DAPS Core Course Cluster I: Cognition & Learning

Overarching Summary: The Cognition and Learning group courses delve into the latest research and theories about how people learn, in formal and informal environments, and as individuals and in groups. Through these courses, students will gain expertise in conducting research that contributes to our fundamental understanding of human learning and will develop the skills to design effective learning experiences that enhance learning outcomes. Overall, the courses in this group aim to empower students to improve the quality of education by applying evidence-based strategies informed by cutting-edge research.

1. EDUC 315A - Introduction to CSCL: Computer-Supported Collaborative Learning (Pea)
2. EDUC 333A - Understanding Learning Environments (Lee)
3. EDUC 364 - Cognition & Learning (Ruiz-Primo)
4. EDUC 366 - Learning in Formal and Informal Environments (Barron)
5. EDUC 368 - Cognitive Development in Childhood & Adolescence
6. EDUC 398 - Core Mechanics of Learning (Schwartz/Blair)
7. EDUC 432 - Designing Explorable Explanations for Learning (Subramonyam)

EDUC 315A - Introduction to CSCL: Computer-Supported Collaborative Learning

This seminar introduces students to foundational concepts and research on computer-supported collaborative learning (CSCL). Computer Supported Collaborative Learning (CSCL) is defined as a triadic structure of collaboration mediated by a computational artifact (participant-artifact-participant). CSCL encompasses two individuals performing a task together in a short time, small or class-sized groups, and students following the same course, digitally interacting. The course is designed for LSTD doctoral students, LDT masters' students, other GSE graduate students and advanced undergraduates inquiring about theory, research and design of CSCL.

EDUC 333A - Understanding Learning Environments

This course is an introduction to the foundational ideas and origins of the learning sciences as they relate to conceptualizing, analyzing, and improving learning through the complementary work of researching and designing new learning environments, technologies, tools, and experiences. Core perspectives represented include those that are cognitive, situative, sociocultural, developmental, and critical about what, how, and why people learn new ideas and practices in authentic settings. Activities include detailed analysis of readings, learning environments, learning technologies, and emerging field directions.

EDUC 364 - Cognition and Learning

This course focuses on helping students to advance their knowledge of cognitive psychology and what this field can offer to understand learning and educational practice. We will discuss

how people learn, understand, and remember information, and why some people seem to be better at this than others. Topics discussed include the construction of knowledge, thinking about thinking, and the motivational and affective factors that shape thinking processes. Upon successful completion of this course, you will have a deeper understanding of how learners' knowledge, motivation, and development contribute to making meaning of information and to the actions they take to learn. Click here for full description of the course.

EDUC 366 - Learning in Formal and Informal Environments

Learning is increasingly recognized as distributed across settings with classroom learning occupying a small percentage of time across the lifespan. In this seminar we will explore how non-school learning environments can be powerful resources for multiple domains of development. We will consider the roles of relationships, activities, and ideational resources in creating generative spaces for learning and ask when and how they catalyze cross-setting learning. Readings include empirical studies of place-based studies that work to identify powerful social practices and processes of learning (e.g., peer, family, mentor interactions within after school clubs, sports teams, community art centers, and online communities). We will also consider person-based accounts that capture learning across time and setting with a focus on conceptualizing consequential transitions and transformative learning experiences.
Course readings are drawn from empirical journals, web publications, and books. Students will observe and document a non-school learning environment and complete a collaborative written or multimedia research project.

EDUC 368 - Cognitive Development in Childhood & Adolescence

*This course broadens and deepens students' understanding of cognitive development from the prenatal period through adolescence.*The course examines various theoretical, methodological, and empirical issues pertaining to different domains of cognitive development, such as neurobiological plasticity, infant cognition, theory of mind, memory, language, and executive functions. Throughout the course, as we survey research findings, we will discuss (1) methods that researchers have employed in their study of cognitive development; (2) limitations of current research and directions for future research; and (3) translation of research findings for practitioners and policymakers.

EDUC 398 - Core Mechanics of Learning

This course considers whether there are core mechanics of learning that can drive learning forward, and if so, how to build them into learning environments. We will sample several key learning mechanics that have been demonstrated to promote specific kinds of learning outcomes. The course is a mix of basic theory, research methods, and application of learning principles.

