## Cognitive Science

### Program Requirements

#### Master of Cognitive Science (5.0 credits)

**Requirements - Research Project option (5.0 credits)**

1. 0.5 credit in:
   - CGSC 5100 [0.5] Issues in Cognitive Science

2. 0.5 credit in:
   - CGSC 5101 [0.5] Experimental Methods and Statistics
   - or CGSC 5103 [0.5] Formal Methods

3. 1.5 credits from:
   - CGSC 5001 [0.5] Cognition and Artificial Cognitive Systems
   - CGSC 5002 [0.5] Experimental Research in Cognition
   - CGSC 5003 [0.5] Cognition and Language
   - CGSC 5004 [0.5] Cognition and Conceptual Issues
   - CGSC 5005 [0.5] Cognition and Neuroscience

4. 1.0 credit in:
   - CGSC 5908 [1.0] Research Project

5. 1.5 credits in cognitive science or other courses, selected with approval of the project supervisor and graduate supervisor.

6. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year)

**Total Credits** 5.0

**Requirements - Thesis option (5.0 credits)**

1. 0.5 credit in:
   - CGSC 5100 [0.5] Issues in Cognitive Science

2. 0.5 credit in:
   - CGSC 5101 [0.5] Experimental Methods and Statistics
   - or CGSC 5103 [0.5] Formal Methods

3. 1.5 credits in cognitive science or other courses, from at least two different cognitive disciplines, selected with approval of the thesis supervisor and the graduate supervisor.

4. 2.5 credits in:

   5. Students are required to present their research at the Cognitive Science Student Spring Conference (in either year).

**Total Credits** 5.0

### Guidelines for Completion of the M.Cog.Sc. Degree

The degree is expected to take no more than six terms to complete. Students will enroll in courses while also conducting research.

#### Master of Cognitive Science with Specialization in Data Science (5.0 credits)

**Requirements - Thesis Option (5.0 credits)**

1. 0.5 credit in:
   - DATA 5000 [0.5] Data Science Seminar

2. 0.5 credit in:
   - CGSC 5100 [0.5] Issues in Cognitive Science

3. 0.5 credit in:
   - CGSC 5001 [0.5] Cognition and Artificial Cognitive Systems
   - CGSC 5002 [0.5] Experimental Research in Cognition
   - CGSC 5003 [0.5] Cognition and Language
   - CGSC 5004 [0.5] Cognition and Conceptual Issues
   - CGSC 5005 [0.5] Cognition and Neuroscience

4. 1.0 credit in CGSC or other approved courses selected in consultation with the graduate supervisor.

5. 1.0 credit in:
   - CGSC 5908 [1.0] Research Project (Project must be approved as fulfilling the data science requirement and be supervised by a faculty member working in a data science related field.)

6. Preparation of research for presentation at the Cognitive Science Spring Conference.

**Total Credits** 5.0

#### Ph.D. Cognitive Science (10.0 credits)

**Requirements:**

1. 0.5 credit in:
   - CGSC 5100 [0.5] Issues in Cognitive Science

2. 0.5 credit in:
   - CGSC 6801 [0.5] Proseminar in Cognitive Science

3. 0.5 credit in:
   - CGSC 6002 [0.5] Methodology Rotation I

4. 0.5 credit in:
   - CGSC 6003 [0.5] Methodology Rotation II

5. 6.5 credits in:
   - CGSC 6909 [6.5] Ph.D. Thesis
6. **1.5 credits in** cognition from two different cognitive disciplines, including at least 0.5 credit in cognitive neuroscience if not already completed.

**Total Credits**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CGSC 6002 [0.5]</td>
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<td>CGSC 6003 [0.5]</td>
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<td>CGSC 6909 [6.5]</td>
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<tr>
<td><strong>Ph.D. Thesis</strong></td>
<td><strong>10.0</strong></td>
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**Methodology Rotation**
The methodology rotation consists of two parts. Students spend one term in each of two laboratories or other research venues using two different methods for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific).

The purpose of the methodology rotation is to give students sufficient background in two different approaches to cognition to allow the student to use work from these approaches in his or her own research.

Assignments will be as specified by each rotation supervisor. Each rotation will be graded separately by the rotation supervisor. Passed with Distinction (PWD)/Satisfactory(S)/Unsatisfactory (U). In the event of a grade of U the student may repeat a rotation only once.

