COMPUTER SCIENCE – SPECIALIZATION (COMPUTING) – BACHELOR OF COMPUTING (HONOURS)

CSCI-P-BCH (Computer Science)
CSCI-I-BCH (Computer Science with Professional Internship)

Subject: Administered by the School of Computing.
Plan: Consists of 102.00 units as described below.
Program: The Plan, with sufficient electives to total 120.00 units, will lead to a Bachelor of Computing (Honours) Degree.

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 6.00 units from the following:		**6.00**
CISC 102 & MATH 111	Discrete Mathematics for Computing l and Linear Algebra	
CISC 102 & MATH 112	Discrete Mathematics for Computing l and Introduction to Linear Algebra	
MATH 110	Linear Algebra	
C. Complete 6.00 units from the following:		**6.00**
MATH 120	Differential and Integral Calculus	
MATH 121	Differential and Integral Calculus	
MATH 123 & MATH 124	Differential and Integral Calculus I and Differential and Integral Calculus II	
D. 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		
E. 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
F. Complete 3.00 units from the following:		**3.00**
CISC 322	Software Architecture	
CISC 326	Game Architecture	

Code	Title	Units
G. Complete the following:		
CISC 324	Operating Systems	3.00
CISC 360	Programming Paradigms	3.00
CISC 365	Algorithms I	3.00
H. Complete the following:		
CISC 497	Social, Ethical and Legal Issues in Computing	3.00
I. 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. Sub-Plans		
A. Complete one of the following Sub-Plans:		**15.00**
i. Fundamental Computation (FUNC-O)		
ii. Biomedical Computation (BICO-O)		
iii. Data Analytics (DAAN-O)		
iv. Artificial Intelligence (ARIN-O)		
v. Game Development (GADE-O)		
vi. Security (SECU-O)		
B. Complete 3.00 units from the following:		**3.00**
CISC, COCA, COGS, or SOFT at the 200-level or above		
Complementary Courses:		
C. Complete 9.00 units from the following course list:		**9.00**
ASC_Humanities_Languages_Social_Sciences		
D. Any discipline other than APSC, CISC, COCA, COGS, ELEC, MATH, MTHE, STAT		**21.00**
Electives		
Elective Courses		18.00
Total Units		**120.00**

Sub-Plans

i. Fundamental Computation (FUNC-O)

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_Subs		
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 (BICO-O)

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 (DAAN-O)

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 (ARIN-O)

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 (GADE-O)

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 (SECU-O)

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**

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.l.** (CISC 499 (https://www.queensu.ca/academic-calendar/search/?P=CISC%20499)). 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. In exceptional circumstances (such as a student who has transferred from another Faculty or institution), the distribution requirements in the complementary courses may be relaxed, at the discretion of the Chair of Undergraduate

Studies. Alternative complementary courses may be selected in consultation with the School of Computing.

C. 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 Sciences.

D. 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.

E. 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 and Information Science 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.

ASC_Humanities_Languages_Social_Sciences

Code	Title	Units
ANIM		
ANSH		
ARAB		
ARTF		
ARTH		
BADR (formerly BISC)		
BLCK		
CHIN		
CLST		
COCA		
CWRI		
DEVS		
ECON (except ECON 250)		
EMPR		
ENGL		
ENGX		
ENIN		
ENSC (except ENSC 201; ENSC 301; ENSC 307; ENSC 320; ENSC 407; ENSC 425; ENSC 471; ENSC 480)		
FILM		
FREN		
FRST		
GLPH 271; GLPH 385; GLPH 471; GLPH 482; GLPH 488; GLPH 487; GLPH 493;		
GNDS		
GPHY_Human Course List [1]		
GREK		
GRMN		
HEBR		
HIST		
HLTH (except HLTH 230; HLTH 331)		
IDIS		
INTS		
INUK		
ITLN		
JAPN		
JWST		
KNPE 167; KNPE 203; KNPE 237; KNPE 254; KNPE 265; KNPE 300; KNPE 331; KNPE 335; KNPE 336; KNPE 337; KNPE 338; KNPE 345; KNPE 346; KNPE 363; KNPE 365; KNPE 367; KNPE 397; KNPE 400; KNPE 430; KNPE 433; KNPE 436; KNPE 446; KNPE 463; KNPE 465; KNPE 473;		
LANG		
LATN		
LING		
LIBS		
LLCU		
MAPP		
MOHK		
MUSC		
MUTH		
PHIL		
POLS (except POLS 285)		
PORT		
PPEC		
PSYC 100; PSYC 101; PSYC 102; PSYC 331; PSYC 241; PSYC 235; PSYC 236; PSYC 251		
PSYC_Clinical Course List; PSYC_Developmental Course List; PSYC_Social Course List [1]		
QGSP		
RELS		
SOCY (except SOCY 210; SOCY 211)		

SPAN		
WRIT		

SOCY 211	Introduction to Statistics	3.00
STAM 200	Introduction to Statistics	3.00
STAT 263	Introduction to Statistics	3.00

[1] The GPHY and PSYC Course Lists noted here may be found in the Departments/Schools and Degree Plans section of this *Calendar*.

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_Subs

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
ELEC 474	Machine Vision	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