EDUC 432 - Designing Explorable Explanations for Learning

In this course, students will learn how to design explorable explanations and interactive simulations for learning. We will apply concepts from instructional design, constructivist learning theory, and information visualization to design engaging explorable explanations. Students will follow the human-centered design process to iteratively build working prototypes of explorables. Students will also develop the skills necessary to offer design feedback, and critique and evaluate explorable explanations.

DAPS Core Course Cluster II: Psychology meets Statistics

Overarching Summary: This cluster consists of courses wherein statistical tools are essential for understanding psychological processes. In these courses, students will learn about a range of psychological phenomena that are being studied with the help of statistical tools. These courses may be of relevance for those students with data science interests.

1. EDUC 234 - Curiosity in Artificial Intelligence (Haber)
2. EDUC 252 - Introduction to Psychometrics (Domingue)
3. EDUC 266 - Educational Neuroscience (McCandliss/Yeatman)
4. EDUC 463 - Computer Vision (Haber)

EDUC 234 - Curiosity in Artificial Intelligence

The fields of artificial intelligence and early childhood development stand to learn a great deal from each other, and this course provides an overview of recent research efforts in development, inspired by AI, and developmentally-inspired AI. How do we design artificial systems that learn as we do early in life -- as “scientists in the crib” who explore and experiment with our surroundings? How do we make AI "curious" so that it explores without explicit external feedback? Topics draw from cognitive science (intuitive physics and psychology, developmental differences), computational theory (active learning, optimal experiment design), and AI practice (self-supervised learning, deep reinforcement learning). Students present readings and complete both an introductory computational project (e.g. train a neural network on a self-supervised task) and a deeper-dive project in either cognitive science (e.g. design a novel human subject experiment) or AI (e.g. implement and test a curiosity variant in an RL environment).

EDUC 252 - Introduction to Psychometrics

Measurement of psychological traits is essential to understanding psychological processes and development; this course is an overview of the key ideas and techniques used in psychometrics generally and educational measurement specifically. This course covers key conceptual (e.g., validity, fairness) and technical (e.g., reliability) ideas that are essential for understanding and using common psychological and educational measures. In particular, we will spend a lot of time interacting with technical reports that describe some important psychological measures (e.g.,

the technical report that goes with the California state assessment); students will emerge from this class with the capacity to read and reason about the content of such reports.

EDUC 266 - Educational Neuroscience

This course provides a survey of brain imaging methods and frameworks for understanding brain functions that are shaped by education, including language & literacy, math & reasoning, and executive functions & goal directed actions. EDUC 266 is an introduction to the growing intersection between education and neuroscience. Students will probe the contributions and limitations of emerging theoretical and empirical contributions of neuroscience approaches to specific academic skills such as reading and mathematics, as well as exposure to general processes crucial for educational success, including motivation, attention, and social cognition. Students will gain mastery of theoretical frameworks, methods, and specific findings in cognition and learning, as tools for tackling contemporary challenges in education and development. More specifically, through this course students will gain an understanding of the methods that allow researchers to make inferences into the neural underpinnings of education and draw connections between the study of the mind and brain and the practice of education.

EDUC 463 - Computer Vision

This course provides a project-based introduction to computer vision, with emphasis on applications in education and the social sciences. The study of how to design artificial systems that can perform high-level tasks related to image or video data (e.g. recognizing and locating objects in images and behaviors in videos, or generating photorealistic, imagined data) -- has seen dramatic successes in recent years. In this course, we seek to give education and social science researchers the know-how needed to apply cutting edge computer vision algorithms in their work as well as an opportunity to workshop applications in their domains of interest.

EDUC 464 - Measuring Learning in the Brain

Everything we learn - be it a historical fact, the meaning of a new word, or a skill like reading, math, programming or playing the piano - depends on brain plasticity. The human brain's incredible capacity for learning is served by a variety of learning mechanisms that all result in changes in brain structure and function over different time scales. The goals of this course are to: (a) provide an overview of different learning systems in the brain, (b) introduce methodologies and experiments that have led to new discoveries linking human brain plasticity and learning, (c) design experiments, collect data, and measure the neurobiological underpinnings of learning in your own brain. The first section of the course will involve a series of lectures and discussions on the foundations of plasticity and learning with particular attention to experimental methods used in human neuroimaging studies. The second part of the course will involve workshops on designing and implementing experiments in Python/PsychoPy. During this part of the course students will design, present and implement their own experiments as group projects. Finally, students will learn how to collect and analyze MRI data by being

participants in their own experiments or analyzing publicly available datasets. **Requirements**: This class is designed for students who are interested in gaining hands-on experience with measuring the neurobiological underpinnings of learning. Student projects will involve designing experiments, collecting and analyzing data. This class will be taught using Python and experience with Python is required. Some background in neuroscience is also required as we will assume basic knowledge.