**Prospectus, Prospectus Defence, Thesis and Defence**

When a student is ready to begin work on a thesis, the Graduate Supervisor approves a thesis committee which includes the thesis supervisor or co-supervisors, plus at least two additional members. The committee should include members from at least two different approaches to cognition. The Director of the Institute of Cognitive Science is an ex officio member of the committee. Preparation of the thesis has two stages. First the student prepares a prospectus, which is examined at a prospectus defence on the subject matter of the thesis. Then the student prepares the thesis, which is defended at a public oral examination.

**Prospectus**
The prospectus must describe the proposed research and review the relevant literature in the field of the research. The prospectus must be sufficiently detailed to allow the examining committee to judge the likelihood of a successful thesis ensuing from it. Preparation of the prospectus will follow the practices common in the Thesis Supervisor's area of research. The committee may add further requirements.

**Prospectus Defence**
The prospectus is examined orally by a board consisting of the members of the thesis committee. The committee may add further examiners. The examination is a comprehensive examination of the thesis subject matter, to ensure that the student has a sound understanding of the context of his or her proposed research, and of appropriate methods, ethical considerations, and so on. The examining board will also consider the research that the student is proposing, which must be of sufficiently high quality and described in sufficient detail to allow the committee to judge whether, if completed successfully, it would be likely that the student would be awarded the degree. Should a student's prospectus be unacceptable, or the student fails the prospectus defence, the student may resubmit the prospectus and be reexamined once.

**Thesis**
The completed thesis is examined orally by an examining board consisting at minimum of the thesis committee, an examiner at arm's length to the project from within Carleton University (the internal examiner) and an examiner from another university who is at arm's length to the student and the committee and who is a recognized expert in the area of the thesis (the external examiner). All university regulations apply.

**Residence Requirement**
All Ph.D. candidates must be registered full-time in a minimum of six terms to satisfy the residence requirement.

**Language Requirement**
A second language is required when relevant to the student's program of research. Whether a second language is required and the level of proficiency expected is determined at the time of admission, based on the student's description of his or her proposed area of thesis research.

**Milestones (to be completed by the end of the specified year)**

**First year:** Completion of CGSC 6801* and CGSC 5100, and elective coursework. Spring Conference presentation.

**Second year:** Completion of remaining program coursework and the methodology rotations (CGSC 6002) and (CGSC 6003). Begin work on Prospectus. Spring Conference presentation.

**Third year:** Prospectus defence. Continue to work on thesis CGSC 6909 Ph.D. Thesis. Spring Conference Presentation.

**4th Year:** Thesis completion (CGSC 6909 Ph.D. Thesis) and defence.

*Please note CGSC 6801 is offered in alternate years. Course to be completed in second year if it is not offered in the first year of program.
Admission
The requirement for admission into the M.Cog.Sc. program is an Honours degree with an average of at least B+.

Applicants whose first language is not English must demonstrate a fluent knowledge of English. This is normally done in one of the following ways:

1. An overall score of 70 on the Canadian Academic English Language (CAEL) Assessment
2. A TOEFL score of 230 CBT (computer-based test) or 580; or 86 IBT overall with a minimum score in each component of writing (22), speaking (22), reading (20) and listening (20).
3. An overall IELTS score of 6.5, with a minimum of 6.0 in each band score; or
4. An acceptable certification that the language of instruction in your most recently completed undergraduate or graduate degree was English.

To be admitted, a candidate must submit a description of his or her research interests in the area of Cognitive Science.

Admission
• Master's degree (or the equivalent) from one of the participating disciplines. An average of at least A- in courses in cognition is normally required.
• Applicants with a master's degree in one of the participating disciplines are normally admitted to a 10.0-credit program.
• Students eligible for admission to the 10.0-credit program but with deficiencies may be required to take additional courses or may be directed to apply for the M. Cog.Sc.
• An overall score of 70 on the Canadian Academic English Language (CAEL) Assessment
• A TOEFL score of 230 CBT (computer-based test) or 580; or 86 IBT overall with a minimum score in each component of writing (22), speaking (22), reading (20) and listening (20).
• An overall IELTS score of 6.5, with a minimum of 6.0 in each band score; or
• An acceptable certification that the language of instruction in your most recently completed undergraduate or graduate degree was English.

• To be admitted, a candidate must submit a description of his or her research interests in the area of Cognitive Science.

