PSYCHOLOGY

Directors of undergraduate studies: Yarrow Dunham (yarrow.dunham@yale.edu), 205 K, 432-0699; psychology.yale.edu

Psychology is the scientific study of the mind, the brain, and human behavior. The Psychology department offers coursework and research opportunities in the fields of clinical, cognitive, developmental, neuroscientific, and social psychology. By studying psychology, students better understand human behavior, including who we are, how we do the things we do, and how we enhance our lives and society. The Psychology major provides a foundation for careers in education and research; law; medicine and public health; politics and public policy; and in business fields such as marketing, finance, and management.

COURSE NUMBERING

Courses in the department are organized so that they are best taken in several parallel sequences. Courses numbered from 120–190 and ending in a zero are core survey courses that introduce students to major areas of psychology and provide additional background for more advanced courses. These courses represent major content areas of psychology; students should sample broadly from them before specializing. Courses numbered from 200–209 focus on statistics. Courses numbered from 210–299 teach general methodology or data collection in various areas of psychology. Courses numbered from 300–399 are more advanced courses in a particular specialization. Senior seminars, whose enrollment is limited to no more than twenty students, are numbered from 400–489. These seminars are best taken once a student has appropriate background. Courses numbered from 490–499 are special tutorial courses that require permission of the adviser and the director of undergraduate studies (DUS).

PREREQUISITE

PSYC 110, a general survey course, is prerequisite to several 100-level and all 200-level and above courses. This prerequisite may alternatively be satisfied by a score of 5 on the Psychology Advanced Placement test or a score of 7 on the IB Psychology exam.

REQUIREMENTS OF THE MAJOR

Standard major The standard major in Psychology for both the B.A. degree program and the B.S. degree program requires twelve credits beyond PSYC 110, including the senior requirement. The difference between the B.A. and the B.S. degree programs is the senior requirement (see below).

1. Because psychology is so diverse a subject, every student is required to take two courses from the social science point of view in psychology and two from the natural science point of view in psychology. Listed below are examples of courses that fulfill these requirements. A complete list of courses, updated each term, may be found on Yale Course Search (YCS) by searching "Any Course Information Attribute." At least one from each group must be a course designated as Core in the course listings and below. Students are expected to take their two core courses as early as possible in the major, normally within two terms after declaring their major.

Social science core (YC PSYC: Social Science Core): PSYC 140, 150, 180

Social science: Search YCS for courses with the YC PSYC: Social Science designation.

Natural science core (YC PSYC: Natural Science Core): PSYC 120, 130, 135, 160

Natural science: Search YCS for courses with the YC PSYC: Natural Science designation.

2. Because statistical techniques and the mode of reasoning they employ are fundamental in psychology, a course in statistics (PSYC 200) is required, preferably prior to the senior year. A student may substitute S&DS 103 for PSYC 200 or may substitute an examination arranged with the instructor of PSYC 200 for the course requirement. Students may take the examination only one time, and an additional course in psychology should be taken if the examination substitutes for PSYC 200. A student who has taken S&DS 103 may not take PSYC 200 for credit.

3. To assure some direct experience in collecting and analyzing data, students must elect at least one course, preferably prior to the senior year, in which research is planned and carried out. Courses numbered between 210–299 fulfill this research methods requirement.

4. Students may, with permission of the DUS, count up to three term courses in other related departments toward the major.

Appropriate courses are rare and students should consult with the DUS in Psychology about selecting outside courses.

Students interested in research are encouraged to take an independent study course (PSYC 493) as early as the sophomore year. Students may also take PSYC 495 for one-half course credit of independent research per term with prior permission of the faculty adviser and the DUS. To obtain permission, download the tutorial form from the department website, and submit it by the seventh calendar day before classes begin. These independent study courses are graded P/F. No more than a total of three credits from PSYC 490–499 combined may count toward the major.

