

**TEACHERS COLLEGE**  

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**COLUMBIA UNIVERSITY**

**ACADEMIC CATALOG 2015-2016**

**DEPARTMENT OF HUMAN DEVELOPMENT**

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**PROGRAMS**

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# Human Development

## Contact Information

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## Mission

The Department of Human Development is devoted to promoting an understanding of human development in families, schools, and institutions across the lifespan. The department provides social scientists and educators with theories, empirical methods, and analytical tools for understanding and conducting research in human development and cognition and for helping solve educational and psychological problems.

# Cognitive Studies in Education

Department of - Human Development

## Contact Information

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**Coordinator:** Professor John B. Black

## Program Description

In Studies in Education, 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, and 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 master's programs, these settings include:

- Publishers and software companies looking for people with knowledge of cognition and development and experience in instructional design.
- Research organizations seeking people to conduct basic research and work on instructional applications of computers and related technologies.

For the doctoral programs, work settings after graduation might include: research organizations or universities seeking faculty in cognitive psychology, educational psychology, educational technology, and reading.

Students in the Cognitive Studies in Education Program begin by taking a set of core background courses, then pursue one of six areas of focus: Cognition and Learning, Intelligent Technologies, Reading Research, Cognitive Studies of Educational Practice, Creativity and Cognition, or Learning Analytics. Students beyond the M.A. level take more advanced courses, including a statistics sequence.

In addition, students register 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 students' 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.

- **Cognition and Learning:** The area of focus in Cognition and Learning is designed for students interested in theories of human cognition and learning and experimental approaches to learning, memory, language, reasoning, and problem solving. The culminating experience for master's students in this concentration is to conduct an empirical research study in the area of cognition or learning.

- **Intelligent Technologies:** The Intelligent Technologies area of focus offers a program of study for students whose interests include developing cognitive science-based theoretical frameworks for informing the design of educational technology, as well as for students wishing to create educational applications that serve as test beds for such theoretical frameworks. By offering this area of focus, the Program in Cognitive Studies in Education recognizes the importance of computational and allied technologies to both guide and be guided by cognitive research. Many of the courses in this area of focus are cross-listed with the programs in Communication, Computing, and Instructional Technology in the Department of Mathematics, Science and Technology. As a culminating experience, master's students in this area of focus create and evaluate an educational technology application.
- **Reading Research:** This area of focus prepares students to do basic research in reading and theory on all aspects of the psychology of reading, (e.g., basic skills, comprehension, and aesthetic response) in order to improve educational practice. Students address the connections between written and oral language and between reading and writing skills. Individual differences are also addressed, especially with respect to students with learning disabilities, adult literacy, learning from text and educational policy issues. The culminating experience for master's students is an empirical study in the area of reading.
- **Cognitive Studies of Educational Practice:** This area of focus is for students interested in understanding and facilitating the thinking and learning involved in educational activities. Students will learn about cognitive processes involved in both formal and informal education and how they are influenced by various factors, including classroom structure, teacher belief systems, student motivation, and educational policy. The focus on understanding cognitive processes and development is designed to help prospective and practicing teachers and other educators improve educational practice. The culminating experience for master's students is an empirical study of cognition in a classroom setting.
- **Creativity and Cognition:** Focusing on the importance, development, and influence of creativity, Creativity and Cognition is designed for those interested in creative problem solving and multi-modal thinking as it affects the classroom, curriculum development, community organizations, therapeutic settings, and business. The culminating experience for master's students is an empirical study in the area of creativity.
- **Learning Analytics:** This area of focus is for students interested in the analysis of large-scale educational data. In this area of focus, you will learn key learning analytics methodologies in technical detail and learn how to apply them to real-world problems. You will learn how to use algorithms and tools appropriately and effectively and learn about relevant policy, legal, and ethical issues involved in conducting analytics on educational data. The culminating experience for master's students is an empirical analysis of educational data using analytics methods.

## Degree Summary

### Cognitive Studies in Education (COGN)

- Master of Arts (M.A.)
- Doctor of Education (Ed.D.)
- Doctor of Philosophy (Ph.D.)

### Educational Psychology: Cognitive, Behavioral, and Developmental Analysis (COGF)

- Master of Education (Ed.M.)

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

# Degree Requirements

## Master of Arts

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### Master of Arts

MASTER OF ARTS-32 POINTS (Code: COGN)

Core Courses (9 points):

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

Statistics/Research Design (3 points):

At least one of the following:

- HUD 4120 Methods of empirical research (3)
- HUDM 4120 Basic concepts in statistics (3)
- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)

Research Practicum (3 points):

- HUDK 5324 Research work practicum (2-3) or by permission
- HUDK 6539 Research practicum in educational psychology, cognition, and learning (1-3)

Breadth Requirement (6-9 points): (each course must be for at least 2 points)

A minimum of three Teachers College courses outside of HUDK are selected in consultation with an advisor:

- A&HF 4090 Philosophies of education (3)
- A&HL 4000 Introduction to linguistics (3)
- BBS 5068-5069 Brain and behavior I and II (1-2 each; total of 3)
- BBSQ 4040 Introduction to communication disorders (2-3)
- ITSF 4010 Cultural and social bases of education (3-4)
- MSTU 4036 Hypermedia and education (2-3)
- MSTU 4133 Cognition and computers (3)
- ORLJ 4005 Organizational psychology (3)

Specialized Courses (8-11 points):

Selected in consultation with an advisor, and focusing on one of the following areas:

Cognition and Learning:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4027 Development of mathematical thinking (3)
- HUDK 5024 Language development (2-3)
- HUDK 5025 Spatial thinking (3)

- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- HUDK 6095 Critical review of current journals in psychology (3)
- HUDM 5058 Choice and decision making (3)
- HBSK 5096 The psychology of memory (3)

#### Intelligent Technologies:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4035 Technology and human development (3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- HUDK 5035 Psychology of media (3)
- HUDK 5039 Design of intelligent learning environments (3)
- HUDK 5198 Psychology of instructional systems design (2-3)
- MSTU 4031 Programming I (4)
- MSTU 4083 Instructional design of educational technology (3)
- MSTU 4133 Cognition and computers (3)
- MSTU 4134 Cognition and computers lab (1-3)

#### Reading Research:

- HUDK 5024 Language development (2-3)
- HUDK 5080 Experimental psychology: Schooling and reading (2-3)
- HUDK 5090 Psychology of language and reading (2-3)
- HUDK 6095 Critical review of current journals in psychology (3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- MSTU 4086 Text understanding and design (3)

#### Cognitive Studies of Educational Practice:

- EDPS 4021 Sociology of education (3)
- HUDK 4035 Technology and human development (3)
- Topics courses in developmental psychology (1-3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- ORL 5522 Evaluation methods I (3)

#### Creativity and Cognition:

- HUDK 5020 Development of creativity (3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5029 Personality development and socialization across the lifespan (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5120 Development of creativity: The case study method (3)
- HUDK 5125 Cross-cultural developmental psychology (3)

Note: At least 2 courses (minimum of 4 points) must be taken outside the department.

#### Integrative Project:

Varies according to selected area of focus: Cognition and Learning—an empirical cognitive research study; Intelligent Technologies—creation and evaluation of an educational technology program; Reading Research—an empirical reading research paper; Cognitive Studies of Educational Practice

—an empirical study of cognition in a classroom setting; and Creativity and Cognition—an essay or project related to creativity.

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## Master of Education

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# Master of Education

Core Courses (9 points):

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

Statistics/Research Design (minimum of 12 points):

- HUD 4120 Methods of empirical research (3)
- HUDM 4120 Basic concepts in statistics (3) (if no undergraduate statistics)
- HUDM 4122 Probability and statistical inference (3)
- HUDM 5059 Psychological measurement (3)
- HUDM 5122 Applied regression analysis (3)

Research (6 points):

- HUDK 5324 Research work practicum (2-3) or, by permission, a 6000-level research work practicum, minimum of 2 semesters.

Breadth Requirement (9 points):

To satisfy college requirements, all students must complete a minimum of three Teachers College courses (a course for this purpose is one in which at least 2 points are earned) outside of HUDK.

