Cognitive Science

Department Website: https://voices.uchicago.edu/cognitivescience

Program of Study

Cognitive science explores the nature of cognitive processes such as perception, reasoning, memory, attention, language, decision making, emotion, motor control, and problem solving. The goal of cognitive science, stated simply, is to understand how minds work, in humans, animals, and machines. Cognitive science emerged in the latter part of the 20th century at the intersection of computer science, linguistics, philosophy, psychology, and neuroscience, and is an inherently interdisciplinary endeavor, drawing on tools and ideas from the social sciences, the physical and biological sciences, and the humanities. Topics of research include (but are not limited to) cognitive development, cognitive processing, judgment and decision making, language and communication, the neurological bases of cognition, perception, and memory, philosophy of mind, and artificial intelligence. A defining feature of cognitive science is its emphasis on integration among fields, for a truly interdisciplinary study of the mind. Students will be trained in formal methods of analysis and modeling that are common in majors in the physical and biological sciences, but often absent from majors in the humanities and social sciences; at the same time, students will also be trained in the advanced reasoning skills that define humanistic inquiry, but are often absent from more technical or applied majors.

The undergraduate major in Cognitive Science at the University of Chicago is designed to embody this interdisciplinary approach to the study of the mind and brain. Students gain broad knowledge of the field by taking courses in each of the five main disciplinary areas—computer science, linguistics, philosophy, psychology, and neuroscience—and then develop further focus and depth of understanding by taking additional courses in two of these disciplinary areas. Students will form key technical foundations through a Formal Foundations requirement, and will gain critical training in integrating interdisciplinary perspectives through the two core foundational courses: COGS 20001 Mind, Brain and Meaning and COGS 20002 Cognitive Models. A distinguishing feature of the Cognitive Science major at the University of Chicago is the centrality of the humanistic component of the study of the mind: starting immediately with the foundational course sequence, questions about what it means to learn, communicate, and think will be assigned equal significance to, and asked alongside, questions about what it is to learn, communicate, and think. Training emphasizes both engagement with the principal theories of mind and the evidence that bears on choices between them, and development of the conceptual and practical skills needed for understanding and conducting theoretical and empirical work in the field.

Students who are majoring in Cognitive Science may visit the Department of Cognitive Science homepage (https://voices.uchicago.edu/cognitivescience/) at voices.uchicago.edu/cognitivescience/ to learn about events and resources on and off campus and for links to information on employment opportunities.

Program Requirements

Students majoring in Cognitive Science will receive the degree of bachelor of arts. To qualify for the BA, students must minimally satisfy the general education requirements and take an additional 15 required courses for the major, which fall into four categories: Introductory Courses, which engage students with the core questions, intellectual history, and analytical methods that unify cognitive scientific research (200 units); Formal Foundations Courses, which give students the analytical tools to explore different strands of contemporary cognitive scientific research (200 units); Core Discipline Courses, which provide breadth and depth in the five core disciplines (900 units); and Extra-Disciplinary Courses, which engage students with cognitive scientific work in areas beyond the core disciplines (200 units). These courses and their pedagogical roles in the major are described in more detail below.

Note that some courses may be used to satisfy different requirements; but no single course may be “double counted” towards satisfaction of two requirements. For example, a student who takes PHIL 20100 Introduction to Logic may count it either towards satisfaction of the Formal Foundations requirement or towards satisfaction of the Philosophy Core Discipline requirement, but not both.

Introductory Courses

There are two introductory courses in the Cognitive Science major, COGS 20001 Mind, Brain and Meaning and COGS 20002 Cognitive Models, which serve two purposes. First, they introduce students to the empirical questions, theoretical concepts, and analytical methodologies that led to the emergence of cognitive science as a distinct field of study and continue to drive contemporary research. Second, they will highlight the ways that these issues manifest in the core disciplines of cognitive science—philosophy, psychology, linguistics, computer science, and neuroscience—and the ways that progress on central questions about the nature of the mind have been informed by interactions, conversations, and collaborations across the disciplines. Ideally, both courses will normally be co-taught by faculty from different fields, with the dual goal of providing substantive disciplinary expertise in more than one area, and of demonstrating, in the classroom, the kind of interdisciplinary that defines the field.
FORMAL FOUNDATIONS COURSES

