

Cognitive Sciences (COGS)

Courses

COGS 14P. Scientific Python for Research. 4 Units.

Introduces Python for data analysis and modeling encountered in cognitive science and neuroscience. Topics include data structures, execution control, graphic visualization, and interaction with sound and display interfaces. Application in statistical analysis, model simulation, and stimulus presentation and experimental control.

Same as PSYC 14P.

Restriction: Cognitive Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

COGS H101A. Honors Seminar in Psychology and Cognitive Sciences I. 4 Units.

Focuses on the research activities and honors thesis research projects of each student and the research of various Cognitive Sciences faculty. Students discuss their research interests in the early and later stages of their projects. Research projects and write-ups required.

Grading Option: Pass/no pass only.

Same as PSYC H101A.

Restriction: Cognitive Sciences Honors students only. Psychology Honors students only.

COGS H101B. Honors Seminar in Psychology and Cognitive Sciences II. 4 Units.

Focuses on the research activities and honors thesis research projects of each student and the research of various Cognitive Sciences faculty. Students discuss their research interests in the early and later stages of their projects. Research projects and write-ups required.

Prerequisite: PSYC H101A

Grading Option: Pass/no pass only.

Same as PSYC H101B.

Restriction: Cognitive Sciences Honors students only. Psychology Honors students only.

COGS H101C. Honors Seminar in Psychology and Cognitive Sciences III. 4 Units.

Focuses on the research activities and honors thesis research projects of each student and the research of various Cognitive Sciences faculty. Students discuss their research interests in the early and later stages of their projects. Research projects and write-ups required.

Prerequisite: PSYC H101B

Same as PSYC H101C.

Restriction: Cognitive Sciences Honors students only. Psychology Honors students only.

COGS 106. Computational Lab Skills. 4 Units.

Teaches programming tools, skills, and conventions for collaborative work in computational cognitive science. Topics covered include program structure, version control, random number generation, plotting, basic model fitting, and numerical optimization methods.

Prerequisite: (PSYC 14M or COGS 14P or ICS 31) and (PSYC 10C or STAT 7 or STAT 110)

Restriction: Cognitive Sciences Majors only.

Concurrent with COGS 205B.

COGS 107. Cognitive Modeling. 4 Units.

Cognitive process models analyzed using computational Bayesian methods. Formal statistical specification of models, parameter estimation, model evaluation, and research applications. Covers multinomial process trees, signal detection theory, Thurstone ranking models, item-response theory, decision models, and reaction time models.

Prerequisite: (PSYC 14M or COGS 14P or ICS 31) and (PSYC 10C or STAT 7 or STAT 110)

Restriction: Cognitive Sciences Majors have first consideration for enrollment.

COGS 108. Neural Analytics. 4 Units.

Introduces the theoretical foundations and practical applications of neural data analysis. Topics include models of neural signals, neural time series analysis, and machine learning applications in cognitive neuroscience.

Prerequisite: (PSYC 14M or COGS 14P or ICS 31) and (PSYC 10C or STAT 7 or STAT 110)

Restriction: Cognitive Sciences Majors have first consideration for enrollment.

COGS 109. Cognitive Sciences Research Seminar. 4 Units.

Read and discuss examples of the primary research leading to the concepts covered in Psychology Fundamentals. Focuses on how this research is conducted and how inferences from it are drawn.

Prerequisite or corequisite: PSYC 9A

Restriction: Cognitive Sciences Majors only.

COGS 110. Quantitative Methods for Cognitive Sciences Research. 4 Units.

Basics of quantitative methods used in cognitive sciences research focusing on linear algebra, Fourier analysis, multivariate statistics, and signal detection theory. Examples drawn from models and methods used in cognitive sciences research with practical examples.

Prerequisite: MATH 2B and STAT 7 and (PSYC 114M or ICS 31)

Restriction: Cognitive Sciences majors only.

COGS 112LP. Research in Perception and Psychophysics Laboratory. 2 Units.

Required laboratory section and co-requisite for COGS 112P.

Corequisite: COGS 112P

Same as PSYC 112LP.

Restriction: Psychology Majors have first consideration for enrollment.

COGS 112LR. Cognitive Robotics Laboratory. 2 Units.

Required laboratory section and corequisite for PSYCH 112R.

Corequisite: PSYC 112R

Same as PSYC 112LR.

Restriction: Cognitive Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

COGS 112P. Research in Perception and Psychophysics. 4 Units.

Introduction to design and practice of experiments: students perform auditory, visual, tactile, or other experiments. Emphasis on methodology, finding and reading previous research, generating research ideas, statistical analysis.