Must select at least two of the following:

- A&HF 4090 Philosophies of education (3)
- A&HL 4000 Introduction to linguistics (3)
- BBS 5068-5069 Brain and behavior I and II (1-2 each; total of 3)
- BBSQ 4040 Introduction to communication disorders (2-3)
- ITSF 4010 Cultural and social bases of education (3-4)
- MSTU 4008 Information technology and education (3)
- MSTU 4036 Hypermedia and education (2-3)
- MSTU 4133 Cognition and computers (3)
- ORLJ 4005 Organizational psychology (3)

Specialized Courses (24-27 points):

Selected in consultation with an advisor and focusing on one of the following areas:

Cognition and Learning:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4027 Development of mathematical thinking (3)
- HUDK 5024 Language development (2-3)



- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- Topics courses in developmental psychology (1-3)
- HUDM 5058 Choice and decision making (3)
- HBSK 5096 The psychology of memory (3)

#### Intelligent Technologies:

- HUDK 4035 Technology and human development (3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5039 Design of intelligent learning environments (3)
- HUDK 5198 Psychology of instructional systems design (2-3)
- Topics courses in developmental psychology (1-3)
- MSTU 4083 Instructional design of educational technology (3)

#### Reading Research:

- HUDK 5024 Language development (2-3)
- HUDK 5080 Experimental psychology: Schooling and reading (2-3)
- HUDK 5090 Psychology of language and reading (2-3)
- HUDK 6095 Critical review of current journals in psychology (3)
- Topics courses in developmental psychology (1-3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)

#### Cognitive Studies of Educational Practice:

- EDPS 4021 Sociology of education (3)
- HUDK 4035 Technology and human development (3)
- Topics courses in developmental psychology (1-3)
- ORL 5522 Evaluation methods I (3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- HBSK 5099 Writing interventions theory and practice (3)

Integrative Project: Varies according to selected area of focus: Cognition and Learning -- an empirical cognitive research study; Intelligent Technologies -- creation and evaluation of an educational technology program; Reading Research -- an empirical reading research paper; Cognitive Studies of Educational Practice -- an empirical study of cognition in a classroom setting.

## Doctor of Education

# Doctor of Education

Doctor of Education - 90 points

#### Core Courses (9 points):

- HUDK 4029 Human cognition and learning (3)

- HUDK 4080 Educational psychology (3)
- HUDK 5023 Cognitive development (3)

Statistical and Research Methodology (12 points):

- HUDM 4120 Basic concepts in statistics (not recommended for those with undergraduate statistics) (3)
- 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 I (3)

Specialized Courses (minimum of 30 points):

Selected in consultation with an advisor and focusing on one of the following areas:

Cognition and Learning:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4027 Development of mathematical thinking (3)
- HUDK 5024 Language development (2-3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- HUDK 6095 Critical review of current journals in psychology (3)
- HUDM 5058 Choice and decision making (3)
- HBSK 5096 The psychology of memory (3)

Intelligent Technologies:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4035 Technology and human development (3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- HUDK 5035 Psychology of media (3)
- HUDK 5039 Design of intelligent learning environments (3)
- HUDK 5198 Psychology of instructional systems design (2-3)
- MSTU 4031 Programming I (4)
- MSTU 4083 Instructional design of educational technology (3)
- MSTU 4133 Cognition and computers (3)
- MSTU 4134 Cognition and computers lab (1-3)

Reading Research:

- HUDK 5024 Language development (2-3)
- HUDK 5080 Experimental psychology: Schooling and reading (2-3)
- HUDK 5090 Psychology of language and reading (2-3)
- HUDK 6095 Critical review of current journals in psychology (3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- MSTU 4086 Text understanding and design (3)

Cognitive Studies of Educational Practice:

- EDPS 4021 Sociology of education (3)
- HUDK 4035 Technology and human development (3)
- ORL 5522 Evaluation methods I (3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)

Research Apprenticeship (6 points):

Two semesters in a research practicum:

- HUDK 6523 Seminar in cognitive development (3)
- HUDK 6539 Research practicum in educational psychology, cognition, and learning (1-3)
- HUDK 6592 Advanced research seminar: Learning and instruction (3)

Special Seminars (minimum of 9 points):

- Topics courses in developmental psychology (1-3) (taken fall and spring semesters during both first and second years)
- HUDK 7502 Dissertation seminar (1-3)
- HUDK 8901 Dissertation advisement (0)

Breadth/Foundation Courses (12 Points):

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

1. Biological Basis of Behavior:

- BBS 5068-5069 Brain and behavior I and II (1-2)
- BBSN 5033 Human clinical neuropsychology (3)
- MSTC 5000 Neurocognitive models of information processing (1-3)

2. Cognitive Basis of Behavior:

- HUDK 4015 Psychology of thinking (2-3)
- HUDK 5090 Psychology of language and reading (2-3)
- HBSK 5096 The psychology of memory (3)
- CCPX 5020 Cognition, emotion, and culture (3)

3. Social Cultural Factors and Individual Differences:

- HUDK 5029 Personality development and socialization across the lifespan (2-3)
- HUDK 5040 Development and psychopathology: Atypical contexts and populations (2-3)
- HUDK 5121 Personality development and socialization in childhood (2-3)
- HUDK 5125 Cross-cultural developmental psychology (2-3)
- CCPX 5034 Child psychopathology (3)
- HBSK 5031 Family as a context for child development (3)
- ORLJ 5017 Small group intervention: Theory and method (2-3)
- ORLJ 5106 Psychological aspects of organizations (2-3)
- ORL 5362 Group dynamics: A systems perspective (3)

- ORLJ 5540 Pro-seminar in social psychology (2-3)

#### 4. Measurement:

- HUDM 5059 Psychological measurement (3)

Non-departmental Courses (minimum of 8 points):

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

Additional Requirements:

Two papers, one in theory and application and one in empirical research; certification examination; and an approved dissertation.

## Doctor of Philosophy

# Doctor of Philosophy

Doctor of Philosophy-75 points (Code: COGN)

Core Courses (9 points):

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

Statistics (12 points):

- HUDM 4120 Basic concepts in statistics (not recommended for those with undergraduate statistics) (3)
- 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 I (3)

Specialized Courses (minimum of 15 points):

Selected in consultation with an advisor, and focusing on one of the following areas:

Cognition and Learning:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4027 Development of mathematical thinking (3)
- HUDK 5024 Language development (2-3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- HUDK 6095 Critical review of current journals in psychology (3)
- HUDM 5058 Choice and decision making (3)

- HBSK 5096 The psychology of memory (3)

#### Intelligent Technologies:

- HUDK 4015 Psychology of thinking (3)
- HUDK 4035 Technology and human development (3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5034 Cognitive research methods and applications (3)
- HUDK 5035 Psychology of media (2-3)
- HUDK 5039 Design of intelligent learning environments (3)
- HUDK 5198 Psychology of instructional systems design (2-3)
- MSTU 4031 Programming I (4)
- MSTU 4083 Instructional design of educational technology (3)
- MSTU 4133 Cognition and computers (3)
- MSTU 4134 Cognition and computers lab (1-3)

#### Reading Research:

- HUDK 5024 Language development (2-3)
- HUDK 5080 Experimental psychology: Schooling and reading (2-3)
- HUDK 5090 Psychology of language and reading (2-3)
- HUDK 6095 Critical review of current journals in psychology (3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- MSTU 4086 Text understanding and design (3)

#### Cognitive Studies of Educational Practice:

- EDPS 4021 Sociology of education (3)
- HUDK 4035 Technology and human development (3)
- HBSK 4074 Development of reading comprehension strategies and study skills (3)
- ORL 5522 Evaluation methods I (3)

#### Research Apprenticeship (6 points):

##### Two semesters in a research practicum:

- HUDK 6523 Seminar in cognitive development (3)
- HUDK 6539 Research practicum in educational psychology, cognition, and learning (1-3)

#### Special Seminars (minimum of 9 points):

- Topics courses in developmental psychology (1-3) (taken during both first and second years)
- HUDK 7502 Dissertation seminar (1-3)
- HUDK 8901 Dissertation advisement (0)
- TI 8900 Dissertation defense (0)