The Cognitive Science major requires students to develop expertise in the formal analytical methods used in the field. The specific formal skills that will be most useful to individual students depend on their particular areas of interest, so students are free to select any two courses from an approved set of options from a range of courses in mathematics, computer science, statistics, and logic. Though not formally required, experience with the equivalent of one course in calculus is highly recommended, as expertise in this area is required for many of the Core Discipline courses. (NOTE: Calculus I-II may be used to satisfy the Formal Foundations requirement only if the courses are not used to satisfy the general education requirement in the mathematical sciences.)

The following list provides examples of courses that could be used to satisfy the Formal Foundations requirement, but it is meant to be illustrative only and is not exhaustive. Students may petition for approval of a course not on this list as satisfaction of the Formal Foundations requirement by submitting a proposal and rationale to the Director of the Cognitive Science Program.

Cognitive Science Formal Foundations Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CHDV 39301</td>
<td>Qualitative Research Methods</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 12100</td>
<td>Computer Science with Applications I</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 12200</td>
<td>Computer Science with Applications II</td>
<td>100</td>
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<tr>
<td>CMSC 14100</td>
<td>Introduction to Computer Science I</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 14200</td>
<td>Introduction to Computer Science II</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 14300</td>
<td>Systems Programming I</td>
<td>100</td>
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<tr>
<td>CMSC 14400</td>
<td>Systems Programming II</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 15100</td>
<td>Introduction to Computer Science I</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 15200</td>
<td>Introduction to Computer Science II</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 15400</td>
<td>Introduction to Computer Systems</td>
<td>100</td>
</tr>
<tr>
<td>CMSC 25300</td>
<td>Mathematical Foundations of Machine Learning</td>
<td>100</td>
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<tr>
<td>CMSC 27100</td>
<td>Discrete Mathematics</td>
<td>100</td>
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<tr>
<td>LING 21020</td>
<td>Formal Foundations of Linguistics</td>
<td>100</td>
</tr>
<tr>
<td>LING 22500</td>
<td>Quantitative Research Methods in Linguistics</td>
<td>100</td>
</tr>
<tr>
<td>MATH 13100</td>
<td>Elem Functions and Calculus I (or higher)</td>
<td>100</td>
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<tr>
<td>MATH 13200</td>
<td>Elem Functions and Calculus II (or higher)</td>
<td>100</td>
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<tr>
<td>MATH 19620</td>
<td>Linear Algebra</td>
<td>100</td>
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<tr>
<td>MATH 27700</td>
<td>Mathematical Logic I</td>
<td>100</td>
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<tr>
<td>MATH 28000</td>
<td>Introduction to Formal Languages</td>
<td>100</td>
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<tr>
<td>PHIL 20100</td>
<td>Introduction to Logic</td>
<td>100</td>
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<tr>
<td>PSYC 20200</td>
<td>Psychological Research Methods</td>
<td>100</td>
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<tr>
<td>PSYC 20250</td>
<td>Introduction to Statistical Concepts and Methods</td>
<td>100</td>
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<tr>
<td>STAT 24400</td>
<td>Statistical Theory and Methods I</td>
<td>100</td>
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<tr>
<td>STAT 24500</td>
<td>Statistical Theory and Methods II</td>
<td>100</td>
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<tr>
<td>STAT 27410</td>
<td>Introduction to Bayesian Data Analysis</td>
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CORE DISCIPLINE COURSES

The core disciplines of cognitive science are computer science, linguistics, philosophy, psychology, and neuroscience. The Core Discipline requirements are designed to strike a balance between breadth and depth in the core disciplines, while also allowing students a great deal of freedom to construct an individualized plan of study that best matches their interests in cognitive science. Students in the Cognitive Science major must take:

- **Five Core Discipline breadth courses:** one approved course in each of the five core disciplines
- **Four Core Discipline depth courses:** two additional courses in two of the core disciplines

Approved electives from each of the five core disciplines are listed below; students may, in addition, request approval of a course that is not on this list by submitting a proposal and rationale to the Director of the Cognitive Science Program.

