

COMPUTING – MAJOR (COMPUTING) – BACHELOR OF COMPUTING (HONOURS)

COMP-M-BCH (Computing)

COMP-I-BCH (Computing with Professional Internship)

Subject: Administered by the School of Computing.

Plan: Consists of 72.00 units as described below.

Program: The Plan, alone, or in combination with a Minor in another subject, and with sufficient electives to total 120.00 units, will lead to a Bachelor of Computing (Honours) Degree.

Note: Requirements for this program have been modified. Please consult the 2022-2023 (<https://www.queensu.ca/academic-calendar/archive/2022-2023/arts-science/Calendar>) for the previous requirements.

Code	Title	Units
1. Core		
A. Complete the following:		
CISC 121	Introduction to Computing Science I	3.00
CISC 124	Introduction to Computing Science II	3.00
B. Complete 3.00 units from the following:		3.00
STAT 263	Introduction to Statistics	
STAT 268	Statistics and Probability I	
STAT 351	Probability I	
STAT_Options		
C. Complete the following:		
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
D. Complete 3.00 units from the following:		3.00
CISC 322	Software Architecture	
CISC 326	Game Architecture	
E. Complete the following:		
CISC 324	Operating Systems	3.00
CISC 360	Programming Paradigms	3.00
CISC 365	Algorithms I	3.00
F. Complete the following:		
CISC 497	Social, Ethical and Legal Issues in Computing	3.00
G. Complete 3.00 units from the following:		3.00
CISC 495	Software Evolution	
CISC 496	Game Development Project	
CISC 499	Advanced Undergraduate Project	

CISC 500 Undergraduate Thesis

2. Option

A. Complete 15.00 units from one of the following options: 15.00

- i. Fundamental Computation
- ii. Biomedical Computation
- iii. Data Analytics
- iv. Artificial Intelligence
- v. Game Development
- vi. Security

B. Complete 3.00 units from the following: 3.00

CISC, COCA, COGS, or SOFT at the 200-level or above

3. Supporting

A. Complete 6.00 units from the following: 6.00

- CISC 102 Discrete Mathematics for Computing I & MATH 111 and Linear Algebra
- CISC 102 Discrete Mathematics for Computing I & MATH 112 and Introduction to Linear Algebra
- MATH 110 Linear Algebra

B. Complete 6.00 units 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

Electives

Elective Courses 48.00

Total Units 120.00

Option List

i. Fundamental Computation

Code	Title	Units
a. Complete 3.00 units from the following: 3.00		
CISC 422	Formal Methods in Software Engineering	
CISC 455	Evolutionary Optimization and Learning	
CISC 462	Computability and Complexity	
CISC 465	Semantics of Programming Languages	
CISC 467	Fuzzy Logic	
b. Complete 3.00 units from the following: 3.00		
CISC		
CISC_Sub		
SOFT at the 400-level or above		
c. Complete 6.00 units from the following: 6.00		



CISC at the 300-level or above	
CISC_Subs at the 300-level or above	
SOFT at the 300-level or above	
d. Complete 3.00 units from the following:	3.00
CISC at the 200-level or above	
CISC_Subs at the 200-level or above	
SOFT at the 200-level or above	
Total Units	15.00

ii. Biomedical Computation

Code	Title	Units
a. Complete the following:		
CISC 271	Linear Data Analysis	3.00
CISC 330	Computer-Integrated Surgery	3.00
CISC 352	Artificial Intelligence	3.00
CISC 472	Medical Informatics	3.00
b. Complete 3.00 units from the following:		3.00
CISC 320	Fundamentals of Software Development	
CISC 471	Computational Biology	
Total Units		15.00

iii. Data Analytics

Code	Title	Units
a. Complete the following:		
CISC 271	Linear Data Analysis	3.00
CISC 371	Nonlinear Data Analysis	3.00
CISC 372	Advanced Data Analytics	3.00
CISC 451	Topics in Data Analytics	3.00
CISC 452	Neural and Genetic Computing	3.00
Total Units		15.00

iv. Artificial Intelligence

Code	Title	Units
a. Complete the following:		
COGS 100	Introduction to Cognitive Science	3.00
COGS 201	Cognition and Computation	3.00
CISC 352	Artificial Intelligence	3.00
b. Complete 6.00 units from the following course list: 6.00		
CISC_Artificial_Intelligence		
Total Units		15.00

v. Game Development

Code	Title	Units
a. Complete the following:		
CISC 226	Game Design	3.00
CISC 320	Fundamentals of Software Development	3.00