#### Breadth/Foundation Courses (12 Points):

Take 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 (1-2 each)
- BBSN 5033 Human clinical neuropsychology (3)
- MSTC 5000 Neurocognitive models of information processing (1-3)

## 2. Cognitive Basis of Behavior:

- HUDK 4015 Psychology of thinking (3)
- HUDK 5090 Psychology of language and reading (2-3)
- HBSK 5096 The psychology of memory (3)
- CCPX 5020 Cognition, emotion, and culture (3)

## 3. Social Cultural Factors and Individual Differences:

- HUDK 5029 Personality development and socialization across the lifespan (2-3)
- HUDK 5040 Development and psychopathology: Atypical contexts and populations (2-3)
- HUDK 5121 Personality development and socialization in childhood (2-3)
- HUDK 5125 Cross-cultural developmental psychology (2-3)
- ORL 5362 Group dynamics: A systems perspective (3)
- CCPX 5034 Child psychopathology (3)
- HBSK 5031 Family as a context for child development (3)
- ORLJ 5017 Small group intervention: Theory and method (3)
- ORLJ 5106 Psychological aspects of organizations (2-3)
- ORLJ 5540 Proseminar in social psychology (2-3)

## 4. Measurement:

- HUDM 5059 Psychological measurement (3)

Non-departmental Courses (minimum of 8 points):

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

Additional Requirements: Two papers—one an empirical study the student has conducted, another an integrative research literature survey; certification examination; and an approved dissertation.

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# Application Information

GRE General Test is required for admission to the doctoral programs.

## Faculty List

### Faculty

RYAN S. BAKER ([HTTP://TC.EDU/FACULTY/RSB2162](http://tc.edu/faculty/rsb2162))

Associate Professor of Cognitive Studies

JOHN B BLACK ([HTTP://TC.EDU/FACULTY/JBB21](http://tc.edu/faculty/jbb21))

Cleveland E. Dodge Professor of Telecommunications & Ed.

CATHERINE CHI CHASE ([HTTP://TC.EDU/FACULTY/CC3663](http://tc.edu/faculty/cc3663))

Assistant Professor of Cognitive Studies

JAMES E CORTER ([HTTP://TC.EDU/FACULTY/JEC34](http://tc.edu/faculty/jec34))

Professor of Statistics and Education

LAWRENCE DECARLO ([HTTP://TC.EDU/FACULTY/LD208](http://tc.edu/faculty/ld208))

Professor of Psychology and Education

HERBERT P GINSBURG ([HTTP://TC.EDU/FACULTY/HPG4](http://tc.edu/faculty/hpg4))

Jacob H Schiff Foundations Prof of Psychology & Education

DEANNA KUHN ([HTTP://TC.EDU/FACULTY/DK100](http://tc.edu/faculty/dk100))

Professor of Psychology and Education

XIAODONG D LIN ([HTTP://TC.EDU/FACULTY/XDL2001](http://tc.edu/faculty/xdl2001))

Associate Professor of Cognitive Studies

GARY J NATRIELLO ([HTTP://TC.EDU/FACULTY/GJN6](http://tc.edu/faculty/gjn6))

Ruth L. Gottesman Prof. in Educ. Research

BARBARA TVERSKY ([HTTP://TC.EDU/FACULTY/BT2158](http://tc.edu/faculty/bt2158))

Professor of Psychology and Education

### Adjunct

MICHAEL JEFFREY DEAN ([HTTP://TC.EDU/FACULTY/MJD44](http://tc.edu/faculty/mjd44))

Adjunct Assistant Professor of Education

DAVID GURALNICK ([HTTP://TC.EDU/FACULTY/DG2236](http://tc.edu/faculty/dg2236))

Adjunct Assistant Professor of Technology and Education

ALYSE CHRISTINE HACHEY ([HTTP://TC.EDU/FACULTY/ACH48](http://tc.edu/faculty/ach48))

Adjunct Associate Professor of Psychology and Education

MICHAEL ALAN HANCHETT HANSON ([HTTP://TC.EDU/FACULTY/MAH59](http://tc.edu/faculty/mah59))

Adjunct Assistant Professor of Psychology and Education

SUSAN JANG ([HTTP://TC.EDU/FACULTY/SJ306](http://tc.edu/faculty/sj306))

Adjunct Assistant Professor of Psychology and Education

JAMIE L. KRENN ([HTTP://TC.EDU/FACULTY/JLG2102](http://tc.edu/faculty/jlg2102))

Adjunct Assistant Professor of Psychology and Education



## Course List

### **HUDK 4015 PSYCHOLOGY OF THINKING**

Examines cognitive psychology theories and research about various kinds of thinking, what each kind is best suited for, and problems people have with it. Also examines the best ways of learning from each kind of thinking. Critically examines the various thinking skills curricula that have been proposed.

### **HUDK 4027 DEVELOPMENT OF MATHEMATICAL THINKING**

The development of informal and formal mathematical thinking from infancy through childhood with implications for education.

### **HUDK 4029 HUMAN COGNITION AND LEARNING**

Cognitive and information-processing approaches to attention, learning, language, memory, and reasoning. Fee: \$20.

### **HUDK 4030 COGNITIVE CLINICAL INTERVIEW**

Introduction to the cognitive clinical interview and exploration of how it has and can be used in psychological and educational research and assessment.

### **HUDK 4035 TECHNOLOGY AND HUMAN DEVELOPMENT**

Examines the use and design of various educational technologies (computer software, multimedia shareware, TV, World Wide Web sites, etc.) from the perspective of basic research and theory in human cognitive and social development. Provides a framework for reasoning about the most developmentally appropriate uses of technology for people at different ages.

### **HUDK 4080 EDUCATIONAL PSYCHOLOGY**

Examines landmark issues in educational psychology, highlighting philosophical underpinnings and empirical evidence, tracing each issue from its roots to contemporary debates and evaluating current educational practice.

### **HUDK 4902 RESEARCH AND INDEPENDENT STUDY**

Permission required.

### **HUDK 5020 THE DEVELOPMENT OF CREATIVITY**

Major theories and contemporary research in creative work, emphasizing case studies of exceptional and historically influential individuals.

### **HUDK 5023 COGNITIVE DEVELOPMENT**

Theory and research on the development of cognitive processes across the lifespan.

### **HUDK 5025 SPATIAL THINKING**

Analyzes research on how people learn, mentally represent, mentally transform, describe, and act on the spaces they encounter. Mental models of and transformations of space underlie the way people think about abstract domains, so thought about space has implications for thought in general. Implications for education and HCI are considered.

**HUDK 5030 VISUAL EXPLANATIONS**

Surveys production and comprehension of visualizations ranging from ancient cave paintings and petroglyphs to diagrams, charts, graphs, comics, picture books, photographs, gesture, and film to extract and apply techniques for conveying objects, actions, forces relations, and emotions, meanings that are both inherently visible and non-visible. Implications for education, art, media, and HCI are drawn.

**HUDK 5035 PSYCHOLOGY OF MEDIA**

Covers psychological theories and research that relate to various media and what people learn directly and indirectly from them.

**HUDK 5063 COGNITIVE DEVELOPMENT BEYOND CHILDHOOD**

Examination of all aspects of cognitive functioning over the major portion of the life cycle that occurs beyond childhood, addressing both common patterns and individual and cultural variations. A particular focus will be critical examination of the research methods by which such knowledge is gained.

**HUDK 5090 PSYCHOLOGY OF LANGUAGE AND READING**

Basic theories, empirical findings, and educational applications in the psychology of language and reading: the cognitive processes involved in the perception and production of oral and written language.

**HUDK 5197 PSYCHOLOGY OF TRAINING IN E-LEARNING AND INDUSTRY**

The design, conduct, and evaluation of training in closed systems. A critical review of available methods for task analysis, formative development, and the creation of performance aids. Special fee: \$15.

**HUDK 5324 RESEARCH WORK PRACTICUM**

Students learn research skills by participating actively in an ongoing faculty research project.

**HUDK 6095 CRITICAL REVIEW OF CURRENT JOURNALS IN PSYCHOLOGY**

Limited to candidates in psychology; others by permission. Critical review of current journals in psychology and education, analysis of articles, discussion of general trends in current theoretical and research literature, and guidance in preparing manuscripts for publication in peer-reviewed journals.