Cognitive Science Core Discipline Courses: Computer Science

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<td>CMSC 14100</td>
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<td>Systems Programming I</td>
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</tr>
<tr>
<td>CMSC 15100</td>
<td>Introduction to Computer Science I</td>
<td>100</td>
</tr>
</tbody>
</table>
CMSC 15200 Introduction to Computer Science II 100  
CMSC 15400 Introduction to Computer Systems 100  
CMSC 20600 Introduction to Robotics 100  
CMSC 21800 Data Science for Computer Scientists 100  
CMSC 23900 Data Visualization 100  
CMSC 25300 Mathematical Foundations of Machine Learning 100  
CMSC 25400 Machine Learning 100  
CMSC 25500 Introduction to Neural Networks 100  
CMSC 25700 Natural Language Processing 100  

Cognitive Science Core Discipline Courses: Linguistics  
LING 20101 Introduction to Phonetics and Phonology 100  
LING 20201 Introduction to Syntax 100  
LING 20301 Introduction to Semantics and Pragmatics 100  
LING 21020 Formal Foundations of Linguistics 100  
LING 27010 Psycholinguistics 100  
LING 28610 Undergraduate Computational Linguistics 100  

Cognitive Science Core Discipline Courses: Philosophy  
PHIL 20100 Introduction to Logic 100  
PHIL 22960 Bayesian Epistemology 100  
PHIL 23000 Introduction to Metaphysics and Epistemology 100  
PHIL 23501 Philosophy of Mind 100  
PHIL 24010 Meaning and Reference 100  
PHIL 26000 History of Philosophy II: Medieval and Early Modern Philosophy 100  

Cognitive Science Core Discipline Courses: Psychology  
PSYC 20400 Cognitive Psychology 100  
PSYC 20500 Developmental Psychology 100  
PSYC 20700 Sensation and Perception 100  
PSYC 21510 Neuroscience of Communication 100  
PSYC 23200 Introduction to Language Acquisition 100  
PSYC 23820 Attention and Working Memory in the Mind and Brain 100  
PSYC 25101 The Psychology of Decision Making 100  
PSYC 28990 Constructing consciousness: How do we go from matter to mind? 100  

Cognitive Science Core Discipline Courses: Neuroscience  
NSCI 20101 Foundations of Neuroscience 100  
NSCI 20130 Systems Neuroscience 100  
NSCI 21015 Biological Psychology 100  
NSCI 21625 Cognitive Neuroscience in Humans and Rodents 100  
NSCI 21750 Ethics through a Neurobiological Lens 100  
NSCI 22010 Neuroscience of Consciousness 100  
NSCI 23700 Methods in Computational Neuroscience 100  

Extra-Disciplinary Courses  
The Extra-Disciplinary requirement ensures that students also engage with cognitive scientific work outside the core disciplines, in areas such as music, anthropology, religion, economics, and political science, and so are exposed to the full breadth of the interdisciplinary study of the mind. Students in the major must take a total of two Extra-Disciplinary courses.

A partial list of courses that could be used to satisfy the Extra-Disciplinary requirement is provided below; as above, students may also request approval of courses not included in this list, or courses from other fields, by submitting a proposal and rationale to the Director of the Cognitive Science Program.

Cognitive Science Extra-Disciplinary Courses
ANTH 21355 Remembering: An Anthropological Approach 100
ANTH 24321 Psychological Anthropology 100
ASTR 23000 Cosmos and Conscience: Looking for Ourselves Elsewhere 100
BPRO 28400 Thinking Psychoanalytically: From the Sciences to the Arts 100
BUSN 20710 Behavioral Economics 100
ENGL 12720 Inventing Consciousness: Literature, Philosophy, Psychology 100
CHDV 20703 Literacy, Language, and Education 100
CHDV 22580 Child Development in the Classroom 100
CHDV 23100 Human Language and Interaction 100
CHDV 27950 Evolution and Economics of Human Behavior 100
MUSI 20719 Music and Mind 100
MUSI 43720 Music and Affect 100
PLSC 24210 Politicizing the Passions: Emotions and Collective Action 100
RLST 23750 The End of Metaphysics and the Future of Philosophy 100