DAPS Core Course Cluster III: Social-Emotional Development and Understanding Risk and Resilience

Overarching Summary: This cluster includes courses that highlight developmental processes from early childhood through and beyond young adulthood. Students will learn about salient risk and resilience factors across contexts (e.g., family, community, school) that can influence social-emotional development and mental health. These courses attend to factors that can support or inhibit basic and applied research with children, youth, families, and systems.

1. EDUC 245 - Understand Racial & Ethnic Identity (LaFromboise)
2. EDUC 340 - Psychology and American Indian/Alaska Native Mental Health (LaFromboise)
3. EDUC 360 - Child Development in Contexts of Risk and Adversity (Obradovic)
4. EDUC 365 - Social, Emotional, and Personality Development (Damon)
5. EDUC 370 - Parenting and Family Relationships in Childhood (Obradovic)
6. EDUC 371 - Social Psychology and Social Change (Cohen)
7. EDUC 372 - African American Child and Adolescent Mental Health: An Ecological Lens (Saleem)
8. EDUC 454 - Prevention Science and Prevention Science and Community-Based Participatory Research (Fisher)

EDUC 245 - Understand Racial & Ethnic Identity
This seminar will explore the impact and relative salience of racial/ethnic identity on select issues including: discrimination, social justice, mental health and academic performance. New areas within this field such as the complexity of multiracial identity status and intersectional invisibility will also be discussed. Students will work with community partners to better understand the nuances of racial and ethnic identity development in different contexts.
Click here for full course description

EDUC 360 - Child Development in Contexts of Risk and Adversity

This course provides an overview of theoretical approaches and methodological issues pertaining to the study of child development in contexts of risk and adversity. Students will learn about different approaches to conceptualizing, measuring, and analyzing exposure to risk and adversity as well as children's adaptation. We review different theoretical frameworks and empirical models that researchers employ to identify and study factors and processes that are associated with variability in child outcomes. We will consider equity issues relevant to studying

adversity and adaptive functioning in diverse groups of children. Students will apply the knowledge gained in the course to develop a research proposal that is aligned with their own interests and work.
Click here for full course description

EDUC 365 - Social, Emotional, and Personality Development
This class focuses on the story of human development across the lifespan, with an emphasis on how people acquire the capacities for mutually beneficial social relations, positive motivation, and mature self-understanding. Topics include socialization, identity, purpose, moral commitment, anti-social behavior, SEL (social and emotional learning in schools), gender, culture, self-concept, and personality.
Click here for full course description

EDUC 370 - Parenting and Family Relationships in Childhood

In this course, students examine the relevance of parenting behaviors and family relationships for young children's development. The course readings and discussions first focus popular beliefs about parenting, transition to parenting, neurobiological implications of parenting, and on the family system's structure and function. Next, students learn how parental and child behaviors contribute to sensitivity, responsiveness, scaffolding, autonomy, and control within the dyad. The course concludes with examining parents' role in socializing children's emotions, promoting development of children's ethnic-racial identity, and participating in children's early education. Special consideration will be given to environmental (e.g., cultural, economic) factors affecting our conceptualization, measurement, and interpretations of parents' behaviors and their interactions with their children. *Click here for full course description*

EDUC 371 - Social Psychology and Social Change (Cohen)
This course will focus on the methodological foundations of research in social psychology and allied fields, and on the scientific and career decision-making that fosters strong research in these fields. It will focus on such topics as: why do science; how to develop research ideas and formulate a research program; classic experimental design; experimental approaches to social problems—the Lewinian tradition; the choice between laboratory, on-line, field and intervention research strategies; the role of theory in methodological choices; how to build experiments that reflect the real world; crafting independent variable manipulations and dependent measures; and the many routes to statistical power; the precautions of research hygiene; refining theory—generalizing and replicating; research productivity and the life of a research psychologist, effective approaches to writing. The course will explore many of these topics in the context of educational intervention grounded in social psychological theory.
Click here for full course description

