

# COMPUTER SCIENCE AND LEARNING SCIENCES PHD

## Degree Requirements

The following requirements are in addition to, or further elaborate upon, those requirements outlined in The Graduate School Policy Guide (<https://catalogs.northwestern.edu/tgs/academic-policies-procedures/>).

### Course Requirements

Students are expected to take courses during the first two years of their graduate career. Every student is required to take courses that fulfill specific requirements for breadth and depth in computer science and learning sciences. Students are also expected to take coursework and continue reading beyond these specific requirements. In particular, students should take coursework that is relevant to their research.

#### Learning Sciences Foundational Courses (4 courses)

Course	Title
LRN_SCI 401-0 or COMP_SCI 371-0	Knowledge Representation for the Learning Sciences Knowledge Representation and Reasoning
LRN_SCI 402-0	Social Dimensions of Teaching & Learning
LRN_SCI 403-0	Foundations of the Learning Science
LRN_SCI 426-0	Design of Technological Tools for Thinking and Learning

#### Learning Sciences Approved Methods Courses (choose 3 courses)

Course	Title
LRN_SCI 410-0	Quantitative Methods I: Probability and Statistics
LRN_SCI 451-0	Topics in Learning Sciences (Quantitative Methods II regression analysis)
LRN_SCI 451-0	Topics in Learning Sciences (Discourse Analysis)
LRN_SCI 415-0	Field Methods
LRN_SCI 416-0	Advanced Qualitative Methods
LRN_SCI 451-0	Topics in Learning Sciences (Computational Methods)
COMP_SCI 472-0/ LRN_SCI 451-0	Designing and Constructing Models with Multi-Agent Languages

#### Computer Science Foundational Courses (at least 5 courses)

Students will declare a Computer Science doctoral degree track (e.g., Graphics and Interactive Media or AI/ML) as outlined in the Computer Science graduate study manual ([https://www.mccormick.northwestern.edu/computer-science/documents/2021-20.cs.gradstudymanual\\_v271.pdf](https://www.mccormick.northwestern.edu/computer-science/documents/2021-20.cs.gradstudymanual_v271.pdf)) (section 4). Students should take at least 5 courses in CS that are approved for graduate credit (all 300 and 400-level courses). Students should consult the qualifying procedures for their track to ensure they have the necessary background. In general, we require a breadth of experience in all of the following areas:

- Programming (comparable to CS 111+211+214)
- Human Computer Interaction
- AI, Machine Learning, or Cognitive Systems
- Systems (1 of the following)
  - Operating systems
  - Databases
  - Computer architecture
  - Networking

- Programming languages
- Computer Graphics
- Theory (1 of the following)
  - Fundamental algorithms
  - Computing and complexity theory

We accept both Northwestern courses and prior coursework at other institutions to satisfy these requirements.

#### Breadth Courses (3 courses)

Three additional courses are required within years 2 and 3. Any non-required, graduate-level course in any school or department can be used to fulfill the breadth requirement.

#### Responsible Conduct of Research Training

Students should complete the McCormick Responsible Conduct of Research training course: GEN\_ENG 519.

#### Other Degree Requirements

- *Second-year qualifying exams*
- *Second-year independent research project*
- *PhD Prospectus*
- *PhD Dissertation*