Neuroscience track Students with a major interest in neuroscience may wish to elect the neuroscience track. Such students are considered Psychology majors for whom the requirements have been modified to accommodate their interests, and to reflect the multidisciplinary nature of modern neuroscience and psychology. Given the broad nature of the field of neuroscience, students may wish to concentrate their studies in one area of the field (e.g., behavioral, cellular and molecular, cognitive, affective, social, clinical, or developmental).
Interested students are encouraged to meet with the track adviser, Steve Chang (steve.chang@yale.edu). Majors in the neuroscience track meet with the track adviser at the beginning of each term in their junior and senior years.

Requirements for the neuroscience track are the same as for the standard major, with the additional requirements listed below. A complete list of courses, updated each term, may be found on Yale Course Search (YCS) by searching "Any Course Information Attribute."

1. Two terms of introductory biology are required for the major, BIOL 101-104. Students who have scored 5 on the Advanced Placement test in Biology or scored 7 on the IB Biology exam may place out of these courses.

2. Students must take PSYC 160 or 170 and a data-collection course (YCS attribute: YC PSYC: NSCI Track Rsrch Mthds) chosen from PSYC 230, 238, 250, 258 or 270. PSYC 229L, 260, or MCDB 320 may substitute for the PSYC 160 or 170 requirement, or MCDB 320 and 229L may substitute for PSYC 229L or 260, but not both. If MCDB 320 is substituted for a Psychology course, it cannot be counted as one of the two advanced science courses outside the department (see item 4 below).

3. As required for the standard major, students in the neuroscience track must take two social science courses, at least one of which must be designated as Core in the course listings. Students in the neuroscience track must also take a course from the natural science list in addition to the courses specified in item 2 above.

4. At least two advanced science courses (YCS attribute: YC PSYC: NSCI Track Adv Scie) must be chosen from Molecular, Cellular, and Developmental Biology and Ecology and Evolutionary Biology courses numbered 200 and above that deal with human and/or animal biology; recommended courses include MCDB 200, 202, 205, 210, 250, 300, 315, 320, E&EB 220, 225, and 240. Certain courses outside of these departments may also meet the advanced science requirement, including BENG 350, 421, CPSC 475, MB&B 300, 301, 420, 435, 443, 452, MATH 222, 225, 230, 231, and 241. Other courses may qualify for this requirement with permission of the neuroscience track adviser. Laboratory courses do not count toward the advanced science requirement. Students should note that many advanced science courses have prerequisites that must be taken first.

Credit/D/Fail No more than two term courses taken Credit/D/Fail may be applied toward the major; no 200-level course taken Credit/D/Fail may be applied toward the major.

Roadmap See visual roadmap of the requirements.

Senior Requirement

Standard major Majors are required to earn two course credits from courses numbered PSYC 400–499. At least one of these courses (excluding PSYC 490–495, which can only be taken P/F) must be taken during the senior year, for which a student must write a substantial final paper (a minimum of 5,000 words) and receive a letter grade. The B.A. degree is typically awarded to students who conduct a nonempirical literature review during senior year. There are no restrictions in the research format for the B.A. The B.S. degree is awarded to students who conduct empirical research through PSYC 499 during senior year. An empirical research project normally includes designing an experiment and collecting and analyzing the data.

Neuroscience track The senior requirement for the neuroscience track is the same as for the standard major, except that the two required course credits from PSYC 400–499 must have neuroscience content (Consult YCS for courses with the YC PSYC: NSCI Track Senior Seminar designation). Students pursuing the B.S. degree in the track must carry out a neuroscientific empirical project in PSYC 499 and must be supervised by a faculty member within the neuroscience area of the Psychology department. Students who wish to work with an affiliated faculty member studying neuroscience outside the department must obtain permission from the neuroscience track adviser.

Distinction in the Major To be considered for Distinction in the Major, students must submit a senior essay to the Psychology department at least one week before the last day of classes in the term when the course used for the senior essay is taken. Senior essays that are submitted after the deadline will be subject to grade penalties. Senior essays considered for Distinction in the Major are graded by a second reader and the essay adviser.