**HUDK 6523 SEMINAR IN COGNITIVE DEVELOPMENT**

Permission required. Advanced topics in research and theory in cognitive development.

**HUDK 6530 SEMINAR IN THEORETICAL ISSUES IN COGNITIVE AND EDUCATIONAL PSYCHOLOGY**

Permission required. Limited to doctoral candidates in psychology.

**HUDK 6539 RESEARCH PRACTICUM IN EDUCATIONAL PSYCHOLOGY, COGNITION, AND LEARNING**

Permission required. Limited to doctoral candidates in psychology.

**HUDK 6902 ADVANCED RESEARCH AND INDEPENDENT STUDY**

Permission required.

**HUDK 7502 DISSERTATION SEMINAR**

Permission required. Development of doctoral dissertation and presentation of plans for approval. Registration limited to two terms.

**HUDK 8901 DISSERTATION ADVISEMENT - HUMAN COGNITION AND LEARNING**

Individual advisement on doctoral dissertation. Fee to equal 3 points at current tuition rate for each term. See catalog section on Continuous Registration for Ed.D./Ph.D. degrees.

# Developmental Psychology Programs

Department of - Human Development

## Contact Information

**Phone:** (212) 678 4190

**Fax:** (212) 678-3837

**Email:** cheung@tc.edu

**Coordinator:** Professor Jeanne Brooks-Gunn

## Program Description

Developmental psychology focuses on the development of individuals across their lifespan within the context of family, peer groups, childcare and after-school programs, schools, neighborhoods, and larger communities and society. It considers the well-being of children, youth, and adults, vis-a-vis the cognitive, emotional, social, academic, and health domains. Our Program is concerned about disparities among groups (for example, gender, resources such as parental income and education, ethnicity, and immigrant status) as well as the ways in which equity among groups may be promoted. The pathways through which such disparities emerge is our focus of inquiry, as well as the promotion of educational and societal strategies for ameliorating them. The Program stresses theory and research in the service of policy and practice.

### Master of Arts (M.A.)

The Master of Arts in developmental psychology typically requires completion of 32 points. In accordance with individual interests and objectives, students acquire familiarity with basic theoretical and research orientations as well as exposure to substantive knowledge in the areas of cognitive, language, personality, and social functioning and development. Opportunity exists for the study of deviant as well as normal psychological functioning within a developmental framework.

Students may register for independent study in order to undertake theoretical or empirical research projects or fieldwork. Students whose goal is to acquire professional skills in clinical or counseling psychology may enroll in introductory course offerings, which in many cases can be applicable if the student is later admitted to one of the more advanced master's or doctoral programs in these areas.

In order to accommodate the diverse aims of individual students, a considerable degree of flexibility has been built into the course of study leading to the M.A. degree. An attempt has been made to minimize specific course requirements, and the student will find that there is a good deal of freedom to choose from among the many offerings provided by Teachers College and the Columbia University Graduate Faculties. In consultation with an advisor, students may create an individually tailored program of study or may enter an area of focus in Risk, Resilience, and Prevention; Developmental Psychology for Educators; or Creativity and Cognition.

The course of study has these main components:

- A basic course in methods of research.

- Required courses in cognitive development, personality development in atypical populations, and social and personality development.
- A basic course in statistics.
- Research practicum.
- Electives in developmental psychology plus relevant electives offered by other Teachers College and Columbia University programs.
- A special project.

Students completing the M.A. degree accept positions in research laboratories or field settings, biomedical institutions, educational and child care agencies, foundations, public policy settings, state and local governments, community programs, and as instructors in community colleges, or they go on to pursue more advanced degrees in particular areas of specialization.

Students may elect, but are not required, to focus study in one of the following areas:

- **Risk, Resilience, and Prevention:** This area of focus brings knowledge of developmental psychology to future work relating to competence and maladjustment among at-risk children and families. Diverse areas are considered, ranging from intellectual giftedness/mental retardation and academic achievement to child poverty, cross-cultural differences, resilience, and different domains of psychopathology.
- **Developmental Psychology for Educators:** This area of focus helps to promote an understanding of development in varying social contexts and cultures, ethnic and racial groups, and social classes. It focuses on how knowledge about development, thinking, and learning can be applied to educational practice and to educational policy.
- **Creativity and Cognition:** Focusing on the importance, development, and influence of creativity, this area is designed for those interested in creative problem-solving and multi-modal thinking as it affects the classroom, curriculum development, community organizations, therapeutic settings, and business.

### Doctor of Philosophy (Ph.D.)

The 75-point doctoral degree prepares students for faculty positions in colleges, graduate schools of education, and universities, and for positions as research associates in research laboratories, biomedical schools, foundations, public policy, and arts and sciences, as well as policy research firms, governmental agencies, and NPOs. Throughout their program, doctoral candidates work in a close apprentice relationship with a faculty advisor of their choice. The Ph.D. degree requires completion of 75 points with an empirical research dissertation.

The aim of instruction at the doctoral level is to produce a psychologist who can make a sound and innovative research contribution to the study of human development, who is concerned with the relationship between development and education, and who is equipped to teach about such matters. Students acquire the conceptual background and methodological skills necessary for faculty positions in colleges and universities or for positions as associates and consultants in research laboratories, biomedical schools, and other applied settings.

While consultation between student and faculty advisor is considered to be the best way to decide which steps should be taken towards these goals, there are specific requirements for all students in Developmental Psychology that serve to define the character of the program and to ensure that all students have a common experience and acquire a common level of expertise in dealing with the core issues in the field.

The courses offered through the program provide content in the research and theoretical literature relating to all phases of the psychology of human development. All age groups are covered, from infancy through childhood, adolescence to adulthood, and later life. Coursework in developmental psychology can be supplemented by courses in the other psychology programs at Teachers College as well as by courses in the social sciences, linguistics, and other fields offered at Teachers College and the graduate faculty of Columbia University (including the Columbia University College of Physicians and Surgeons). The doctoral program is focused primarily on training in the conduct of empirical (e.g., experimental, observational, and interview) research. Other types of research (theoretical, descriptive, and historical) may be undertaken in special circumstances of student and advisor competence.

## Degree Summary

Psychology-Developmental (DEVM)

- Master of Arts (M.A.)

Developmental Psychology (DEVD)

- Doctor of Philosophy (Ph.D.)

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

# Degree Requirements

## Master of Arts

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### Master of Arts

Core Courses (five courses, 15 points): M.A. students take five core courses.

- HUD 4120            Methods of empirical research (must be with Developmental Psychology Faculty) (3)
- HUDK 5023            Cognitive development (3)
- HUDK 5040            Development and psychopathology: Atypical contexts and populations (2-3)

Either one of the following two courses:

- HUDK 5121            Personality development and socialization in childhood (2-3)
- HUDK 5029            Personality development and socialization across the lifespan (2-3)

For the fifth course, there are several options:

- HUDK 4027            Development of mathematical thinking (3)
- HUDK 4029            Human cognition and learning (2-3)
- HUDK 4080            Educational psychology (3)
- HUDK 5024            Language development (2-3)
- HUDK 5025            Spatial thinking (3)
- HUDK 5030            Visual explanations (3)
- BBS 5068-5069        Brain and behavior I and II (1-2 each)

Specialized Courses (two courses, 6 points): Two courses in developmental psychology taken for 3 points each:

- HUDK 5324            Research work practicum (2-3)
- HUDK 6539            Research practicum in educational psychology, cognition, and learning (1-3)

Plus one additional course in developmental psychology

Breadth Courses (two courses, 4-6 points): Three Teachers College courses outside of developmental psychology taken for 2-3 points each.

Statistics Course (one course, 3 points):

- HUDM 4120            Basic concepts in statistics (if no undergraduate statistics) (3)
- HUDM 4122            Probability and statistical inference (3)
- HUDM 5122            Applied regression analysis (3)

Elective Course: One course selected in consultation with an advisor.

**Special Research Project**: The special research project is a research paper written under the supervision of a faculty advisor. The project can be an empirical research study, an evaluation of an educational program, or a research review article.