SUMMARY OF REQUIREMENTS FOR THE BA IN COGNITIVE SCIENCE

COGS 20001 Mind, Brain and Meaning 100
COGS 20002 Cognitive Models 100
Two Formal Foundations Courses 200
Five Core Discipline breadth courses 500
Four Core Discipline depth courses 400
Two Extra-Disciplinary courses 200
Total Units 1500

GRADING

All courses used to satisfy requirements for the major must be taken for quality grades. With consent of the instructor, nonmajors may take COGS courses for P/F grading.

HONORS

Students wishing to receive a BA in Cognitive Science with honors must carry out an independent research project that culminates in an honors thesis. Any student who has maintained a 3.25 or better overall GPA and a 3.5 or better GPA in courses that count towards the major may apply to receive a degree with honors; the deadline for application is the end of the fifth week of the third quarter before the student graduates, canonically Autumn Quarter of the fourth year. Applications must include a research proposal of no more than three pages, which explains the project and its significance, documents the student’s preparation for the work, and has been approved by a faculty advisor or advisors. Students are strongly encouraged to identify co-advisors from distinct disciplines. The thesis must be submitted by the fifth week of the quarter in which the student plans to graduate.

This program may accept an honors thesis or project used to satisfy the same requirement in another major with the consent of both program directors. Students should consult with the relevant program directors by the earliest BA proposal deadline, or by the end of their third year if neither program publishes a deadline. The petition to use a Single Bachelor’s Paper for Two Majors (https://humanities-web.s3-us-east-2.amazonaws.com/college-prod/s3fs-public/documents/BA_Double_Major_0.pdf) form, to be signed by both program directors, must be completed and returned to the College adviser by the end of Autumn Quarter of the student’s year of graduation.

COGNITIVE SCIENCE COURSES

COGS 20001. Mind, Brain and Meaning. 100 Units.
What is the relationship between physical processes in the brain and body and the processes of thought and consciousness that constitute our mental life? Philosophers and others have puzzled over this question for millennia. Many have concluded it to be intractable. In recent decades, the field of cognitive science—encompassing philosophy, psychology, neuroscience, computer science, linguistics, and other disciplines—has proposed a new form of answer. The driving idea is that the interaction of the mental and the physical may be understood via a third level of analysis: that of the computational. This course offers a critical introduction to the elements of this approach, and surveys some of the alternative models and theories that fall within it. Readings are drawn from a range of historical and contemporary sources in philosophy, psychology, linguistics, and computer science. (B) (II)
Instructor(s): J. Bridges; L. Kay; C. Kennedy Terms Offered: Autumn
Equivalent Course(s): PSYC 26520, PHIL 36520, PHIL 26520, LING 26520, PSYC 36520, NSCI 22520, LING 36520
COGS 20002. Cognitive Models. 100 Units.
A foundational principle of cognitive science is that the workings of cognitive systems—whether biological, mechanical, or digital—can be productively represented by the operation of formal computational models. This course provides a survey of popular modeling frameworks (such as Bayesian rational agents, connectionist networks, dynamical systems, etc.), as well as the cognitive phenomena that these models have been used to simulate. We will discuss the theoretical commitments of these models, assess strengths and weaknesses of each framework for addressing different types of cognitive questions, and analyze the implications of these models’ successes and failures for our understanding of the mind.
Instructor(s): Yu Ji, Eugene Terms Offered: Spring
Equivalent Course(s): LING 30002, LING 20002