Advising

Schedules for all majors must be discussed with, and approved by, the DUS or the adviser for the neuroscience track in Psychology. For questions concerning credits for courses taken at other institutions or at Yale but outside the Department of Psychology, students should consult with the DUS. For questions concerning the neuroscience track, students should consult with the adviser for the neuroscience track in Psychology.

Computer Science and Psychology major The interdepartmental major in Computer Science and Psychology may be considered by students with interests lying squarely between the two disciplines. See Computer Science and Psychology for more information.

Requirements of the Major

Standard major

Prerequisite PSYC 110

Number of courses 12 courses beyond prereq (incl senior req)

Specific course required PSYC 200

Distribution of courses B.A. or B.S. — 2 social science courses and 2 natural science courses, as specified; 1 course numbered PSYC 210–
Substitution permitted For PSYC 200, S&DS 103 or exam arranged with instructor; up to 3 relevant courses in other depts, with DUS permission

Senior requirement B.A. – 1 course credit from PSYC 400–489 or 499 taken during senior year; 1 additional course credit from PSYC 400–499; B.S. – PSYC 499 taken during senior year; 1 additional course credit from PSYC 400–499

NEUROSCIENCE TRACK
Prerequisite PSYC 110
Number of courses 12 courses beyond prereq (incl senior req); same as for the standard major with the additional requirements listed below
Specific courses required BIOL 101–104 unless students place out; PSYC 160 or 170; PSYC 200; PSYC 230, 238, 250, 258 or 270.
Distribution of courses B.A. or B.S. – 2 social science courses and 1 natural science course, as specified; at least 2 advanced science courses, as specified
Substitution permitted MCDB 320 or PSYC 229L or 260 may substitute for PSYC 160 or 170; or MCDB 320 and 321L may substitute for PSYC 229L or 260; S&DS 103 or exam arranged with instructor for PSYC 200
Senior requirement B.A. – 1 course credit from PSYC 400–489 with neuroscience content taken during senior year; 1 additional course credit from PSYC 400–499 with neuroscience content; B.S. – PSYC 499 taken during senior year, with neuroscience content in a research project; 1 additional course credit from PSYC 400–499 with neuroscience content

The field of psychology scientifically studies the mind and behavior. Psychologists study a number of specific topics including perception, cognition, emotion, motivation, personality, development, mental health, social processes, and organizational behavior. Understanding these topics requires multiple perspectives, and the field uses a number of different levels of analysis. Psychologists investigate mental processing from the level of the neurons and brain function up to the level of how behavior is shaped by complex social processes. Because of this interdisciplinary breadth, psychology is by nature a diverse discipline that spans the natural and social sciences.

The Psychology major aims to provide students with a strong academic foundation in the science of psychology. Students who major in Psychology often differ widely in their reasons for choosing the major and in their post-graduation plans. Some students go on to graduate training in Psychology, while others enter professional schools (e.g., medicine and law) or choose from a variety of professions such as education or business and finance. The specific requirements of the major ensure that students with a variety of goals can achieve the necessary background in psychology within the context of a general liberal arts education.

The prerequisite to many courses in the major is PSYC 110. Students interested in the major are encouraged to take PSYC 110 during the first year. This prerequisite may be waived for students who present a score of 5 on the AP test in Psychology or a score of 7 on the IB Psychology exam.

The following introductory courses also have no prerequisites and are open to first-year students:

PSYC 126, Attraction and Relationships
PSYC 130, Introduction to Cognitive Science
PSYC 140, Developmental Psychology
PSYC 141, The Criminal Mind
PSYC 150, Social Psychology
PSYC 160, The Human Brain
PSYC 165, Personality Psychology
PSYC 170, Fundamentals of Neuroscience
PSYC 180, Clinical Psychology

FACULTY OF THE DEPARTMENT OF PSYCHOLOGY
Profs Woo-kyoung Ahn, John Bargh, Tyrone Cannon, B. J. Casey, Marvin Chun, Margaret Clark, Melissa Ferguson, Jutta Joormann, Frank Keil, Joshua Knode, Gregory McCarthy, Jennifer Richeson, Peter Salovey, Laurie Santos, Brian Scholl, Nick Turk-Browne