Cognitive Science (CGSC) Courses
CGSC 5001 [0.5 credit]
Cognition and Artificial Cognitive Systems
An introduction to the contribution of artificial intelligence and computer modeling of cognitive processes to cognitive science.

CGSC 5002 [0.5 credit]
Experimental Research in Cognition
An introduction to the contribution of experimental psychology and neuroscience to cognitive science.

CGSC 5003 [0.5 credit]
Cognition and Language
An introduction to the contribution of theoretical linguistics and linguistic research to cognitive science.

CGSC 5004 [0.5 credit]
Cognition and Conceptual Issues
An introduction to the contribution of philosophy of mind, philosophy of language, and other conceptual investigations to cognitive science.

CGSC 5005 [0.5 credit]
Cognition and Neuroscience
An introduction to the contribution of neuroscience to cognitive science.

CGSC 5100 [0.5 credit]
Issues in Cognitive Science
A survey of the central problems and issues of cognitive research to start the process of acquiring the interdisciplinary breadth required to understand research in cognitive science.

CGSC 5101 [0.5 credit]
Experimental Methods and Statistics
An introduction to the design of experiments and the statistics needed to interpret data in cognitive science. Also offered at the undergraduate level, with different requirements, as HCIN 5400, for which additional credit is precluded.

CGSC 5103 [0.5 credit]
Formal Methods
The class introduces students to various formal methods relevant to cognitive science, possibly including (but not limited to) formal logic, the theory of computation, probability theory, decision theory. Precludes additional credit for CGSC 5102. Prerequisite(s): permission of the department. Seminar.

CGSC 5106 [0.5 credit]
Cognitive Modelling for Cognitive Science
Introduction to the field of cognitive modelling. Different modelling systems and how to evaluate them against human data; how to create cognitive models using the ACT-R cognitive architecture. Precludes additional credit for CGSC 6004 (no longer offered).
CGSC 5303 [0.5 credit]
Linguistic Analysis, Culture and Cognition
Universals of language from a cross-cultural perspective. Study of lesser-known languages leading to critical understanding of universal human concepts and communication practices in culture-specific configurations. Cross-linguistic analysis as a means to general understanding of diversity and universality in human cognition.

CGSC 5901 [0.5 credit]
Special Topics in Cognitive Science
Seminar on current, important issues related to Cognition and Neuroscience, Philosophy, Computer Science, Linguistics and/or Psychology. Topics will vary from year to year.

CGSC 5907 [0.5 credit]
Independent Research
Permission to register and approval of research plan must be obtained from the graduate supervisor. A final research report must be filed in the departmental office prior to submission of course grade. The course may be repeated for credit.

CGSC 5908 [1.0 credit]
Research Project
Students may enroll in multiple sections of this course (as necessary) to complete their Research credits.

CGSC 5909 [2.5 credits]
M. Cog. Thesis

CGSC 6002 [0.5 credit]
Methodology Rotation I
Students spend one term in a laboratory or other research venue using a method for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific). Assignments will be as specified by each rotation supervisor.

CGSC 6003 [0.5 credit]
Methodology Rotation II
Students spend one term in a laboratory or other research venue using a different method for studying cognition (behavioural, linguistic-theoretic, computational, conceptual, neuroscientific). Assignments will be as specified by each rotation supervisor.

CGSC 6501 [0.5 credit]
Special Topics in Cognitive Science
Seminar course on a topic of interest to students in Cognitive Science. Topics will vary from year to year. Lectures three hours per week.

CGSC 6801 [0.5 credit]
Proseminar in Cognitive Science
A survey of the central problems and issues of natural and artificial cognition and a brief examination of contemporary neuroscience. Compulsory in the first year of registration. Precludes additional credit for CGSC 6801 (no longer offered).

CGSC 6901 [0.5 credit]
Directed Studies in Cognitive Science I

CGSC 6902 [0.5 credit]
Directed Studies in Cognitive Science II

CGSC 6909 [6.5 credits]
Ph.D. Thesis

Summer session: some of the courses listed in this Calendar are offered during the summer. Hours and scheduling for summer session courses will differ significantly from those reported in the fall/winter Calendar. To determine the scheduling and hours for summer session classes, consult the class schedule at central.carleton.ca

Not all courses listed are offered in a given year. For an up-to-date statement of course offerings for the current session and to determine the term of offering, consult the class schedule at central.carleton.ca