COGS 20100. Perspectives on large language models: computational, cognitive, social. 100 Units.
In this interdisciplinary course, students will delve into the multifaceted world of large language models (LLMs), investigating their computational, cognitive, and social dimensions. The course covers an array of topics, such as the history and evolution of LLMs, computational underpinnings like neural networks and training methodologies, cognitive aspects of human-like language understanding, communication, and creativity, as well as crucial ethical and social considerations, encompassing fairness, transparency, trustworthiness, and privacy.
Through both lectures and discussions, we will examine the scientific and practical applications and limitations of LLMs across diverse domains and contemplate the future prospects and challenges LLMs pose for science, technology, and society. Through critical discourse, hands-on exercises, and case studies, our goal is to foster a comprehensive understanding of LLMs, empowering students to critically assess these models and contribute to ongoing dialogues regarding their broader implications. Prior experience in computer science or cognitive science is beneficial but not mandatory. Note: this course primarily focuses on cultivating reflective thinking about LLMs, rather than programming or implementation. Students with programming skills are, however, encouraged to utilize them to facilitate their learning.
Instructor(s): Eugene Yu Ji Terms Offered: Autumn
Equivalent Course(s): LING 20110

COGS 22000. Introduction to Linguistics. 100 Units.
This course offers a brief survey of how linguists analyze the structure and the use of language. Looking at the structure of language means understanding what phonemes, words, and sentences are, and how each language establishes principles for the combinations of these things and for their use; looking at the use of language means understanding the ways in which individuals and groups use language to declare their social identities and the ways in which languages can change over time. The overarching theme is understanding what varieties of language structure and use are found across the world’s languages and cultures, and what limitations on this variety exist.
Equivalent Course(s): LING 20001

COGS 22001. Introduction to Phonetics and Phonology. 100 Units.
This course is an introduction to the study of speech sounds and their patterning in the world’s languages. The first half of the course focuses on how speech sounds are described with respect to their articulatory, acoustic, and perceptual structures. There are lab exercises both in phonetic transcription and in the acoustic analysis of speech sounds. The second half focuses on fundamental notions that have always been central to phonological analysis and that transcend differences between theoretical approaches: contrast, neutralization, natural classes, distinctive features, and basic phonological processes (e.g., assimilation).
Equivalent Course(s): LING 20101

COGS 22002. Language and Communication. 100 Units.
This course can also be taken by students who are not majoring in Linguistics but are interested in learning something about the uniqueness of human language, spoken or signed. It covers a selection from the following topics: What is the position of spoken language in the usually multimodal forms of communication among humans? In what ways does spoken language differ from signed language? What features make spoken and signed language linguistic? What features distinguish linguistic means of communication from animal communication? How do humans communicate with animals? From an evolutionary point of view, how can we account for the fact that spoken language is the dominant mode of communication in all human communities around the world? Why cannot animals really communicate linguistically? What do the terms language “acquisition” and “transmission” really mean? What factors account for differences between “language acquisition” by children and by adults? Are children really perfect language learners? What factors bring about language evolution, including language speciation and the emergence of new language varieties? How did language evolve in mankind? This is a general education course without any prerequisites. It provides a necessary foundation to those working on language at the graduate and undergraduate levels.
Equivalent Course(s): CHDV 30150, EDSO 20150, CHDV 20150, LING 30150, LING 20150

COGS 22003. Introduction to Syntax. 100 Units.
This course is an introduction to basic goals and methods of current syntactic theory through a detailed analysis of a range of phenomena, with emphasis on argumentation and empirical justification. Major topics include phrase structure and constituency, selection and subcategorization, argument structure, case, voice, expletives, and raising and control structures.
Equivalent Course(s): LING 20201
COGS 22004. Introduction to Semantics and Pragmatics. 100 Units.
This course familiarizes students with what it means to study meaning and use in natural language. By
"meaning" we refer to the (for the most part, logical) content of words, constituents, and sentences (semantics),
and by "use" we intend to capture how this content is implemented in discourse and what kinds of additional
dimensions of meaning may then arise (pragmatics). Some of the core empirical phenomena that have to
do with meaning are introduced: lexical (i.e., word) meaning, reference, quantification, logical inferencing,
presupposition, implicature, context sensitivity, cross-linguistic variation, speech acts. Main course goals are not
only to familiarize students with the basic topics in semantics and pragmatics but also to help them develop basic
skills in semantic analysis and argumentation.
Equivalent Course(s): LING 20301, LING 30310