Associate Profs Arielle Baskin-Sommers, Steve Wohn Chang, Molly Crockett, Yarrow Dunham, Avram Holmes

Asst Profs Dylan Gee, Maria Gendron, Julian Jara-Ettinger, Julia Leonard, Sam McDougle, Robb Rutledge, Ilker Yildirim

Lecturers Jennifer Hirsch, Stephanie Lazzaro, Kristi Lockhart, Mary O’Brien, Matthias Siemer

View Courses
Courses

**PSYC 110a or b, Introduction to Psychology**  Stephanie Lazzaro  
A survey of major psychological approaches to the biological, cognitive, and social bases of behavior.  

**PSYC 116b / CGSC 216b / LING 116b, Cognitive Science of Language**  Robert Frank  
The study of language from the perspective of cognitive science. Exploration of mental structures that underlie the human ability to learn and process language, drawing on studies of normal and atypical language development and processing, brain imaging, neuropsychology, and computational modeling. Innate linguistic structure vs. determination by experience and culture; the relation between linguistic and nonlinguistic cognition in the domains of decision making, social cognition, and musical cognition; the degree to which language shapes perceptions of color, number, space, and gender.  

**PSYC 125a / CHLD 125a / EDST 125a, Child Development**  Ann Close and Carla Horwitz  
This course is first in a sequence including Theory and Practice of Early Childhood Education (CHLD127/PSYCH 127/EDST 127) and Language Literacy and Play (CHLD 128/PSYCH 128/EDST 128). This course provides students a theoretical base in child development and behavior and tools to sensitively and carefully observer infants and young children. The seminar will consider aspects of cognitive, social, and emotional development. An assumption of this course is that it is not possible to understand children – their behavior and development – without understanding their families and culture and the relationships between children and parents. The course will give an overview of the major theories in the field, focusing on the complex interaction between the developing self and the environment, exploring current research and theory as well as practice. Students will have the opportunity to see how programs for young children use psychodynamic and interactional theories to inform the development of their philosophy and curriculum. In the past students have done weekly in-person classroom observations at a Yale affiliated childcare program. If this is not possible, students will be expected to arrange on their own to do a weekly observation in-person or virtually of a child under the age of 6. For a portion of class meetings, the class will divide into small supervisory discussion groups. Priority given to juniors, seniors, Ed Study students.  

**PSYC 126a, Attraction and Relationships**  Yarrow Dunham and Jennifer Hirsch  
Theory and empirical research on the antecedents and consequences of attraction, and on intra- and interpersonal processes that either facilitate or interfere with the formation and maintenance of close relationships. Methodological bases for rigorous study of these topics.  

**PSYC 130a / CGSC 110a, Introduction to Cognitive Science**  Brian Scholl  
An introduction to the interdisciplinary study of how the mind works. Discussion of tools, theories, and assumptions from psychology, computer science, neuroscience, linguistics, and philosophy.  

**PSYC 140a / EDST 140a, Developmental Psychology**  Julia Leonard  
An introduction to research and theory on the development of perception, action, emotion, personality, language, and cognition from a cognitive science perspective. Focus on birth to adolescence in humans and other species. Prerequisite: PSYC 110.  

**PSYC 141b / NSCI 141b, The Criminal Mind**  Arielle Baskin-Sommers  
Theoretical and empirical study of the development of criminal behavior, including constitutional, social, and neurobiological elements. Personality and psychopathological factors associated with criminal behavior; theoretical and psychobiological explanations of crime; the biological/environment interaction; the impact of psychobiological models for policy and intervention.  

**PSYC 150b / EDST 160b, Social Psychology**  Jennifer Hirsch  
Theories, methodology, and applications of social psychology. Core topics include the self, social cognition/social perception, attitudes and persuasion, group processes, conformity, human conflict and aggression, prejudice, prosocial behavior, and emotion.  

