

Cognitive Science in Education

Department of Human Development

Ph.D. PROGRAM

Major Code: COGS

Teachers College, Columbia University
2024 - 2025

In the Cognitive Science in Education Program, students examine the cognitive mechanisms that underlie learning and thinking in school and non-school settings. The program trains students in basic theories of human cognition, the practice and interpretation of empirical cognitive and developmental research, as well as how to use research to improve educational practices and develop innovative methods built around new technologies. Studies in cognitive, developmental, and educational psychology and computer science provide students with a valuable perspective on cognition and learning.

The curriculum and program requirements are designed to prepare graduates for careers in several possible settings. For the doctoral programs, work settings after graduation might include: research organizations, or universities seeking faculty in cognitive psychology, educational psychology, educational technology, reading, and learning analytics.

Students in the Cognitive Science in Education Program begin by taking a set of core background courses, then pursue one of three areas of focus: Foundations of Cognition and Learning, Applications, and Intelligent Technologies.

In addition, each student registers for research practicum seminars during which they complete a substantive project as a culminating experience for that degree. Choice of advanced courses and research seminars should be shaped by the student's area of focus, as described below. Students whose interests do not fit one of these tracks may design their own area of focus, in consultation with their advisor.

Doctor of Philosophy-75 points

Required Courses (9 points):

- HUDK 4029 Human cognition and learning (3)
- HUDK 4080 Educational psychology (3)
- HUDK 5023 Cognitive development (3)

Statistics (12 points):

Optional: HUDM 4120 Basic concepts in statistics (3) This course is not recommended for those who have taken undergraduate statistics.

Required:

- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)
- HUDM 6122 Multivariate analysis (3)

Specialized Courses (minimum of 15 points): Selected in consultation with an advisor and focusing on **one** of the following areas of focus:

I. Foundations of Cognition and Learning

- HUDK 4015 Psychology of thinking (3)
- HUDK 4027 Development of mathematical thinking (3)
- HUDK 4050 Core methods in educational data mining (3)
- HUDK 4051 Learning analytics: process and theory (3)
- HUDK 4052 Data, Learning, and Society (3)
- HUDK 4054 Managing education data (3)
- HUDK 5020 Development of creativity (3)
- HUDK 5024 Language development (2-3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5029 Personality development and socialization across the lifespan (3)
- HUDK 5030 Visual explanations (3)
- HUDM 5058 Choice and decision making (3)
- HBSK 5096 Psychology of memory (3)
- HUDK 5042 Motivation in education (3)
- HUDK 5053 Feature engineering studio (3)
- HUDK 5063 Cognitive development beyond childhood (3)
- HUDK 5120 Development of creativity: the case study method (3)
- HUDK 5125 Cross-cultural psychology (3)

II. Applications

- HUDK 4015 Psychology of thinking (3)
- HUDK 4027 Development of mathematical thinking (3)
- HUDK 4035 Technology and human development (3)
- HUDK 4031 Data, testing, and meritocracy (3)
- HUDK 5024 Language development (3)
- HUDK 5035 Psychology of media (3)
- HUDK 5042 Motivation in education (3)
- HUDK 5063 Cognitive development beyond childhood (3)
- HUDK 5090 Psychology of language and reading (3)

- HUDK 5100 Supervised research and practice (1-6)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- EDPS 4021 Sociology of education (3)
- HBSK 4074 Reading comprehension strategies and study skills (3)
- ORL 5522 Evaluation methods I (3)

III. Intelligent Technologies:

- HUDK 4011 Networked and Online learning (3)
- HUDK 4015 Psychology of thinking (3)
- HUDK 4021 Developmental psychology – infancy (2-3)
- HUDK 4022 Developmental psychology – childhood (2-3)
- HUDK 4023 Developmental psychology – adolescence (2-3)
- HUDK 4025 Cognition of handheld devices (3)
- HUDK 4029 Cognition and learning (3)
- HUDK 4035 Technology and human development (3)
- HUDK 4040 Social media and users (3)
- HUDK 4050 Core methods in educational data mining (3)
- HUDK 4051 Learning analytics: Process and theory (3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5035 Psychology of media (3)
- HUDK 5036 Psychology of children’s television (3)
- HUDK 5063 Cognitive development beyond childhood (3)
- HUDK 5120 Development of creativity: the case study method (3)
- HUDK 5197 Psychology of eLearning in business and industry (3)
- HUDK 5037 Psychology of children’s television (3)
- HUDK 5063 Cognitive development beyond childhood (3)
- MSTU 4039 Video games in education (3)
- MSTU 5000 Possibility of virtual worlds (3)
- ORLD 4015 How adults learn (3)
- ORLJ 4005 Organizational psychology (3)