## Doctor of Philosophy

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# Doctor of Philosophy

The 75-point course of study has four components:

- **Breadth Requirement.** Students choose four courses, with at least one chosen from each of the following areas: Biological Basis of Behavior, Cognitive Basis of Behavior, Social/Cultural Factors and Individual Differences, and Measurement.
- **Doctoral Requirements.** Students are required to take advanced courses in Developmental Psychology as well as proseminar.
- **Methodology.** All students are required to take the four-course statistics sequence. Students are required to take a special certification examination in research methodology. Students, in consultation with their advisor, should also enroll in the necessary advanced coursework to prepare for both the certification examination and their own research work.
- **Qualifying Paper.** Students are required to write both a theoretical and an empirical paper to qualify for dissertation status.

Core Courses (12 points): Usually taken during the first year of study:

- HUDK 6010 Developmental research methods (3)
- HUDK 6520 Seminar in social and emotional development through childhood and adolescence (3)
- HUDK 6523 Seminar in cognitive development (3)
- HUDK 6529 Seminar in risk, resilience, and developmental psychology (3)

Specialized Courses (Approximately 21 points): Selected in consultation with an advisor.

Methodology Courses (12 points):

Beginning in first year of study:

- 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 I (3)

Breadth Courses: (One course in each area for a minimum of 2 points each; total of 11-12 points):

### 1. Biological Basis of Behavior

- BBS 5068 Brain and behavior I (1-2)
- BBS 5069 Brain and behavior II (1-2)
- MSTC 5000 Neurocognitive models of information processing (1-3)

### 2. Cognitive Basis of Behavior

- HUDK 4015 Psychology of thinking (2-3)
- HUDK 4029 Human cognition and learning (3)
- HUDK 5023 Cognitive development (3)



- HUDK 5024 Language development (2-3)
- HUDK 5025 Spatial thinking (3)
- HUDK 5030 Visual explanations (3)
- HUDK 5090 Psychology of language and reading (2-3)
- CCPX 5020 Cognition, emotion, and culture (3)
- HBSK 5096 The psychology of memory (3)

### 3. Social Cultural Factors and Individual Differences

- HUDK 5029 Personality development and socialization across the lifespan (2-3)
- HUDK 5040 Development and psycho-pathology: Atypical contexts and populations (2-3)
- HUDK 5121 Personality development and socialization in childhood (2-3)
- HUDK 5125 Cross-cultural developmental psychology (2-3)
- HUDK 6036 Child and family policy I (3)
- HBSK 5031 Family as a context for child development (3)
- ORLJ 5017 Small group intervention: Theory and method (2-3)
- ORLJ 5106 Psychological aspects of organizations (2-3)
- ORLJ 5540 Proseminar in social psychology (3)

### 4. Measurement

- HUDM 5059 Psychological measurement (3)
- HUDM 6051 Psychometric theory I (3)
- HUDM 6055 Latent structure analysis (3)

Proseminar Requirement (6 points):

Taken over four semesters:

- HUDK 6600 Proseminar: Developmental psychology and cognitive studies (1-2)

Non-departmental Courses (Minimum of 8 points): At least three courses outside the department selected in consultation with an advisor.

Other Requirements:

- HUDK 6901 Advanced research and independent study (1-3 points)
- HUDK 7501 Dissertation seminar (1-3 points)
- Service as a teaching assistant for two Master's-level Developmental Psychology courses
- Supervision of Master's student's special projects
- Enrollment in research practica
- Successful completion of certification examination
- Approved theoretical paper (concomitant with enrollment in HUDK 6901)
- Approved empirical paper
- Approved doctoral dissertation

# Application Information

## Master of Arts (M.A.)

Applicants who have undergraduate degrees in fields other than psychology will be considered for admission to the M.A. program, as well as those whose previous training is in psychology.

## Doctor of Philosophy (Ph.D.)

This program accepts applications for fall semester only. GRE is required; Subject Test in Psychology is optional. Admission to the program is highly competitive. Primary emphasis in evaluating applicants is given to prior achievements and recommendations, particularly as evidence of a self-motivated research involvement.

Previous work in psychology is highly desirable, but there are no fixed course requirements. Expertise in a related field, such as linguistics, philosophy, anthropology, or biology, may qualify a student as well. At least one year of full-time study in residence, i.e., two semesters of 12 or more points per semester, is required.

# Faculty List

## Faculty

JEANNE BROOKS-GUNN ([HTTP://TC.EDU/FACULTY/JB224](http://tc.edu/faculty/jb224))

Virg. & Leo. Marx Prof. of Child and Parent Dev. Ed.

CAREY ELIZABETH COOPER ([HTTP://TC.EDU/FACULTY/CEC2204](http://tc.edu/faculty/cec2204))

Assistant Professor of Developmental Psychology

HERBERT P GINSBURG ([HTTP://TC.EDU/FACULTY/HPG4](http://tc.edu/faculty/hpg4))

Jacob H Schiff Foundations Prof of Psychology & Education

DEANNA KUHN ([HTTP://TC.EDU/FACULTY/DK100](http://tc.edu/faculty/dk100))

Professor of Psychology and Education

GARY J NATRIELLO ([HTTP://TC.EDU/FACULTY/GJN6](http://tc.edu/faculty/gjn6))

Ruth L. Gottesman Prof. in Educ. Research

## Adjunct

MICHAEL ALAN HANCHETT HANSON ([HTTP://TC.EDU/FACULTY/MAH59](http://tc.edu/faculty/maH59))

Adjunct Assistant Professor of Psychology and Education

JOSEPH ROCKY LAO ([HTTP://TC.EDU/FACULTY/JRL19](http://tc.edu/faculty/jrl19))

Adjunct Associate Professor of Psychology and Education

SARI LOCKER ([HTTP://TC.EDU/FACULTY/SL2036](http://tc.edu/faculty/sl2036))

Adjunct Assistant Professor of Psychology and Education

JUDITH MILLER ([HTTP://TC.EDU/FACULTY/JM1398](http://tc.edu/faculty/jm1398))

Adjunct Professor of Psychology and Education

## Course List

### **HUD 4120 METHODS OF EMPIRICAL RESEARCH**

An introduction to the methods of scientific inquiry, research planning, and techniques of making observations and analyzing and presenting data.

### **HUDK 4021 DEVELOPMENTAL PSYCHOLOGY: INFANCY**

Review of research and theory in early perceptual, cognitive, and social/emotional development, with particular attention to the interaction of biological and environmental factors in early life.

### **HUDK 4022 DEVELOPMENTAL PSYCHOLOGY: CHILDHOOD**

Children's cognition, perception, representation, language, affect, personality, and sexuality. Family structure and school as they influence these aspects of childhood.

### **HUDK 4023 DEVELOPMENTAL PSYCHOLOGY: ADOLESCENCE**

Theoretical and empirical studies of personality and social development processes in adolescence. An ecological systems approach is emphasized.

### **HUDK 4027 DEVELOPMENT OF MATHEMATICAL THINKING**

The development of informal and formal mathematical thinking from infancy through childhood with implications for education.

### **HUDK 4030 COGNITIVE CLINICAL INTERVIEW**

Introduction to the cognitive clinical interview and exploration of how it has and can be used in psychological and educational research and assessment.

### **HUDK 4901 RESEARCH AND INDEPENDENT STUDY**

Permission required.

### **HUDK 5020 THE DEVELOPMENT OF CREATIVITY**

Major theories and contemporary research in creative work, emphasizing case studies of exceptional and historically influential individuals.

### **HUDK 5023 COGNITIVE DEVELOPMENT**

Theory and research on the development of cognitive processes across the lifespan.

### **HUDK 5024 LANGUAGE DEVELOPMENT**

Survey of research and theory in the development of language, beginning with communication and the origins of language in infancy and emphasizing acquisition of the forms of language in relation to their content and use.

### **HUDK 5027 MORAL DEVELOPMENT**

Investigation of the major theoretical and empirical approaches to the study of how morality develops with particular emphasis on the behaviorist, cognitive, psychoanalytic, and sociopolitical approaches.