COGS 22005. Morphology. 100 Units.
Why is the plural of child in English children and not *childs? Why is undoable ambiguous ((ii) 'unable to
be done', (ii) 'able to be undone'), while unkillable isn't (only 'unable to be killed')? Unhappier is intuitively
composed of several, smaller pieces: un-, happy, and -er; but what about unkempt? These questions are the
purview of MORPHOLOGY, the field of linguistics devoted to studying the internal structure of words and
how they are formed. Consequently, in this course we will investigate the nature of morphemes, in all their
cross-linguistic shapes and guises. Key concepts which will frame our discussion include inflection, syncretism,
allomorphy, and blocking. The only prerequisite for this course is LING 20001: Introduction to Linguistics.
Equivalent Course(s): LING 21000

COGS 22006. Sociophonetics. 100 Units.
Variation is a ubiquitous feature of speech, yet much of the variation observed is non-random. This class will
examine this type of structured heterogeneity (Weinreich et al., 1968) from the point of view of sociophonetics.
We will focus on the interrelationships between phonetic/phonological form and social factors such as speaking
style and the background of the speaker, with a particular interest in explaining the origins and transmission of
linguistic change. Our goals will be to (a) acquire the phonetic and phonological foundation necessary to conduct
sociophonetic research through practical exercises; (b) survey new sociolinguistic research that addresses issues
in phonetic and phonological theories and (c) locate and explain phonetic variation in its social context while
drawing on current approaches to the relationship between language and society.
Equivalent Course(s): LING 21720, CHST 21720, LING 31720

COGS 22007. The Evolution of Language. 100 Units.
This course is designed to review critically some of the literature on the phylogenetic emergence of Language, in
order to determine which questions have been central to the subject matter, which ones have recurred the most,
and to what extent the answers to these are now better informed. The class will also review new questions such
as the following: What is the probable time of the emergence of modern language(s)? Should we speak of the
emergence of Language or of languages, in the plural?
Equivalent Course(s): LING 21920, PSYC 41920, CHDV 21920, ANTH 47305, LING 41920, EVOL 41920, CHSS
41920, CHDV 41920

COGS 22008. New Perspectives on Language Emergence. 100 Units.
In this course we will investigate anthropological and linguistic perspectives on language emergence, as well
the social, demographic, environmental, linguistic, and modality (vision, speech, touch) factors that contribute
to the formation of new languages. Emerging languages in communities around the world offer unprecedented
scientific opportunities to address important questions previously deemed intractable, such as: Where does
language come from? How do our experiences of the world influence the way our languages are structured? At
what level of abstraction can language be studied as an autonomous object of analysis? The topic of language
emergence has tended to focus on the interaction of linguistic, psychological, and demographic factors. We will
bring the important anthropological dimension to the topic of language emergence, which addresses the way
that users of emerging languages inhabit the world. The readings, lectures, and discussions will address new
implications for our understanding of language creation.
Equivalent Course(s): CDIN 33500, CHDV 23500, LING 33500, ANTH 33501, CHDV 33500, LING 23501, CDIN
23500, ANTH 23501

COGS 22009. Crosslinguistic Perspectives on Language Development. 100 Units.
This discussion-based course covers cross-linguistic evidence concerning similarities and dissimilarities in how
children learn language across diverse language communities. Each year will revolve around a central topic. This
year we will focus on the acquisition of phonology.
Equivalent Course(s): LING 33700, PSYC 33720, CHDV 23700, PSYC 23720, LING 23701, CHDV 33700

COGS 22010. The Language of Deception and Humor. 100 Units.
In this course we will examine the language of deception and humor from a variety of perspectives: historical,
developmental, neurological, and cross-cultural and in a variety of contexts: fiction, advertising, politics,
courtship, and everyday conversation. We will focus on the (linguistic) knowledge and skills that underlie the
use of humor and deception and on what sorts of things they are used to communicate.
Equivalent Course(s): SIGN 26030, LING 33920, LING 23920

COGS 22011. Bilingualism and Heritage Languages. 100 Units.
TBD.
COGS 22013. Psycholinguistics. 100 Units.
This is a survey course in the psychology of language. We will focus on issues related to language comprehension, language production, and language acquisition. The course will also train students on how to read primary literature and conduct original research studies.
Equivalent Course(s): LING 26810, LING 36810