EDUC 372 - African American Child and Adolescent Mental Health: An Ecological Lens

This seminar will explore the most salient historical, social, cultural, and ecological factors that influence the mental health and resilience of African American youth, with attention to contextual

risk and resilience factors that shape mental health. The course will focus on how families, schools, and communities are integral to youth's adjustment and well-being.
Click here for full course description

EDUC 454 - Prevention Science and Prevention Science and Community-Based Participatory Research

This course is aimed at students who have interest in learning about prevention science and community-based participatory research (CBPR) to address individual, family, community, and other contextual factors that influence development. The course will cover the origins and multidisciplinary roots of both prevention science and CBPR, key concepts, current trends and directions, theoretical approaches, program development and assessment, science to service, evaluation methods, best practices, policy development, and implementation and dissemination approaches in community systems of care.
Click here for full course description

EDUC 340 - Psychology and American Indian/Alaska Native Mental Health

Western medicine's definition of health as the absence of sickness, disease, or pathology; Native American cultures' definition of health as the beauty of physical, spiritual, emotional, and social things, and sickness as something out of balance. Topics include: historical trauma; spirituality and healing; cultural identity; values and acculturation; and individual, school, and community-based interventions. Prerequisite: experience working with American Indian communities.

Click here for full course description

DAPS Core Course Cluster IV: Language/Literacy Courses

Overarching Summary: The Language/Literacy group courses examine different aspects of language and literacy and their relationship to education. We pay attention to multiple levels of analysis (from individual to society), multiple methodologies (from individual and qualitative to group and experimental designs), multiple areas of application (e.g., instruction, policy, research, practice), multiple populations (e.g., students whose home language is not the language of instruction, students with disabilities), and multiple theoretical perspectives (e.g., behavioral, cognitive, sociolinguistic, sociocultural). Students are supported to develop a comprehensive, multidisciplinary-based perspective on the synergistic relationship between language and literacy and their influence on learning and instruction.

- EDUC 223 - Language Issues in Educational Research (Solano-Flores)
- EDUC 258 - Literacy Development and Instruction (Silverman)
- EDUC 443 - Introduction to Single Case Design (Lemons)

EDUC 223 - Language Issues in Educational Research

This course examines the intersection of language, technology, and education, the social nature of language, and its implications for educational research and practice in culturally- and linguistically-diverse societies. Researchers and practitioners in the field of education increasingly need to make a wide variety of decisions concerning language issues, even if language and linguistic groups are not the focus of their activities. Among many others, these decisions involve cultural and linguistic student diversity, the need for effective uses of information technology to communicate with multiple linguistic groups, and the need for valid, fair uses of big data, social media, and artificial intelligence to obtain and interpret information on individuals from multiple cultural and linguistic backgrounds. This course examines the intersection of language, technology, and education and supports both graduate and undergraduate students in thinking critically about and investigating the social nature of language and its implications for educational research and practice.

EDUC 258 - Literacy Development and Instruction

This seminar course focuses on theory, research, policy, and practice related to literacy development and instruction. How do children learn to read and write? Why do some children have difficulty acquiring literacy? What is the role of instruction in supporting reading and writing development? These are the central questions we will explore in EDUC 258 Literacy Development and Instruction. The readings and discussions in this seminar focus on literacy acquisition as a developmental and educational process. Course readings focus on theory, research, policy, and practice. In-class time will include discussion of the readings as well as activities to help you grapple with the content of the readings. The seminar class is designed to guide graduate and advanced undergraduate students in developing an understanding of the vast landscape of theory, research, policy, and practice related to literacy development and instruction.

EDUC 443 - Introduction to Single Case Design

This course will provide an introduction to single case design, an experimental research method that is appropriate to use with small samples. The purpose of this course is to provide an in-depth introduction to single case design—a rigorous, experimental research methodology that is particularly well suited to evaluate academic and behavioral interventions. The course will provide an overview of the rationale for single case design and will introduce critical features of designing and implementing single case design studies. This course is designed to focus on using single case design to evaluate academic and behavioral interventions. However, additional applications of the methodology will also be explored. This course is an intensive reading and writing course. Prerequisite knowledge of evidence-based academic and behavioral interventions, including theory and extant research, will be useful.