**HUDK 5028 SPIRITUAL DEVELOPMENT ACROSS THE LIFESPAN**

This course concentrates on the role of spirituality on human development using a multidisciplinary focus. Spiritual traditions are examined using stage theory and parallel theories from other fields.

**HUDK 5029 PERSONALITY DEVELOPMENT AND SOCIALIZATION ACROSS THE LIFESPAN**

Theory and research regarding the interaction between naturally developing personality structures and socialization processes throughout life.

**HUDK 5040 DEVELOPMENT AND PSYCHOPATHOLOGY: ATYPICAL CONTEXTS AND POPULATIONS**

Using contemporary research as the basis, the focus is on the interface between classical developmental psychology theories and patterns of development identified in atypical contexts (e.g., poverty) and among atypical populations (e.g., resilient youth). Implications for interventions and policy are also discussed.

**HUDK 5121 PERSONALITY DEVELOPMENT AND SOCIALIZATION IN CHILDHOOD**

Prerequisite: HUDK 4022 or equivalent. Contemporary theory and research on children's adaptation to developmental tasks of childhood. Comparison of typical and atypical pathways in social-personality development. Analysis of the logic and method of empirical studies of development.

**HUDK 5125 CROSS-CULTURAL PSYCHOLOGY**

Survey of psychological studies of development in different cultures, with emphasis on perceptual and cognitive issues and methodological problems specific to cross-cultural research.

**HUDK 5324 RESEARCH WORK PRACTICUM**

Students learn research skills by participating actively in an ongoing faculty research project.

**HUDK 6036 CHILD AND FAMILY POLICY I**

Prerequisites: Any two of the following: HUDF 4000; HUDF 4024; HUDK 4021; HUDK 4022; C&T 4113; C&T 5113. Provides a multi-disciplinary perspective on child and family policy. Also provides a foundation of knowledge concerning the role of child and family perspectives in informing policy.

**HUDK 6037 CHILD AND FAMILY POLICY II**

Prerequisites: Any two of the following: HUDF 4000; HUDF 4024; HUDK 4021; HUDK 4022; C&T 4113; C&T 5113. Provides a multi-disciplinary perspective on child and family policy. Also provides a foundation of knowledge concerning the role of child and family perspectives in informing policy.

**HUDK 6520 SEMINAR IN SOCIAL AND EMOTIONAL DEVELOPMENT THROUGH CHILDHOOD AND ADOLESCENCE**

Permission required. How people become socialized and how psychology deals with the process in terms of developmental concepts.

**HUDK 6523 SEMINAR IN COGNITIVE DEVELOPMENT**

Permission required. Advanced topics in research and theory in cognitive development.

**HUDK 6529 SEMINAR IN RISK, RESILIENCE AND DEVELOPMENTAL PSYCHOLOGY**

Permission required. Students participate in ongoing research.

**HUDK 6901 ADVANCED RESEARCH AND INDEPENDENT STUDY**

Permission required.

**HUDK 7501 DISSERTATION SEMINAR**

Permission required. Development of doctoral dissertations and presentation of plans for approval.

Registration limited to two terms.

**HUDK 8900 DISSERTATION ADVISEMENT - DEVELOPMENTAL PSYCHOLOGY**

Individual advisement on doctoral dissertation. Fee to equal 3 points at current tuition rate for each term.

See the section on Continuous Registration for Ed.D./Ph.D. degrees for details.

# Measurement, Evaluation, and Statistics

Department of - Human Development

## Contact Information

**Phone:** (212) 678 4150

**Fax:** (212) 678 3837

**Email:** johnson@tc.edu; decarlo@tc.edu

## Program Description

The Measurement, Evaluation and Statistics area of study includes the following programs: Applied Statistics; and Measurement and Evaluation.

The **M.S. in Applied Statistics** (32 points) requires at least one year of study. This master's degree provides training for a number of positions in applied research settings, testing organizations, and business organizations. In addition to the satisfactory completion of coursework, an integrative project is required.

The **Ed.M. in Measurement and Evaluation** (60 points) is a two-year master's degree. It provides training for a number of positions in educational research bureaus and testing organizations. In addition to the satisfactory completion of coursework, an integrative project is required for the master's degree.

The **Ed.D. and Ph.D. programs in Measurement and Evaluation** are designed to prepare graduates for careers in a wide range of educational settings. Graduates acquire specialized knowledge and skills in test theory, test and instrument development and validation, program evaluation, and quantitative analysis of educational and psychological data. Some graduates pursue careers as college professors teaching measurement, evaluation, and statistics. Some are employed in city or state departments of education in the planning and supervision of testing programs and research and evaluation projects. Others work for test publishers, licensure and certification boards, and government agencies in the construction of tests or in the management of large-scale testing programs. Still others work in applied measurement, evaluation, research design, and statistics in a variety of social science, health care, business, and industrial settings.

A doctorate is required for most college teaching positions and for positions of professional responsibility in testing organizations, departments of education, and licensure and certification boards. The **Ph.D.** (75 points) is appropriate for individuals with strong quantitative and technical skills who wish to focus on theoretical issues in measurement and evaluation or who have a strong background in a substantive area of psychology in which they wish to further the development and application of measurement techniques.

The **Ed.D.** (90 points) is appropriate for individuals who wish to focus on the application of measurement and evaluation techniques in education, psychology, and business and industry. Both doctoral degrees are accepted as qualification for faculty positions in schools of education in the United States.

## Degree Summary

## APPLIED STATISTICS (STAT)

- Master of Science (M.S.)

## MEASUREMENT AND EVALUATION (MEAS)

- Master of Education (Ed.M.)
- Doctor of Education (Ed.D.)
- Doctor of Philosophy (Ph.D.)

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document



# Degree Requirements

## Master of Science

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### Master of Science

Applied Statistics (27 points):

- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)
- HUDM 6030 Multilevel and longitudinal data analysis (3)
- HUDM 6055 Latent structure analysis (3)
- HUDM 6122 Multivariate analysis I (3)
- HUDM 6123 Multivariate analysis II (3)
- W 4105 Probability (3)\*
- W 4107 Statistical inference (3)\*

\* These courses are taken at the Graduate School of Arts and Sciences at Columbia University.

Electives (5 points):

Selected in consultation with an advisor and within the areas of management science, economics, public health, computer science, psychology, sociology, or research methods in any general area.

Breadth Requirement (4-6 points):

At least two courses (for a minimum of 2 points each) must be taken at Teachers College from outside the department.

Culminating Experience: Special project.

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## Master of Education

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### Master of Education

Core Courses (12 points):

- HUDM 5059 Psychological measurement (3)
- HUDM 6051-6052 Psychometric theory I and II (3 each)
- HUDM 6055 Latent structure analysis (3)

And at least 6 points selected from the following or other courses selected in consultation with an advisor:

- P8582 Program evaluation design for health policy and management (3) at Mailman School of

### Public Health

- P8640 Methods in program evaluation (3) at Mailman School of Public Health
- P8705 Evaluation of health programs (3) at Mailman School of Public Health
- T6416 Program evaluation in social services (3) at School of Social Work
- ORLH 5533 Advanced professional seminar: Faculty evaluation and development programming (2-3)

### Quantitative Methods (15 points):

- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)
- HUDM 6030 Multilevel and longitudinal data analysis (3)
- HUDM 6122 Multivariate analysis I (3)

### Psychology (12 points):

Taken in one or more of the following areas: Developmental psychology, cognitive studies, counseling psychology, organizational psychology, or social psychology.

### Research Methods (6 points):

- HUD 4120 Methods of empirical research (3)
- HUDM 5250 Research practicum in measurement and evaluation (0-4)

### Other Aspects in Education (6 - 9 points)

To satisfy college requirements, all students must complete a minimum of three Teachers College courses (a course for this purpose is one in which at least 2 points are earned) outside of HUDM: One course in foundations of education and two courses in curriculum and teaching and/or educational leadership.

### Electives:

Chosen in consultation with an advisor and designed to strengthen and broaden the student's professional preparation.

Culminating Experience: A supervised project.