[ PSYC 157, Psychology and the Good Life ]  

**PSYC 160a / NSCI 160a, The Human Brain**  Gregory McCarthy  
Introduction to the neural bases of human psychological function, including social, cognitive, and affective processing. Preparation for more advanced courses in cognitive and social neuroscience. Topics include memory, reward processing, neuroeconomics, individual differences, emotion, social inferences, and clinical disorders. Neuroanatomy, neurophysiology, and neuropharmacology are also introduced.  

**PSYC 200 or b, Research Methods, Writing Intensive**  Staff  
Introduction to general principles and strategies of psychological research. Topics include generating and testing hypotheses, laboratory and field experiments, scale construction, sampling, archival methods, case studies, ethics and politics of research, and Internet and cross-cultural methods. Hands-on research experience in laboratories. Prerequisite: PSYC 160 or S&DS 103.  

**PSYC 237b, Research Methods with Diverse Samples**  Maria Gendron  
Introduction to general principles and approaches to psychological research, with a focus on sampling diversity and cultural/cross-cultural research. Topics include generating and testing hypotheses, laboratory and field experiments, scale construction, sampling,
archival methods, case studies, ethics, and politics of research. Hands-on research experience is part of the course. Prerequisites: PSYC 110 or Psychology AP equivalent, and Intro Statistics course (concurrent enrollment is acceptable with instructor permission). WR, SO

**PSYC 239b / CGSC 239b / LING 239b, Phonetics II: Speech Production and Perception** Jason Shaw
This course introduces theoretical tools for explaining physical aspects of speech, including speech articulation, acoustics, audition, and perception. Acoustic properties of speech sounds are derived from first principles, following acoustic theories of speech production. The course covers articulatory kinematics alongside contemporary theories of motor coordination and speech planning. Audition and speech perception are introduced in the context of signal processing and statistical tools for mapping the continuous phonetic signal to phonological representations. These topics are pursued in the context of speech examples from a wide range of natural languages, preparing students to engage with primary literature in the field of phonetics. Prerequisites: LING 110, 116, 217, or 220. QR, SO

* **PSYC 258b / NSCI 258b, Computational Methods in Human Neuroscience** Nick Turk-Browne
This course provides training on how to use computational science for the advanced analysis of brain imaging data, primarily from functional magnetic resonance imaging (fMRI). Topics include scientific programming, high-performance computing, machine learning, network/graph analysis, real-time neurofeedback, nonparametric statistics, and functional alignment. Prerequisites: CPSC 100, CPSC 112 or other course involving terminal commands and programming (Python preferred); course in statistics and/or data science; PSYC 160 or other human neuroscience course; or permission of instructor. QR, SC

* **PSYC 260a / NSCI 260a, Research Methods in Psychopathology: Psychotic Disorders** Tyrone Cannon
Methods of research in psychopathology. Focus on longitudinal designs, high-risk sampling approaches, prediction of outcomes, and modeling change over time. Students design and perform analyses of clinical, cognitive, genetic, neuroimaging and other kinds of measures as predictors of psychosis and related outcomes, using existing datasets supplied by the instructor. SO

* **PSYC 270a / NSCI 270a, Research Methods in Cognitive Neuroscience** Stephanie Lazzaro
This course introduces methods used by cognitive neuroscientists to discover the structural and functional features of the nervous system. A combination of lectures and hands-on lab activities help students understand the structure and function of the human brain. WR, SC

[ **PSYC 303, Social Neuroscience** ]

[ **PSYC 308, Intergroup Relations: The Psychology of Social Inequality** ]

* **PSYC 312a / ER&M 412a, Native American Mental Health** Mark Beitel and Christopher Cutter
Issues of health policy, research, and service delivery in Native American communities, with a focus on historical antecedents that shape health outcomes and social policy for indigenous communities. Urgent problems in health and wellness, with special attention to Native American mental health. The roles of the Indian Health Service, state and local agencies, and tribal health centers; comparison of Native American and European American conceptions of health and illness. SO

