DEPARTMENT MAJORS.
- B grade minimum for MATH, MACM, APMA, and OPRES majors.

MATH 240 (3)
Algebra I: Linear Algebra
- Designed for students in the Faculty of Science.
- ABSTRACT.
- RECOMMENDED FOR MATH DEPARTMENT MAJORS.
- C-grade minimum for MATH, MACM, APMA, and OPRES majors.

FACULTY Notes from FALL 2022:
- Covered vector spaces earlier + throughout the semester.
- Covered eigenvectors (one of the capstone topics) much earlier than in 232 (four weeks into the semester instead of at the end).
- Fewer applications and more geometry.
# ANNUAL COURSE OFFERINGS

<table>
<thead>
<tr>
<th>100 LEVEL</th>
<th>FALL</th>
<th>SPRING</th>
<th>SUMMER</th>
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# Biennial Course Offerings

## 300 Level

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## 400 Level

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QUESTIONS?

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