Corequisite: COGS 112LP

Prerequisite: (PSYC 9A and PSYC 9B and PSYC 9C) or (PSCI 11A and PSCI 11B and PSCI 11C) and (PSYC 10C or SSCI 10C or ANTH 10C or PLSC 10C or SOCL 10C) or (MATH 2B and STAT 7)

Same as PSYC 112P.

Restriction: Cognitive Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

COGS 112R. Cognitive Robotics. 4 Units.

Introduces concepts on experimental design, embodiment, robot construction, and computer programming. Concepts of embodied intelligence and case studies of cognitive robotics are covered in lecture. Simple robots are constructed and programmed to carry out different behavioral experiments in lab.

Corequisite: PSYC 112LR

Prerequisite: (PSYC 9A and PSYC 9B and PSYC 9C) or (PSCI 11A and PSCI 11B and PSCI 11C) and (PSYC 10C or SSCI 10C or ANTH 10C or PLSC 10C or SOCL 10C) or (MATH 2B and STAT 7)

Same as PSYC 112R.

Restriction: Cognitive Sciences Majors have first consideration for enrollment. Psychology Majors have first consideration for enrollment.

COGS 201A. Cognitive Sciences Research Seminar. 1.3 Unit.

Weekly reports and colloquia by faculty, students, and visitors.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 201B. Cognitive Sciences Research Seminar. 1.3 Unit.

Weekly reports and colloquia by faculty, students, and visitors.

Prerequisite: COGS 201A

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 201C. Cognitive Sciences Research Seminar. 1.4 Unit.

Weekly reports and colloquia by faculty, students, and visitors.

Prerequisite: COGS 201B

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 202A. Proseminar in the Cognitive Sciences. 1 Unit.

Introduction to the conceptual foundations and basic research results in the cognitive sciences for first-year graduate students.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only.

COGS 203A. Statistical Models for Cognitive Sciences I . 4 Units.

Logic and set theory are covered during the first three weeks, using an interactive computer system. The remaining seven weeks are devoted to probability theory and cover elementary concepts from samples spaces to Chebychev's Inequality and the moment generating function.

Restriction: Graduate students only.

COGS 203B. Statistical Models for Cognitive Sciences II . 4 Units.

An introduction to statistical estimation and statistical inference. Topics include sufficiency and the Rao-Blackwell Theorem, completeness and the Lehmann-Scheffe Theorem. The method of maximum likelihood is explored in some detail. Inference in linear models covers regression and analysis of variance.

Restriction: Graduate students only.

COGS 203C. Statistical Models for Cognitive Sciences III . 4 Units.

Discussion of the fundamentals of statistical inference and computational implementations of common statistical models.

Restriction: Graduate students only.

COGS 203D. Applied Mathematics for Cognitive Sciences. 4 Units.

Covers the basics of linear systems analysis, focusing on linear algebra, Fourier analysis, differential equations, and elementary signal processing. Applications in Cognitive Science and Cognitive Neuroscience research are developed.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 204A. Seminar in Professional Development. 1 Unit.

Development of professional skills. Focuses on grant writing and submission process, responsible conduct of research, and ethics training.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 204B. Seminar in Professional Development. 1 Unit.

Development of professional skills. Focus on scientific presentations and preparation.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 204C. Seminar in Professional Development. 1 Unit.

Development of professional skills. Focuses on career opportunities, interests and information, and community outreach.

Grading Option: Satisfactory/unsatisfactory only.

Restriction: Graduate students only. Cognitive Neuroscience Majors only. Cognitive Sciences Majors only. Psychology Majors only.

COGS 205A. Introduction to Programming. 4 Units.

Introduces rudiments of programming, statistical analysis and probability theory, graphic visualization, GUI design, spectral analysis, and simulation models using MATLAB, a software package for solving quantitative problems often encountered in experimental psychology.

Restriction: Graduate students only.

COGS 205B. Computational Lab Skills for Cognitive Scientists I. 4 Units.

Provides an in-depth introduction to writing MATLAB programs to run auditory and visual experiments. Topics covered include program structure, stimulus generation, presentation, and data collection.

Restriction: Graduate students only.

COGS 205C. Computational Lab Skills for Cognitive Scientists II. 4 Units.

Introduction to a number of computational statistics approaches including exploratory data analysis and modeling using a probabilistic framework with Bayesian graphical models. Emphasis on in-class programming using MATLAB.

Restriction: Graduate students only.

COGS 205D. Neural Networks and Machine Learning. 4 Units.

