

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

COGS-P-BCH (Cognitive Science)

COGS-I-BCH (Cognitive Science with Professional Internship)

Subject: Administered by the School of Computing in cooperation with the Departments of Languages, Literatures, and Cultures, Philosophy, and Psychology.

Plan: Consists of 93.00 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 2023-2024 (<https://queensu-ca-public.courseleaf.com/archive/2023-2024/>) *Calendar* for the previous requirements.

| Code | Title | Units |
|---|--------------------------------------|-------------|
| 1. Core | | |
| A. Complete the following: | | |
| CISC 102 | Discrete Structures I | 3.00 |
| 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 |
| MATH 110 | Linear Algebra | |
| MATH 112 | Introduction to Linear Algebra | |
| C. Complete the following: | | |
| COGS 100 | Introduction to Cognitive Science | 3.00 |
| D. Complete the following: | | |
| COGS 201 | Cognition and Computation | 3.00 |
| E. Complete the following: | | |
| CISC 203 | Discrete Structures II | 3.00 |
| CISC 204 | Logic for Computing Science | 3.00 |
| CISC 221 | Computer Architecture | 3.00 |
| CISC 235 | Data Structures | 3.00 |
| F. Complete 3.00 units from the following: | | 3.00 |
| STAT 263 | Introduction to Statistics | |
| STAT 268 | Statistics and Probability I | |
| STAT_Options | | |
| G. Complete the following: | | |
| CISC 360 | Programming Paradigms | 3.00 |
| H. Complete 9.00 units from the following: | | 9.00 |
| CISC_Artificial_Intelligence | | |
| CISC 352 | Artificial Intelligence | |
| COGS 400 | Neural and Genetic Cognitive Models | |

I. Complete the following:

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| CISC 497 | Social, Ethical and Legal Issues in Computing | 3.00 |
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2. Option

A. Complete 30.00 units from two of the following option lists: 30.00

- i. Linguistics
- ii. Philosophy
- iii. Psychology

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

COGS_Computing

C. Complete 6.00 units from the following course lists: 6.00

COGS_Computing
COGS_Linguistics
COGS_Philosophy
COGS_Psychology
NSCI_Options

Electives

| | |
|------------------|-------|
| Elective Courses | 27.00 |
|------------------|-------|

Total Units 120.00

Option Lists

i. Linguistics

Code Title Units

a. Complete 6.00 units from the following: 6.00

LING 100 Introduction to Linguistics

or

LING 101 Introduction to Linguistics: Words,
& LING 102 Sentences, and Meaning
and Introduction to Linguistics: Sounds,
Signs, and Perception

b. Complete 3.00 units from the following: 3.00

LING 310 Phonetics
LING 320 Phonology
LING 330 Morphology

c. Complete the following:

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|----------|--------|------|
| LING 340 | Syntax | 3.00 |
|----------|--------|------|

d. Complete the following:



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|--------------------|-----------|--------------|
| LING 415 | Semantics | 3.00 |
| Total Units | | 15.00 |

ii. Philosophy

| Code | Title | Units |
|---|---|--------------|
| a. Complete 6.00 units from the following: | | 6.00 |
| PHIL at the 100-level or above | | |
| b. Complete 6.00 units from the following: | | 6.00 |
| PHIL 250 | Epistemology and Metaphysics | |
| or | | |
| PHIL 251 & PHIL 252 | Metaphysics and Epistemology | |
| c. Complete 3.00 units from the following: | | 3.00 |
| PHIL 261 | Philosophy of Mathematics | |
| PHIL 266 | Introduction to Probability and Inductive Logic | |
| PHIL 270 | Minds and Machines | |
| PHIL 311 | Philosophy of Psychology | |
| PHIL 351 | Philosophy of Mind | |
| PHIL 359 | Philosophy of Language | |
| PHIL 381 | Philosophy of the Natural Sciences | |
| Total Units | | 15.00 |

iii. Psychology

| Code | Title | Units |
|---|--------------------------------|--------------|
| a. Complete the following: | | |
| PSYC 100 | Principles of Psychology | 6.00 |
| b. Complete the following: | | |
| PSYC 221 | Cognitive Psychology | 3.00 |
| c. Complete 3.00 units from the following: | | 3.00 |
| PSYC 203 | Research Methods in Psychology | |
| PSYC 271 | Brain and Behaviour I | |
| d. Complete 3.00 units from the following course list: | | 3.00 |
| COGS_Psychology at the 300-level or above | | |
| Total Units | | 15.00 |

3. 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. As COGS is a multi-disciplinary subject, several first-year courses are required. With the exception of CISC 102 and CISC 121, 100-level courses may be deferred to later years depending upon the planned progression of subsequent

courses. With approval of an advisor, COGS 100 may be taken in Year 2 of the Plan.

C. Many upper-year courses in CISC, LING, PHIL, and PSYC have prerequisites outside the courses required for COGS, and students should take this into account in planning for their optional and elective units. Not all upper-year courses are offered every year.

D. The Plan allows 27.00 units for elective courses. Many disciplines are narrowly focused, and electives are essential to allow students to broaden their education. In the case of COGS, the Plan is already very broad, and students are encouraged to use their electives to further pursue the area(s) of Cognitive Science in which they are most interested.

E. With the approval of the Undergraduate Chair, students who take CISC 500 working on a project directly related to Cognitive Science may count 3.00 units towards COGS_Computing.

F. Students completing the internship (COGS-I-BCH) will be required to complete 117.0 units towards their Bachelor of Computing degree and 9.0 units in COMP internship courses for a total of 126.0 units.

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, HSCI, LAW, NURS, and courses offered by Smith Engineering.

