

# APPLIED MATHEMATICS WITH COMPUTER SCIENCE OPTION, B.SC. MAJOR

## Degree Requirements

### Four Year Major (Including Co-operative Option if Selected)

Course	Title	Hours
<b>Year 1</b>		
MATH 1220	Linear Algebra 1 <sup>1</sup>	3
MATH 1230	Differential Calculus <sup>1</sup>	3
MATH 1232	Integral Calculus (C+) <sup>1</sup>	3
MATH 1240	Elementary Discrete Mathematics	3
COMP 1010	Introductory Computer Science 1 <sup>1</sup>	3
COMP 1020	Introductory Computer Science 2	3
6 credit hours from the Faculty of Arts, which should include the required "W" course		6
6 credit hours of electives <sup>2</sup>		6
<b>Hours</b>		<b>30</b>
<b>Year 2</b>		
MATH 2080	Introduction to Analysis	3
MATH 2090	Linear Algebra 2	3
MATH 2150	Multivariable Calculus	3
MATH 2160	Numerical Analysis 1	3
MATH 2180	Real Analysis 1	3
COMP 2140	Data Structures: Analysis and Implementation	3
<b>Hours</b>		<b>18</b>
<b>Years 2-4</b>		
STAT 1150	Introduction to Statistics and Computing <sup>1</sup>	3
STAT 2150	Statistics and Computing	3
COMP 2080	Algorithms: Design and Implementation	3
COMP 2400	Programming Paradigms <sup>3</sup>	3
COMP 2450	Software Development 1 <sup>3</sup>	3
9 credit hours from:		9
MATH 2030	Combinatorics 1	
MATH 2040	Curves and Surfaces	
MATH 2170	Number Theory 1	
Any 3000/4000 level MATH course		
One of the following patterns:		9
<b>Cryptography</b>		
COMP 3170	Analysis of Algorithms and Data Structures	
COMP 4140	Introduction to Cryptography and Cryptosystems	
Any 3000/4000 level COMP course		
<b>Graphics</b>		
COMP 3490	Computer Graphics 1	
COMP 4490	Computer Graphics 2	
Any 3000/4000 level COMP course		
<b>Machine Learning</b>		

COMP 2452	Software Development 2 <sup>3</sup>	
COMP 3190	Introduction to Artificial Intelligence	
COMP 4360	Machine Learning	
<b>Theoretical Computer Science</b>		
COMP 3030	Automata Theory and Formal Languages	
two of:		
COMP 3170	Analysis of Algorithms and Data Structures	
COMP 4820	Bioinformatics	
COMP 4420	Advanced Design and Analysis of Algorithms	
18 credit hours of electives <sup>2</sup>		18
<b>Hours</b>		<b>51</b>
<b>Years 3-4</b>		
MATH 2070	Graph Theory 1	3
MATH 3340	Complex Analysis 1	3
MATH 3420	Numerical Analysis 2	3
MATH 3440	Ordinary Differential Equations	3
MATH 3460	Partial Differential Equations	3
MATH 3474	Real Analysis 2	3
MATH 3610	Introduction to Mathematical Modelling	3
<b>Co-op Requirements (if selected):</b>		
SCI 3980	Co-operative Education Work Term 1	0
SCI 3990	Co-operative Education Work Term 2	0
SCI 4980	Co-operative Education Work Term 3	0
SCI 4990	Co-operative Education Work Term 4 (if a 4th work term is selected)	0
<b>Hours</b>		<b>21</b>
<b>Total Hours</b>		<b>120</b>

<sup>1</sup> Students are strongly advised to take MATH 1220, MATH 1230 and MATH 1232.

The following substitutions are allowed (but not advised), provided the grades indicated in brackets are achieved:

- MATH 1210 (B) or MATH 1300 (C+) in place of MATH 1220;
- MATH 1500 (B) or MATH 1510 (B) in place of MATH 1230;
- MATH 1700 (B) or MATH 1710 (B) in place of MATH 1232;
- STAT 1000 (C) and STAT 2000 (B) in place of STAT 1150.

COMP 1012 may be used in lieu of COMP 1010.

<sup>2</sup> These courses may not be used for credit in this program: MATH 1010, MATH 1018, MATH 1020, FA 1020, MATH 1080, MATH 1090.

<sup>3</sup> Students who have previously completed COMP 2160 may use it in lieu of COMP 2400. Students who have previously completed COMP 2150 may use it and an elective in lieu of COMP 2450 and COMP 2452.

(Letters in brackets indicate minimum prerequisite standing for further study.)