An introduction and review of the current state of the art in neural networks and machine learning with specific emphasis of applications to behavioral and neuroscience data analysis and modeling.

Restriction: Graduate students only.

COGS 210A. Cognitive and Brain Sciences I: Topics in Perception. 4 Units.

Discusses models of cognition and evidence linking cognition and the brain. Focus is on visual, auditory, and somatic perception and bottom-up mechanisms of attention.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 210B. Cognitive and Brain Sciences II: Topics in Cognition. 4 Units.

Discusses models of cognition and evidence linking cognition and the brain. Focus is on emotion, top-down attention, goal-directed behavior, categorization, judgment, and decision-making.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 210C. Cognitive and Brain Sciences III: Topics in Learning and Development. 4 Units.

Discusses experimental data, formal models of learning, and evidence linking learning and development to its neural substrates. Topics include Pavlovian and instrumental conditioning, language acquisition, causal reasoning, perceptual learning, category formation, and structure learning.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 213. The Mind/Body Problem. 4 Units.

Multidisciplinary, drawing on information from the fields of quantum physics, computer vision, artificial intelligence, cognition, neurophysiology, philosophy, and psychophysics.

Restriction: Graduate students only.

COGS 214. Bayesian Cognitive Modeling. 4 Units.

Considers a range of statistical methods of data analysis and simple cognitive models using the Bayesian graphical modeling framework.

Restriction: Graduate students only.

COGS 218. Hearing. 4 Units.

Examines auditory sensation and perception using psychophysical and neuroscientific perspectives. Covers physical aspects of sound; subcortical auditory processing; aspects of sensation and perception such as sensitivity, sound localization, and complex-sound recognition; neuroscientific studies of cortical function; and abnormal auditory processing.

Restriction: Graduate students only.

COGS 229. Special Topics in Human Cognition. 1.3-4 Units.

Current research in brain/ behavior relationships, human memory, and learning theory is presented.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 237. Advanced Bayesian Cognitive Modeling. 4 Units.

Considers a range of advanced cognitive process models including models of signal detection, memory retention, category learning, stimulus representation, and reasoning using the Bayesian graphical modeling framework.

Prerequisite: COGS 214

Restriction: Graduate students only.

COGS 239. Special Topics in Methodology and Models. 1.3-4 Units.

Current research in cognitive sciences methodologies, concepts, and models is presented.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 259. Special Topics in Human Performance. 1.3-4 Units.

Current research in the human issues involved with sensation, perception, and cognition.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 261N. Cortical Neuroscience. 4 Units.

Physiology of the cerebral cortex, theoretical neuroscience, and the neural basis of perception.

Restriction: Graduate students only.

COGS 262. Functional Neuroanatomy. 4 Units.

It is impossible to truly understand human behavior without some understanding of the physical structure that enables behavior. Examines recent findings in functional neuroanatomy through lectures and papers discussing links between particular behaviors and specific brain structures.

Restriction: Graduate students only.

COGS 265. Introduction to Functional MRI. 4 Units.

Describes the fundamentals of imaging the human brain function using functional Magnetic Resonance Imaging (fMRI). Topics include basic fMRI physics, experimental design, and data acquisition and analysis.

Restriction: Graduate students only.

COGS 268A. Computational Neuroscience. 4 Units.

Introduction to computational neuroscience. Mathematical models of single neurons, neural circuits, thalamocortical systems, and cortical mass action can stimulate single-unit, local field potential, and EEG dynamics. These models are used to investigate mechanisms of sensation, motor control, attention, and consciousness.

Prerequisite: COGS 210A or COGS 210B or COGS 210C

Restriction: Graduate students only.

COGS 268R. Cognitive Robotics. 4 Units.

Introduces concepts for studying cognitive function by embedding brain models on robotic platforms. Topics include robot construction, computer programming, and the notion of embodiment. Students construct simple robots and program these robots to perform different behaviors.

COGS 269. Special Topics in Cognitive Neuroscience. 1.3-4 Units.

Current research in cognitive neuroscience.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 289. Special Topics in Sensation and Perception. 1.3-4 Units.

Current research in the reception and processing of visual and auditory stimuli presented.

Repeatability: Unlimited as topics vary.

Restriction: Graduate students only.

COGS 290. Dissertation Research. 1-12 Units.

Dissertation research with Cognitive Science faculty.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only. Cognitive Sciences Majors only.

COGS 299. Individual Study. 4-12 Units.

Individual research with Cognitive Science faculty.

Repeatability: May be repeated for credit unlimited times.

Restriction: Graduate students only.