Cognitive Science Course Lists

The following lists contain 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 Options | | |
| 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 |

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|----------|------------------------|------|
| CISC 473 | Deep Learning | 3.00 |
| CISC 474 | Reinforcement Learning | 3.00 |

COGS_Computing

| Code | Title | Units |
|--|-------|-------|
| Cognitive Science Computing Options | | |

| | | |
|----------|--------------------------------------|------|
| CISC 220 | System-Level Programming | 3.00 |
| CISC 223 | Software Specifications | 3.00 |
| CISC 226 | Game Design | 3.00 |
| CISC 271 | Linear Data Analysis | 3.00 |
| CISC 325 | Human-Computer Interaction | 3.00 |
| CISC 332 | Database Management Systems | 3.00 |
| CISC 340 | Digital Systems | 3.00 |
| CISC 365 | Algorithms I | 3.00 |
| CISC 454 | Computer Graphics | 3.00 |
| CISC 457 | Image Processing and Computer Vision | 3.00 |
| CISC 465 | Semantics of Programming Languages | 3.00 |
| CISC 486 | Game Development | 3.00 |
| CISC 496 | Game Development Project | 3.00 |
| CISC 500 | Undergraduate Thesis | 6.00 |

COGS_Linguistics

| Code | Title | Units |
|--|-------|-------|
| Cognitive Science Linguistics Options | | |

| | | |
|----------|--|------|
| LING 100 | Introduction to Linguistics | 6.00 |
| LING 101 | Introduction to Linguistics: Words, Sentences, and Meaning | 3.00 |
| LING 102 | Introduction to Linguistics: Sounds, Signs, and Perception | 3.00 |
| LING 310 | Phonetics | 3.00 |
| LING 320 | Phonology | 3.00 |
| LING 330 | Morphology | 3.00 |
| LING 340 | Syntax | 3.00 |
| LING 415 | Semantics | 3.00 |

COGS_Philosophy

| Code | Title | Units |
|---|-------|-------|
| Cognitive Science Philosophy Options | | |

| | | |
|----------|------------------------------|------|
| PHIL 111 | What is Philosophy? | 6.00 |
| PHIL 115 | Fundamental Questions | 6.00 |
| PHIL 250 | Epistemology and Metaphysics | 6.00 |
| PHIL 251 | Metaphysics | 3.00 |
| PHIL 252 | Epistemology | 3.00 |
| PHIL 261 | Philosophy of Mathematics | 3.00 |
| PHIL 270 | Minds and Machines | 3.00 |
| PHIL 311 | Philosophy of Psychology | 3.00 |
| PHIL 351 | Philosophy of Mind | 3.00 |

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|----------|------------------------------------|------|
| PHIL 359 | Philosophy of Language | 3.00 |
| PHIL 381 | Philosophy of the Natural Sciences | 3.00 |
| PHIL 451 | Current Issues in Epistemology | 3.00 |
| PHIL 452 | Current Issues in Metaphysics I | 3.00 |
| PHIL 464 | Topics in Philosophy of Mind | 3.00 |

COGS_Psychology

| Code | Title | Units |
|---|-------|-------|
| Cognitive Science Psychology Options | | |

| | | |
|----------|--|------|
| PSYC 100 | Principles of Psychology | 6.00 |
| PSYC 203 | Research Methods in Psychology | 3.00 |
| PSYC 251 | Developmental Psychology | 3.00 |
| PSYC 271 | Brain and Behaviour I | 3.00 |
| PSYC 305 | Introduction to Comparative Cognition | 3.00 |
| PSYC 320 | Selected Topics in Cognitive Neuroscience | 3.00 |
| PSYC 321 | Psycholinguistics | 3.00 |
| PSYC 323 | Laboratory in Attention | 3.00 |
| PSYC 350 | Selected Topics in Developmental Psychology | 3.00 |
| PSYC 352 | Cognitive and Language Development | 3.00 |
| PSYC 353 | Atypical Development | 3.00 |
| PSYC 355 | Comparative Cognition: Cognitive Origins Laboratory | 3.00 |
| PSYC 365 | Selected Topics in Behavioural Neuroscience | 3.00 |
| PSYC 370 | Brain and Behaviour II | 3.00 |
| PSYC 420 | Advanced Topics in Cognitive Psychology | 3.00 |
| PSYC 422 | Advanced Topics in Attention | 3.00 |
| PSYC 423 | Driving, Deepfakes, and Disinformation: Applications of Visual Cognition | 3.00 |
| PSYC 442 | Culture and Cognition | 3.00 |
| PSYC 452 | Developmental Psycholinguistics | 3.00 |

NSCI_Options

| Code | Title | Units |
|-----------------------------|-------|-------|
| Neuroscience Options | | |

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| NSCI 323 | Foundational Neuroscience | 3.00 |
| NSCI 324 | Systems Neuroscience | 3.00 |
| NSCI 401 | Introduction to Theoretical Neuroscience | 3.00 |

STAT_Options

| Code | Title | Units |
|---------------------------------|-------|-------|
| Statistic Course Options | | |

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|----------|---------------------------------------|------|
| BIOL 243 | Introduction to Statistics | 3.00 |
| CHEE 209 | Analysis of Process Data ¹ | 3.50 |
| COMM 162 | Managerial Statistics | 3.00 |
| ECON 250 | Introduction to Statistics | 3.00 |



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|----------|----------------------------|------|
| 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 |

¹ Note that the unit weighting system in Smith Engineering differs from that in the Faculty of Arts and Science. Therefore, upon acceptance of any course from Smith Engineering, the unit weighting towards Arts and Science degree requirements shall be at the discretion of the Associate Dean (Academic). Usually, a one-term course shall count as 3.00 units and a two-term course as 6.00 units.