Research Apprenticeship (9 points):

Three or more semesters in a research practicum:

HUDK 6539 Research practicum in educational psychology, cognition, and learning (1-3), taken over multiple semesters for a total of 9 points. The first 3 points Research Practicum has to be taken in the Spring term of the first year. The student needs to submit a report of participation in a research study by the end of that Spring term.

Flexible Course (3 points)

In consultation with a faculty advisor the student can choose to take either another 3 points of Research Practicum (HUDK 6539) or another 3 points of Specialized Course.

Special Seminars (minimum of 5 points):

- HUD 6500 Proseminar in Human Development (3 points), taken during the Fall term of the first year
- HUDK 7502 Dissertation seminar (1-3), taken two semesters for minimum of 1 pt each
- HUDK 8901 Dissertation Advisement (0), taken after completion of HUDK 7502 and until registration for TI 8900
- TI 8900 PhD Dissertation defense

Breadth/Foundation Courses (12 Points):

One course (minimum of 3 points) in each of the 4 following areas:

1. Biological Basis of Behavior:

- BBS 5068-5069 Brain and behavior I and II (combined for 3 points)
- BBSN 4000 Cognitive neuroscience
- BBSN 5033 Human clinical neuropsychology
- MSTC 5000 Neurocognitive models of information processing

2. Cognitive Basis of Behavior:

- HBSK 5096 Psychology of memory
- HUDK 4015 Psychology of thinking
- HUDK 5025 Spatial thinking
- HUDK 5090 Psychology of language and reading

3. Social Cultural Factors and Individual Differences:

- CCPX 5034 Child psychopathology
- HBSK 5031 Family as a context for child development
- HUDK 5029 Personality development and socialization across the lifespan
- HUDK 5040 Development and psychopathology: atypical contexts and populations
- HUDK 5121 Personality development and socialization in childhood
- HUDK 5125 Cross-cultural psychology
- ORLJ 5017 Small group intervention: theory and method
- ORLJ 5540 Pro-seminar in social and organizational psychology

4. Measurement:

- HUDM 5059 Psychological measurement (3)

5. Please note: Courses used to fill Breadth/Foundation course requirements may not be used to fulfill requirements in another area.

Non-departmental Courses (minimum of 8 points):

At least three courses outside the department and selected in consultation with an advisor.

Additional Requirements:

- Two approved papers: an empirical study and an integrative research literature survey
- Successful performance on the Certification Examination
- Approved dissertation

M.Phil. Degree:

The M. Phil is an *en passant* degree awarded to those nearing the completion of the Ph.D. degree. The student contacts the Office of Doctoral Studies to file for award of the degree.

To receive the M. Phil., the student must satisfactorily complete the following requirements:

1. File an approved "Program Plan of Study" with the Office of Doctoral Studies
2. Complete at least six courses with evaluative grades under Teachers College registration
3. Pass the Certification Examination
4. Complete an approved empirical research paper
5. Complete an approved theoretical research paper
6. Complete all 75 points of coursework required for the degree.

Please note: Students must submit a copy of their "Program Plan of Study" and both research papers to the Department of Human Development for record keeping purposes.

Transfer Credit:

Relevant graduate courses with earned grades of B or higher taken in other recognized graduate schools to a maximum of 30 points, or 45 points if completed in another Faculty of Columbia University, may be accepted toward the minimum point requirement for the Ph.D. degree. For more information, please contact the Transfer Credit Coordinator in the Registrar's Office.

Satisfactory Progress:

Students are expected to make satisfactory progress toward the completion of degree requirements. If satisfactory progress is not maintained, a student may be dismissed from the program. Where there are concerns about satisfactory progress, students will be informed by the program faculty.