CISC 352	Artificial Intelligence	3.00
CISC 454	Graphics (A)	3.00
CISC 486	Game Development	3.00
Total Units		15.00

vi. Security

Code	Title	Units
a. Complete the following:		
CISC 220	System Level Programming	3.00
CISC 327	Software Quality Assurance	3.00
CISC 335	Computer Networks	3.00
CISC 447	Introduction to Cybersecurity	3.00
b. Complete 3.00 units from the following: 3.00		
CISC 434	Distributed Systems	
CISC 448	Software Reliability and Security	
CISC 468	Cryptography	
Total Units		15.00

4. Substitutions

A. Students in the internship version of this Plan will substitute 3.00 units from COMP at the 300-level for requirement **1.G.** (CISC 496 (<https://www.queensu.ca/academic-calendar/search/?P=CISC%20496>) or CISC 499 (<https://www.queensu.ca/academic-calendar/search/?P=CISC%20499>) or CISC 500 (<https://www.queensu.ca/academic-calendar/search/?P=CISC%20500>)). 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.

5. 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. ELEC courses are offered by the Faculty of Engineering and Applied Science. Special permission may be required to register. All such courses will count as 3.00 units towards degree requirements in Arts and Science.

C. Students should consider the following courses to complement their option courses. Data Analytics: Students interested in machine learning or artificial intelligence can take CISC 473. Game Development: Students with interests the arts can take COCA 201. Students with interests in analytics or machine learning can take CISC 271. Students

with interests in human-computer interaction can take CISC 325.

D. 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, HSCI, LAW, NURS, and courses in the Faculty of Engineering and Applied Science.

Computing Course List

The following list contains courses offered through other Departments. In accordance with Academic Regulation **2.6** (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.

CISC_Artificial_Intelligence

Code	Title	Units
Artificial Intelligence Option Courses		
CISC 351	Advanced Data Analytics	3.00
CISC 371	Nonlinear Data Analysis	3.00
CISC 372	Advanced Data Analytics	3.00
CISC 451	Topics in Data Analytics	3.00
CISC 452	Neural and Genetic Computing	3.00
CISC 453	Topics in Artificial Intelligence	3.00
CISC 455	Evolutionary Optimization and Learning	3.00
CISC 467	Fuzzy Logic	3.00
CISC 473	Deep Learning	3.00
CISC 474	Reinforcement Learning	3.00

CISC_Sub

Code	Title	Units
Courses in other departments usable as CISC Options		
COMM 365	Advanced Business Decision Modeling	3.00
ELEC 470	Computer System Architecture	3.00
MATH 272	Applications of Numerical Methods	3.00
MATH 337	Stochastic Models in Operations Research	3.00
MATH 401	Graph Theory	3.00
MATH 402	Enumerative Combinatorics	3.00
MATH 434	Optimization Theory with Applications to Machine Learning	3.00
MATH 474	Information Theory	3.00

STAT_Options

Code	Title	Units
Statistic Course Options		
BIOL 243	Introduction to Statistics	3.00
CHEE 209	Analysis Of Process Data	3.00

COMM 162	Managerial Statistics	3.00
ECON 250	Introduction to Statistics	3.00
GPHY 247	Introduction to Statistics	3.00
KNPE 251	Introduction to Statistics	3.00
NURS 323	Introduction to Statistics	3.00
POLS 285	Introduction to Statistics	3.00
PSYC 202	Statistics in Psychology	3.00
SOCY 211	Introduction to Statistics	3.00
STAM 200	Introduction to Statistics	3.00
STAT 263	Introduction to Statistics	3.00