COGS 22014. Lexical Semantics. 100 Units.
TBD.
Equivalent Course(s): LING 37131, LING 27131

COGS 22015. Computational Linguistics. 100 Units.
This course is a mixed level introduction to topics at the intersection of computation and language. We will study computational linguistics from both scientific and engineering angles: the use of computational modeling to address scientific questions in linguistics and cognitive science, as well as the design of computational systems to solve engineering problems in natural language processing (NLP). The course will combine analysis and discussion of these approaches with training in the programming and mathematical foundations necessary to put these methods into practice. The course is designed to accommodate students both with and without prior programming experience. Our goal is for all students to leave the course able to engage with and critically evaluate research in cognitive/linguistic modeling and NLP, and to be able to implement intermediate-level computational models for novel computational linguistics research.
Equivalent Course(s): LING 38620, CMSC 35620, LING 28620

COGS 22017. Spiritual Exercises: Giving Form to Thought and Life from Plato to Descartes. 100 Units.
This course will examine the tradition of spiritual exercises from antiquity to the early modern period. Spiritual exercises were at the core of classical paideia, the regimen of self-formation designed and promoted by ancient philosophers, orators, and other pedagogues. As Pierre Hadot and Michel Foucault have demonstrated, ancient philosophy first and foremost has to be understood as a “way of life,” as a set of techniques and practices for shaping the self according to wisdom. It was not until philosophy’s critical turn with Kant that it shed its practical dimension and became a “theoretical” discipline. Early Christianity, styling itself as the “true philosophy,” eagerly adopted the ancient spiritual exercises and retooled them for its salvational ends. Throughout the middle ages and early modern period spiritual exercises and meditative techniques informed a host of religious, cultural, and artistic practices and media such as prayer and devotional reading, religious art and poetry, but also theatrical performances and musical works. We will focus on individual exercises like the meditation, the examination of conscience, the discernment of spirits, the application of senses, prosoche (attention), consolation, contemplation, etc., and discuss authors such as Epictetus, Seneca, Marcus Aurelius, John Cassian, Augustine, Bonaventure, Ignatius, Descartes, and others.
Equivalent Course(s): RLST 25424, CMLT 35424, GRMN 25424, FNDL 25424, CLCV 25423, CMLT 35424, CLAS 35423, GRMN 35424

COGS 24001. Prediction in Language Comprehension. 100 Units.
Language tends to follow predictable patterns, from what sounds and words are about to be uttered, to what grammatical structures are likely, to be used to what broader implications are about to be suggested, and more. One prevailing hypothesis is that the human mind can take advantage of this predictability to help maintain the rapid pace of language comprehension. This course will explore critical questions surrounding the nature of prediction processes during language comprehension. What do people predict? How are their predictions constrained? How can we study the inherently internal processes(es) of prediction? What are the consequences of prediction? Perhaps most importantly, what do the answers to these questions suggest about the mechanisms and computations of prediction? Readings will primarily consist of contemporary articles from peer-reviewed journals, and class meetings will be a mix of lectures and student-led discussions.
Instructor(s): Melinh Lai Terms Offered: Spring
Equivalent Course(s): LING 24001

COGS 25000. Artificial Intelligence, Human Condition, Human Capacities. 100 Units.
This seminar course will engage students from multiple disciplines in critically reflecting upon the current advancements in artificial intelligence with their implications for the human condition and human capabilities. The first group of readings will incorporate classical works by thinkers such as Hanna Arendt, Norbert Wiener, and Karl Jaspers on the human condition, and Amartya Sen and Martha Nussbaum’s works on human capacities. The second group of readings will include contemporary research papers from computer science, cognitive science, linguistics, anthropology, economics, and philosophy. Students will be asked to develop their own perspective and methodology to engage with and relate the two groups of readings, further develop their literature on the topic, and write a final research paper on the human condition in the age of AI.
Equivalent Course(s): KNOW 35002, COGS 35000, MAPH 35000, KNOW 25002, MAPS 35000, FNDL 25004