COGNITIVE SCIENCE, PHD

https://cogsci.jhu.edu/graduate/phd-program/

The Department of Cognitive Science's five-year PhD program has a primary goal to train a new generation of cognitive scientists who can meld multiple existing disciplines into a new, genuinely integrated science of the mind/brain. A secondary goal is to train graduates who are competitive for positions in traditional disciplinary departments at research universities. Because many of the most exciting research developments recognized within the related traditional disciplines arise through interdisciplinary research, the training in cognitive science offered by our department can promote a graduate's attractiveness as a candidate for positions in a variety of departments.

The training we offer in cognitive science is highly interdisciplinary, strongly theoretically oriented, and integrated to an extent only possible within a department of cognitive science. In addition, PhD students are provided extensive experience integrating the theory and methods of diverse cognitive sub-disciplines through specially designed integrative courses and regular seminars involving the entire department.

Our program can offer such a breadth and depth of training because, unlike departments in the allied disciplines, in a department of cognitive science, 100% of graduate training can be focused on cognition. Integrated training across the spectrum of cognitive methods allows students to emerge from graduate school as professional cognitive scientists.

Financial Support

The department provides competitive levels of funding for PhD students. This funding includes full tuition, student health insurance, and a 12-month stipend. PhD students are also given access to an annual travel/research allowance for eligible expenses. Assuming satisfactory progress toward the Ph.D. degree and continued funding levels, PhD students may expect this support to continue for five years (10 semesters).

In return, graduate students are expected to dedicate their full time and attention to coursework, teaching, research, etc. within the Department of Cognitive Science. Additionally, they are expected to apply for any outside funding (e.g., NSF fellowship, etc.) for which they are eligible as early as their first semester. Students who receive fellowships or grants are to report this information to the Chair and administrative staff of the department to work out an overall package.

Program Requirements

The Department of Cognitive Science's PhD requirements are designed to meet the goals below.

- **Depth**: Students become expert in their primary area of research interest and are prepared so that they will be competitive for academic positions in one of the traditional disciplines. Students take several advanced courses or participate in seminars/lab meetings that the student, in conjunction with their advisory committee, determines to be important for achieving expertise in a chosen research area and marketplace competitiveness.

  - In the specialized **Computational Cognitive Science Track** the students become expert in the area of CCS and are prepared so that they will be competitive in the job market. Students take several advanced courses or participate in seminars/lab meetings that the student, in conjunction with their advisory committee, determines to be important for achieving expertise in CCS research and marketplace competitiveness.

  - PhD students are also given access to an annual travel/research allowance for eligible expenses. Assuming satisfactory progress toward the Ph.D. degree and continued funding levels, PhD students may expect this support to continue for five years (10 semesters).

  - **Integration**: Students learn to integrate theory and method across sub-disciplines through a specially designed integrative course.

  - **Research Ethics**: Students complete a research ethics course, which they are encouraged to take in their first year.

  - **Professional Development**: Students attend a spring seminar devoted to professional development.

  - **Training in Teaching**: Students TA three to five semesters (depending upon external funding). Students are not typically expected to TA in their first semester or in the last two semesters of residency (5th year).

  - **Research Papers and Dissertation**: Students produce two research papers prior to completing a dissertation. These papers, which are due November 1st of the second year and May 1st of the third year, draw on two different research methodologies. These two research papers are typically presented at conferences and often lead to separate journal publications.

General PhD Track Requirements

Courses may not be double-counted to fulfill more than one degree requirement. Students are expected to attend the Cognitive Science Colloquium Series and Brown Bag Series in addition to completing course requirements.

The Computational Cognitive Science (CCS) Track (p. 2) within the PhD program in Cognitive Science has requirements that differ somewhat from the program outlined immediately below.

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<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Breadth</td>
<td>One breadth course may be audited in consultation with your adviser.</td>
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<tr>
<td>AS.200.657</td>
<td>Advanced Statistical Methods (to be completed early in the program, preferably the first semester)</td>
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<tr>
<td>AS.050.639</td>
<td>Cognitive Development</td>
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<tr>
<td>AS.050.672</td>
<td>Foundations of Neural Network Theory</td>
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Select one of the following or an approved course on Programming (C++, Java, etc.), or equivalent (e.g. computational linguistics):

- AS.050.671 Bayesian Inference
- AS.050.660 Computational Psycholinguistics

Linguistics

- AS.050.670 Mathematical Models of Language

Select one of the following:

- AS.050.617 Semantics I
- AS.050.620 Syntax I
- AS.050.625 Phonology I

Integration

- AS.050.626 Foundations of Cognitive Science

Research Ethics

- AS.360.625 Responsible Conduct of Research (encouraged to complete in first year)

Depth: Area of Focus in Computation CogSci

6-8 courses selected in conjunction with advisor(s) to achieve depth and expertise in CCS. Lab meetings may be used to fulfill this requirement. Following are examples of courses that apply:

- AS.050.660 Computational Psycholinguistics
- AS.050.675 Probabilistic Models of the Visual Cortex
- EN.601.665 Natural Language Processing
- EN.601.769 Events Semantics in Theory and Practice
- EN.601.783 Vision as Bayesian Inference

Professional Development

- AS.050.860 Professional Seminar in Cognitive Science (two mini sessions or one semester-long course)

Teaching Assignments

- AS.050.849 Teaching Practicum (x3-5 semesters depending on external funding.)

Two Research Papers

Dissertation Proposal

Graduate Board Oral Exam (Dissertation Defense)

Computational Cognitive Science Track Requirements

Students in this track will obtain a depth of focus in computational coursework, not achieved in the PhD in Cognitive Science general requirements. Accordingly, some of the breadth coursework has been replaced with computational courses, while aiming to retain the spirit of the breadth requirement.

Courses may not be double-counted to fulfill more than one degree requirement. Students are expected to attend the Cognitive Science Colloquium Series and Brown Bag Series in addition to completing course requirements.

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<tr>
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<tbody>
<tr>
<td>AS.050.670</td>
<td>Mathematical Models of Language</td>
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<tr>
<td>AS.050.671</td>
<td>Bayesian Inference</td>
</tr>
<tr>
<td>AS.050.672</td>
<td>Foundations of Neural Network Theory</td>
</tr>
<tr>
<td>EN.601.675</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>AS.050.626</td>
<td>Foundations of Cognitive Science</td>
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</tbody>
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Breadth

3-4 courses in the Department of Cognitive Science that collectively develop sophistication in theoretical and (human) experimental approaches to cognitive science.

At least one course must be in each language and vision.

Basic Computation

Three courses. Following are examples of courses that apply:

- AS.050.670 Mathematical Models of Language
- AS.050.671 Bayesian Inference
- AS.050.672 Foundations of Neural Network Theory
- EN.601.675 Machine Learning