## Doctor of Education

## Doctor of Education

### Measurement and Evaluation Core Courses (18 points):

- HUDM 5059 Psychological measurement (3)
- HUDM 5250 Research practicum in measurement and evaluation (0-4)
- HUDM 6030 Multilevel and longitudinal analysis (3)
- HUDM 6051-6052 Psychometric theory I and II (3 each)
- HUDM 6055 Latent structure analysis (3)

And at least 9 points selected from the following or other courses selected in consultation with an advisor:

- HUDM 5058 Choice and decision making (3)
- (Various course numbers) Topics in measurement theory (3)

And at least one evaluation course selected from the following:

- P8582 Program evaluation design for health policy and management (3) at Mailman School of Public Health
- P8640 Methods in program evaluation (3) at Mailman School of Public Health
- P8705 Evaluation of health programs (3) at Mailman School of Public Health
- T6414 Program evaluation in social services (3) at School of Social Work

**Quantitative Methods and Research Design (27 points):**

- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)
- HUDM 5124 Multidimensional scaling and clustering (3)
- HUDM 6026 Statistical treatment of mass data (3)
- HUDM 6122 Multivariate analysis I (3)
- P8120 Analysis of categorical data (3) at Mailman School of Public Health
- HUDM 7500 Dissertation seminar (1-3 each for two semesters)
- HUDM 8900 Dissertation advisement (0)

**Psychology (minimum of 18 points):**

In consultation with an advisor, a group of courses aimed at substantive preparation in the field of psychology.

**Related Courses (minimum of 6 points):**

Selected in consultation with an advisor from the areas of curriculum development, guidance, applied human development, supervision, and administration.

**Electives (maximum of 10 points):**

Selected to meet special interests and needs.

Special Requirements: The first two years require full-time study. An empirical paper and a research paper, certification examination, and completion of an approved doctoral dissertation, are also required.

## Doctor of Philosophy

## Doctor of Philosophy

Measurement and Evaluation Core Courses (21 points):

- HUDM 5059 Psychological measurement (3)

- HUDM 5124 Multidimensional scaling and clustering (3)
- HUDM 5250 Research practicum in measurement and evaluation (0-4)
- HUDM 6030 Multilevel and longitudinal data analysis (3)
- HUDM 6051-6052 Psychometric theory I and II (3 each)
- HUDM 6055 Latent structure analysis (3)

And at least 3 points selected from the following or other courses selected in consultation with an advisor:

- HUDM 5058 Choice and decision making (3)
- (Various course numbers) Special topics offerings in measurement theory (3)

Quantitative Methods and Research Design (29 points):

- HUD 4120 Methods of empirical research (3)
- HUDM 4122 Probability and statistical inference (3)
- HUDM 5122 Applied regression analysis (3)
- HUDM 5123 Linear models and experimental design (3)
- HUDM 6026 Statistical treatment of mass data (3)
- HUDM 6122-6123 Multivariate analysis I and II (3 each)
- HUDM 7500 Dissertation seminar (1-3 each for two semesters)
- HUDM 8900 Dissertation advisement (0)
- W4105 Probability (3)\*
- W4107 Statistical inference (3)\*

\*These courses are taken at the Graduate School of Arts and Sciences at Columbia University.

Psychology (minimum of 15 points):

In consultation with an advisor, a group of courses aimed at substantive preparation in the field of psychology.

Non-department Requirement (7 points):

Courses in the social sciences, curriculum and teaching, and educational leadership selected in consultation with an advisor from offerings at Teachers College and other branches of Columbia University.

Special Requirements: The first two years require full-time study. An empirical paper and a research paper, certification examination, and completion of an approved doctoral dissertation, are also required.

# Application Information

## Applied Statistics

GRE General Test is required for the M.S. in Applied Statistics. Background in calculus is also required.

## Measurement and Evaluation

GRE General Test is required for all programs in Measurement and Evaluation. Some preparation in college-level mathematics or statistics coursework is required for doctoral study

# Faculty List

## Faculty

JAMES E CORTER ([HTTP://TC.EDU/FACULTY/JEC34](http://tc.edu/faculty/jec34))

Professor of Statistics and Education

LAWRENCE DECARLO ([HTTP://TC.EDU/FACULTY/LD208](http://tc.edu/faculty/ld208))

Professor of Psychology and Education

MATTHEW S. JOHNSON ([HTTP://TC.EDU/FACULTY/MSJ2119](http://tc.edu/faculty/msj2119))

Associate Professor of Statistics and Education

BRYAN SEAN KELLER ([HTTP://TC.EDU/FACULTY/BSK2131](http://tc.edu/faculty/bsk2131))

Assistant Professor of Applied Statistics

YOUNG-SUN LEE ([HTTP://TC.EDU/FACULTY/SLY2003](http://tc.edu/faculty/sly2003))

Associate Professor of Psychology and Education

LAURA ELIZABETH TIPTON ([HTTP://TC.EDU/FACULTY/LET2119](http://tc.edu/faculty/let2119))

Assistant Professor of Applied Statistics

## Adjunct

MICHAEL JEFFREY DEAN ([HTTP://TC.EDU/FACULTY/MJD44](http://tc.edu/faculty/mjd44))

Adjunct Assistant Professor of Education

## Course List

### **HUD 4120 METHODS OF EMPIRICAL RESEARCH**

An introduction to the methods of scientific inquiry, research planning, and techniques of making observations and analyzing and presenting data.

### **HUDM 4050 INTRODUCTION TO MEASUREMENT**

An introduction to basic concepts and issues in measurement. Descriptive statistics, scales of measurement, norms, reliability, validity. Advantages and limitations of measurement techniques are discussed and illustrated.

### **HUDM 4120 BASIC CONCEPTS IN STATISTICS**

Descriptive statistics including organizing, summarizing, reporting, and interpreting data. Understanding relationships expressed by cross-tabulation, breakdown, and scatterdiagrams. Designed as a one-semester introduction to statistical methods. Will include reading journal articles.

### **HUDM 4122 PROBABILITY AND STATISTICAL INFERENCE**

Elementary probability theory; random variables and probability distributions; sampling distributions; estimation theory and hypothesis testing using binomial, normal, T, chi square, and F distributions.

### **HUDM 4901 RESEARCH AND INDEPENDENT STUDY: MEASUREMENT AND EVALUATION**

Permission required.

### **HUDM 4902 RESEARCH AND INDEPENDENT STUDY: APPLIED STATISTICS**

Permission required.

### **HUDM 5058 CHOICE AND DECISION MAKING**

Prerequisite: HUDM 4122 or equivalent. Surveys quantitative models of individual decision making, from the introduction of the notion of "utility" by Daniel Bernoulli through current models such as Tversky and Kahneman's "Prospect Theory." The focus is on psychological or descriptive models of how people make decisions, although methods of rational decision analysis are briefly discussed.

### **HUDM 5059 PSYCHOLOGICAL MEASUREMENT**

Open to doctoral and Ed.M. students in psychology; others only by permission. A previous course in statistics or measurement is recommended. An in-depth examination of measurement and associated techniques, norms, classical test theory, reliability, validity, item response theory, issues, and applications.

### **HUDM 5122 APPLIED REGRESSION ANALYSIS**

Prerequisite: HUDM 4122 or permission of instructor. Least squares estimation theory. Traditional simple and multiple regression models and polynomial regression models, with grouping variables including one-way ANOVA, two-way ANOVA, and analysis of covariance. Lab devoted to applications of SPSS regression program. Lab fee: \$50.

### **HUDM 5123 LINEAR MODELS AND EXPERIMENTAL DESIGN**

Prerequisite: HUDM 5122. Analysis of variance models including within subject designs, mixed models, blocking, Latin Square, path analysis, and models with categorical dependent variables. Lab devoted to computer applications. Lab fee: \$50.

### **HUDM 5124 MULTIDIMENSIONAL SCALING AND CLUSTERING**

Permission required. Prerequisites: HUDM 4122 and HUDM 5122 or equivalent. Methods of analyzing proximity data (similarities, correlations, etc.), including multidimensional scaling, which represents similarities among items by plotting the items into a geometric space, and cluster analysis for grouping items.

### **HUDM 5250 RESEARCH PRACTICUM IN MEASUREMENT AND EVALUATION**

Permission required. Students enrolled are expected to spend a semester involved in a research project, either assisting a faculty member or in an applied setting. A formal report will be submitted.

