

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.

Requirements for this program have been modified. Please consult the [2021-2022 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	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	
C. 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	
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	
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
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I. Complete 3.00 units from the following: 3.00

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	
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Complementary Courses:

C. Complete 9.00 units from the following course list: 9.00

ASC_Humanities_Languages_Social_Sciences	
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D. Any discipline other than APSC, CISC, COCA, COGS, ELEC, MATH, MTHE, STAT 21.00

Electives

Elective Courses	18.00
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Total Units	120.00
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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 466	Algorithms II	



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
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a. Complete the following:

CISC 271	Linear Data Analysis	3.00
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CISC 330	Computer-Integrated Surgery	3.00
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CISC 352	Artificial Intelligence	3.00
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CISC 472	Medical Informatics	3.00
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b. Complete 3.00 units from the following: 3.00

CISC 320	Fundamentals of Software Development	
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CISC 471	Computational Biology	
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Total Units 15.00

iii. Data Analytics (DAAN-O)

Code	Title	Units
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a. Complete the following:

CISC 271	Linear Data Analysis	3.00
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CISC 371	Nonlinear Data Analysis	3.00
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CISC 372	Advanced Data Analytics	3.00
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CISC 451	Topics in Data Analytics	3.00
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CISC 452	Neural and Genetic Computing	3.00
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Total Units 15.00

iv. Artificial Intelligence (ARIN-O)

Code	Title	Units
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a. Complete the following:

COGS 100	Introduction to Cognitive Science	3.00
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COGS 201	Cognition and Computation	3.00
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CISC 352	Artificial Intelligence	3.00
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b. Complete 6.00 units from the following course list: 6.00

CISC_Artificial_Intelligence	
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Total Units 15.00

v. Game Development (GADE-O)

Code	Title	Units
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a. Complete the following:

CISC 226	Game Design	3.00
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CISC 320	Fundamentals of Software Development	3.00
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CISC 352	Artificial Intelligence	3.00
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CISC 454	Graphics (A)	3.00
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CISC 486	Game Development	3.00
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Total Units 15.00

vi. Security (SECU-O)

Code	Title	Units
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a. Complete the following:

CISC 220	System Level Programming	3.00
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CISC 327	Software Quality Assurance	3.00
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CISC 335	Computer Networks	3.00
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CISC 447	Introduction to Cybersecurity	3.00
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b. Complete 3.00 units from the following: 3.00

CISC 434	Distributed Systems	
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CISC 448	Software Reliability and Security	
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CISC 468	Cryptography	
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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.I. (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. 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, 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 **2.5** (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.

ASC_Humanities_Languages_Social_Sciences

Code	Title	Units
Humanities, Languages, and Social Sciences Courses		
ANSH; ARAB; ARTF; ARTH		
BISC		
CHIN; CLST; COCA; CWRI		
DEVS; DRAM		
ECON ¹		
EMPR; ENGL; ENGX; ENIN; ENSC (except those courses listed above in ASC_Science)		
FILM; FREN; FRST		
GLPH 271	Global and Population Health	3.00
GLPH 385	Biohacking & Gerontechnology	3.00
GLPH 471	Advanced Global and Population Health	3.00
GLPH 493	Global Health Practice	3.00
GNDS; GPHY_Human; GREK; GRMN		
HEBR; HIST		
HLTH ²		

IDIS; ITLN; INUK; INTS		
JAPN; JWST		
KNPE 167	Socio-Cult Dimensions of Sport and Physical Activity	3.00
KNPE 203	Coaching and Leadership in Sport	3.00
KNPE 237	Child and Adolescent Motor Development	3.00
KNPE 265	Psychology of Sport and Exercise	3.00
KNPE 300	Community-Based Internship	3.00
KNPE 331	Care and Prevention of Athletic Injuries	3.00
KNPE 335	Healthy Aging	3.00
KNPE 337	Physical Activity Promotion for Children and Youth	3.00
KNPE 338	Field Course in Kinesiology and Health Studies	3.00
KNPE 345	The Science and Methodology of Sport Training Conditioning Programs	3.00
KNPE 346	Strength and Conditioning Field Placement	4.50
KNPE 363	Team Dynamics in Sport: Theory and Practice	3.00
KNPE 365	Motivational Interviewing for Physical Activity Behaviour Change	3.00
KNPE 367	Fitness, the Body and Culture	3.00
KNPE 397	Special Topics in Kinesiology	3.00
KNPE 400	Professional Issues in Allied Health	3.00
KNPE 430	Athletic Therapy Internship	4.50
KNPE 433	Global Sport and Disability	3.00
KNPE 436	Advanced Placement in Disability and Physical Activity	3.00
KNPE 446	Strength and Conditioning Internship	4.50
KNPE 463	Community-Based Physical Activity Promotion	6.00
KNPE 465	Sport Participation and Performance	3.00
KNPE 473	Sport and Culture	3.00
LANG; LATN; LIBS; LING; LLCU		
MAPP; MOHK; MUSC; MUTH		
PACT; PHED; PHIL; POLS; PORT; PPEC ³		
PSYC 100	Principles of Psychology	6.00
PSYC 101	Principles of Psychology I	3.00
PSYC 102	Principles of Psychology II	3.00
PSYC 231		3.00
PSYC 241	Social Psychology	3.00
PSYC 235	Abnormal Psychology	6.00
PSYC 236	Introduction to Clinical Psychology	3.00
PSYC 251	Developmental Psychology	3.00
PSYC_Cluster_B		
RELS		



SOCY; SPAN; STSC ⁴

WRIT

¹ except ECON 250.

² except HLTH 230; HLTH 331.

³ except POLS 285.

⁴ except SOCY 210; SOCY 211.

(Note that the GPHY and PSYC course lists noted here may be found in the Degree Plans and Course Lists section of this *Calendar*.)

CISC_Artificial_Intelligence

Code	Title	Units
Artificial Intelligence Option Courses		
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

SOCY 211	Introduction to Statistics	3.00
STAM 200	Introduction to Statistics	3.00
STAT 252	Introductory Applied Probability	3.00
STAT 263	Introduction to Statistics	3.00
STAT 367	Engineering Data Analysis	4.00