

# COMPUTING, MATHEMATICS AND ANALYTICS – SPECIALIZATION (COMPUTING) – BACHELOR OF COMPUTING (HONOURS)

**COMA-P-BCH** (Computing, Mathematics and Analytics)

**COMA-I-BCH** (Computing, Mathematics and Analytics with Professional Internship)

**Subject:** Administered by the School of Computing and the Department of Mathematics and Statistics.

**Plan:** Consists of 84.00 units as described below.

**Program:** The Plan, with sufficient electives to total 120.00 units, will lead to a Bachelor of Computing (Honours) Degree.

Requirements for this program have been modified. Please consult the 2021-2022 (<https://www.queensu.ca/academic-calendar/archive/2021-2022/arts-science/>) *Calendar* for the previous requirements.

Code	Title	Units
<b>1. Core</b>		
COMPUTING:		
<b>A. Complete the following:</b>		
CISC 121	Introduction to Computing Science I	3.00
CISC 124	Introduction to Computing Science II	3.00
<b>B. Complete the following:</b>		
CISC 203	Discrete Mathematics for Computing II	3.00
CISC 204	Logic for Computing Science	3.00
CISC 221	Computer Architecture	3.00
CISC 223	Software Specifications	3.00
CISC 235	Data Structures	3.00
<b>C. Complete 3.00 units from the following:</b>		<b>3.00</b>
CISC 322	Software Architecture	
CISC 326	Game Architecture	
<b>D. Complete the following:</b>		
CISC 324	Operating Systems	3.00
CISC 360	Programming Paradigms	3.00
CISC 365	Algorithms I	3.00
<b>E. Complete the following:</b>		
CISC 497	Social, Ethical and Legal Issues in Computing	3.00
<b>F. Complete 3.00 units from the following:</b>		<b>3.00</b>
CISC 499	Advanced Undergraduate Project	
CISC 500	Undergraduate Thesis	
MATHEMATICS AND STATISTICS:		
<b>G. Complete 6.00 units from the following:</b>		<b>6.00</b>
MATH 110	Linear Algebra	

CISC 102 Discrete Mathematics for Computing I & MATH 111 and Linear Algebra

**H. Complete 6.00 from the following: 6.00**

MATH 120 Differential and Integral Calculus

MATH 121 Differential and Integral Calculus

MATH 123 Differential and Integral Calculus I

& MATH 124 and Differential and Integral Calculus II

**I. Complete 6.00 units from the following: 6.00**

MATH 210 Rings and Fields

MATH 211 Algebraic Methods

MATH 310 Group Theory

MATH 311 Elementary Number Theory

MATH 413 Introduction to Algebraic Geometry

MATH 414 Introduction to Galois Theory

**J. Complete 3.00 units from the following: 3.00**

MATH 221 Vector Calculus

MATH 280 Advanced Calculus

**K. Complete the following:**

STAT 269 Statistics and Probability II 3.00

STAT 361 Applied Methods in Statistics I 3.00

STAT 463 Fundamentals of Statistical Inference 3.00

**L. Complete 3.00 units from following: 3.00**

STAT 252 Introductory Applied Probability

STAT 268 Statistics and Probability I

STAT 351 Probability I

**2. Option**

**A. Complete 12.00 units from the following course list: 12.00**

COMA\_Options

**Electives**

Elective Courses 36.00

**Total Units 120.00**

## 3. Substitutions

A. Students in the internship version of this Plan will substitute 3.00 units from COMP at the 300-level for requirement **1.F.** (CISC 499). In addition, the B.Cmp.(Hons.) Program requirements will be increased by 6.00 units from COMP at the 300-level, for a total of 126.00 units if the student is taking a 12-month internship, or by 9.00 units



from COMP at the 300-level, for a total of 129.00 units if the student is taking a 16-month internship.

## 4. Notes

A. Students with no programming experience should review the Introductory Courses (<https://www.queensu.ca/academic-calendar/arts-science/schools-departments-programs/computing/>) paragraph included on the School of Computing overview page in the *Calendar*.

B. Students should select some of their option courses to be focused in a particular area; the following is a list of suggested areas:

i. Communications and Coding: MATH 401; MATH 406; MATH 418; MATH 474; MATH 477.

ii. Data Analysis: CISC 271; CISC 371; CISC 372; CISC 473; STAT 361; STAT 456; STAT 457; STAT 462; STAT 463; STAT 464; STAT 471; STAT 473; STAT 486.

iii. Theory in Computer Science: CISC 422; CISC 462; CISC 465; CISC 466; CISC 467; MATH 401; MATH 402; MATH 418.

iv. Discrete Math and Optimization: CISC 466; MATH 337; MATH 401; MATH 402.

C. Students may seek approval for a modified selection of courses for COMA\_Options; a written rationale is required.

D. Students interested in pursuing graduate studies in mathematics should take additional mathematics courses.

E. Some CISC, MATH, STAT and BIOM option courses are offered only in alternate years. The courses to be offered each year are announced on the departmental websites before the course selection period, and students should refer to that information in planning their course selections.

F. With the approval of the Undergraduate Chair, students who take CISC 500 working on a project directly related to Computing, Mathematics, or Analytics may count 3.00 units towards COMA\_Options.

G. A maximum of 6.00 units from courses offered by other Faculties and Schools may be counted toward the program and/or Plan requirements. This includes courses in BMED, COMM, GLPH, LAW, NURS and courses in the Faculty of Engineering and Applied Science.

## Computing and Mathematics Course List

The following list contains courses offered through other Departments. In accordance with Academic Regulation 2.5 (Access to Classes), students do not have enrolment priority

in all of these courses. Access to these courses may only be made available during the Open Enrolment period, and then only if space permits.

## COMA\_Options

Code	Title	Units
<b>Courses in other departments usable as COMA options</b>		
BIOM 300	Modeling Techniques in Biology	3.00
CISC 271	Linear Data Analysis	3.00
CISC 330	Computer-Integrated Surgery	3.00
CISC 371	Nonlinear Data Analysis	3.00
CISC 372	Advanced Data Analytics	3.00
CISC 422	Formal Methods in Software Engineering	3.00
CISC 455	Evolutionary Optimization and Learning	3.00
CISC 457	Image Processing and Computer	3.00
CISC 462	Computability and Complexity	3.00
CISC 465	Semantics of Programming Languages	3.00
CISC 466	Algorithms II	3.00
CISC 467	Fuzzy Logic	3.00
CISC 472	Medical Informatics	3.00
CISC 473	Deep Learning	3.00
CISC 500	Undergraduate Thesis	6.00
MATH 337	Stochastic Models in Operations Research	3.00
MATH 339	Evolutionary Game Theory	3.00
MATH 401	Graph Theory	3.00
MATH 402	Enumerative Combinatorics	3.00
MATH 406	Introduction to Coding Theory	3.00
MATH 413	Introduction to Algebraic Geometry	3.00
MATH 414	Introduction to Galois Theory	3.00
MATH 418	Number Theory and Cryptography	3.00
MATH 474	Information Theory	3.00
MATH 477	Data Compression and Source Coding	3.00
STAT 361	Applied Methods in Statistics I	3.00
STAT 456	Bayesian Analysis	3.00
STAT 457	Statistical Learning II	3.00
STAT 462	Statistical Learning I	3.00
STAT 463	Fundamentals of Statistical Inference	3.00
STAT 464	Discrete Time Series Analysis	3.00
STAT 471	Sampling and Experimental Design	3.00
STAT 473	Generalized Linear Models	3.00
STAT 486	Survival Analysis	3.00