### **HUDM 6026 COMPUTATIONAL STATISTICS**

Prerequisite: HUDM 5123 or equivalent. Examines problems involved in preparing and analyzing large data sets. Includes a survey of data manipulation and statistical tools in SAS (Statistical Analysis System). Optional topics: introduction to numerical methods and survey of data mining tools.

### **HUDM 6030 MULTILEVEL LONGITUDINAL DATA ANALYSIS**

Prerequisite: HUDM 5122. Multilevel models include a broad range of models called by various names, such as random effects models, multi-level models, and growth curve models. This course introduces the background and computer skills needed to understand and utilize these models.

### **HUDM 6051 INTERMEDIATE PSYCHOMETRICS**

Permission required. Prerequisites: HUDM 5059, HUDM 5122, or equivalents. Psychometric theory underlying test construction; classical test theory, item response theory, and applications.

### **HUDM 6052 PSYCHOMETRIC THEORY II**

Permission required. Prerequisites: HUDM 5059, HUDM 5122, or equivalents. Psychometric theory underlying test construction; classical test theory, item response theory, and applications.

### **HUDM 6055 LATENT STRUCTURE ANALYSIS**

Permission required. Prerequisite: HUDM 5122. Recommended: HUDM 6122. Study of latent structure analysis, including measurement models for latent traits and latent classes, path analysis, factor analysis, structural equations, and categorical data analysis.

### **HUDM 6122 MULTIVARIATE ANALYSIS I**

Permission required. Prerequisite: HUDM 5122 or equivalent; HUDM 5123 is recommended. An introduction to multivariate statistical analysis, including matrix algebra, general linear hypothesis and application, profile analysis, principal components analysis, discriminant analysis, and classification methods.

### **HUDM 6900 ADVANCED RESEARCH AND INDEPENDENT STUDY**

Permission required.

**HUDM 7500 DISSERTATION SEMINAR**

Permission required. Development of doctoral dissertations and presentation of plans for approval.  
Registration limited to two terms.

**HUDM 8900 DISSERTATION ADVISEMENT**

Individual advisement on doctoral dissertation. Fee to equal 3 points at current tuition rate for each term.  
See section in catalog on Continuous Registration for Ed.D./ Ph.D. degrees.



# Learning Analytics

Department of - Human Development

## Contact Information

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**Email:** [hud1@tc.columbia.edu](mailto:hud1@tc.columbia.edu)

**Coordinator:** Ryan Baker

## Program Description

Studying with a faculty of internationally recognized experts, students in the Master of Science in Learning Analytics program work with real-world data collected from massive open online courses (MOOCs) and other educational domains. The degree requires 32 credits of coursework on learning analytics methods, tools, and theory, as well as key background in related areas such as cognition, educational theory, and statistics and measurement. Students are also required to complete an integrative project in which they apply data analytics to real-world large-scale educational data sets.

## Degree Summary

Master of Science (32-Credits)

For a complete listing of degree requirements, please continue on to this program's "Degrees" section in this document

# Degree Requirements

## Masters of Science (32-credits)

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### Masters of Science (32-credits)

#### Program Core Courses:

- HUDK4050: Core Methods in Educational Data Mining
- HUDK4051: Learning Analytics: Process and Theory
- HUDK4052: Normative Perspectives on the Analysis of Learners and Learning
- HUDK4054: Managing Educational Data
- HUDK5053: Feature Engineering Studio

#### Additional Core Courses:

- HUDK 4029: Human Cognition and Learning
- HUDK 5030: Visual Explanations
- HUDM 5124: Multidimensional Scaling and Clustering

#### Measurement:

- HUDM4050 Introduction to measurement  
OR
- HUDM5059 Psychological Measurement

#### Capstone Project:

Students will complete an integrative capstone project, involving conducting analytics on real-world educational data to solve a real-world problem or answer a real-world question.

**In addition, a minimum of two additional Teachers College courses outside of HUDK are selected in consultation with an advisor. Some potential courses include:**

- HUDM 5123 Linear Models and Experimental Design
- HUDM 5133 Causal Inference for Program Evaluation
- ITSF 4010 Cultural and social bases of education
- MSTU 4001 Technology and School Change
- MSTU 4020 Social and Communicative Aspects of the Internet and other ICTs
- MSTU 4022 Telecommunications, distance learning, and collaborative interchange
- MSTU 4036 Hypermedia and education
- MSTU 4037 Computers and the uses of information in education
- MSTU 4039 Video games in education
- MSTU 4052 Computers, problem solving, and cooperative learning
- MSTU 4083 Instructional design of educational technology
- MSTU 4085 New technologies for learning
- MSTU 4133 Cognition and computers

- MSTU 5001 Assessing the impact of technology in our schools
  - MSTU 5005 Case-based Teaching and Learning in Electronic Environments
  - MSTU 5030 Intelligent computer-assisted instruction
  - MSTU 5035 Technology and Metacognition
  - ORLA 6641 Advanced topics in research methods and design
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# Faculty List

## Faculty

RYAN S. BAKER ([HTTP://TC.EDU/FACULTY/RSB2162](http://tc.edu/faculty/rsb2162))

Associate Professor of Cognitive Studies

JOHN B BLACK ([HTTP://TC.EDU/FACULTY/JBB21](http://tc.edu/faculty/jbb21))

Cleveland E. Dodge Professor of Telecommunications & Ed.

JAMES E CORTER ([HTTP://TC.EDU/FACULTY/JEC34](http://tc.edu/faculty/jec34))

Professor of Statistics and Education

GARY J NATRIELLO ([HTTP://TC.EDU/FACULTY/GJN6](http://tc.edu/faculty/gjn6))

Ruth L. Gottesman Prof. in Educ. Research

BARBARA TVERSKY ([HTTP://TC.EDU/FACULTY/BT2158](http://tc.edu/faculty/bt2158))

Professor of Psychology and Education

## Course List

### **HUDK 4050 CORE METHODS IN EDUCATIONAL DATA MINING**

Prerequisite: HUDM 5122 or equivalent, or approved statistics or computer science data mining course. Methods of educational data mining focused on automated discovery of patterns in large-scale educational data, execution of methods in standard software packages, limitations of existing implementations of methods, and when and why to use these methods. Discussion of how EDM uses some of the same mathematical frameworks as traditional statistics and how their use in EDM differs.

### **HUDK 4051 LEARNING ANALYTICS: PROCESS AND THEORY**

Prerequisite: Course in statistics is recommended. Framework for understanding the emerging field of learning analytics. Examines primary perspectives on what the field should be, including educational data mining, learning analytics and big data perspectives, and relationships to related and existing fields. Includes perspectives on philosophy and theory of design and inquiry, validity of a learning analytics analysis or model, and challenges to its effectiveness and appropriate use.

### **HUDK 4052 NORMATIVE PERSPECTIVES ON THE ANALYSIS OF LEARNING AND LEARNERS**

Introduction to multiple perspectives on activities connected to progress in our capacity to examine learning and learners, represented by the rise of learning analytics. Students develop strategies for framing and responding to the ranges of values-laden opportunities and dilemmas presented to research, policy, and practice communities as a result of the increasing capacity to monitor learning and learners.

### **HUDK 4054 MANAGING EDUCATION DATA**

Attaining, compiling, analyzing, and reporting data for academic research. Includes data definitions, forms, and descriptions; data and the research lifecycle; data and public policies; and data preservation practices, policies, and costs.

### **HUDK 5030 VISUAL EXPLANATIONS**

Surveys production and comprehension of visualizations ranging from ancient cave paintings and petroglyphs to diagrams, charts, graphs, comics, picture books, photographs, gesture, and film to extract and apply techniques for conveying objects, actions, forces relations, and emotions, meanings that are both inherently visible and non-visible. Implications for education, art, media, and HCI are drawn.

### **HUDK 5053 FEATURE ENGINEERING STUDIO**

Prerequisite: HUDK 4050. Design studio-style course covers the process of feature engineering and distillation, including brainstorming features, deciding what features to create, and criteria for selecting features for data mining. Students learn how to create features in Excel, Java, Google Refine, EDM Workbench, and other relevant tools.