* **PSYC 315a / CGSC 315a, The Modern Unconscious** Staff
The notion of the unconscious mind traced from the early 1800s through Freud to present-day cognitive science, with a focus on the past thirty years. The power and function of the unconscious as a pervasive part of normal everyday human functioning. Readings mainly from cognitive and social cognitive psychology but also philosophy of mind and evolutionary biology. SO

**PSYC 317a / EDST 237a / LING 217a, Language and Mind** Maria Pinango
The structure of linguistic knowledge and how it is used during communication. The principles that guide the acquisition of this system by children learning their first language, by children learning language in unusual circumstances (heritage speakers, sign languages) and adults learning a second language, bilingual speakers. The processing of language in real-time. Psychological traits that impact language learning and language use. RP o Course CR

**PSYC 318a / LING 220a, Phonetics I** Jason Shaw
Each spoken language composes words using a relatively small number of speech sounds, a subset of the much larger set of possible human speech sounds. This course introduces tools to describe the complete set of speech sounds found in the world’s spoken languages. It covers the articulatory organs involved in speech production and the acoustic structure of the resulting sounds. Students learn how to transcribe sounds using the International Phonetic Alphabet, including different varieties of English and languages around the world. The course also introduces sociophonetics, how variation in sound patterns can convey social meaning within a community, speech perception, and sound change. SO o Course CR

* **PSYC 320a / ENGL 382a / FILM 280a, The Science and Culture of Memory** John Williams and Samuel McDougle
This is an FAS-sponsored cross-divisional course. This course offers a comparative and interdisciplinary approach to the science and culture of memory. We aim to bring traditional philosophies, narratives, and histories of memory into conversation with both long established and cutting-edge research findings on the neuroscience of memory. Questions explored in the course include: What is memory and how does it work? How has memory been conceptualized over time in both culture and science? What are the various media through which we process memories, including collective and individual forms? What can we learn from moments of mnemonic failure? What new technologies of memory are on the horizon? How is our vision of the future influenced by the content and processes of memory? In wrestling with these questions, we encounter a wide selection of narratives, art objects, films, and scientific data. Students
also have an opportunity to explore their own experiences in learning and memory (including experiential assignments, e.g., asking them to memorize certain things and report on the experience, as well as opportunities to reflect on their experiences of and access to forms of collective, communal memory). HU, SO

**PSYC 327b / LING 227b, Language and Computation I** Robert Frank
Design and analysis of computational models of language. Topics include finite state tools, computational morphology and phonology, grammar and parsing, lexical semantics, and the use of linguistic models in applied problems. Prerequisite: prior programming experience or permission of instructor. Q8, SO

**PSYC 331b / LING 231b, Neurolinguistics** Maria Pinango
The study of language as a cognitive neuroscience. The interaction between linguistic theory and neurological evidence from brain damage, degenerative diseases (e.g., Alzheimer’s disease), mental illness (e.g., schizophrenia), neuroimaging, and neurophysiology. The connection of language as a neurocognitive system to other systems such as memory and music. At least one class that introduces students to linguistic theory and linguistic argumentation from at least one perspective, including any of the following: (1) LING 217 Language and Mind, (2) LING 110 Intro to linguistics, (3) LING 253 Syntax 1, (4) LING 112 Historical Linguistics, (5) LING 232 Phonology 1, (6) LING 220 General Phonetics, or (7) Instructor permission. SC, SO

* PSYC 334a / CHLD 334a, Developmental Psychopathology Fred Volkmar, Eli Lebowitz, and Denis Sukhodolsky
Study of developmental psychopathology during childhood and adolescence, team taught by a child psychiatrist and three psychologists. Topics include: aspects of normal development, assessment methods, clinical disorders, treatment, and legal and social policy issues. Review of normative development, followed by discussion of theoretical approaches to understanding developmental aspects of common mental health conditions in childhood. Attention to treatment models as well as relevant issues of culture and ethnicity in the expression of psychopathology. Prerequisites: PSYC 130, 140, 180, or equivalent, or with permission of instructor.

[ PSYC 355, Clinical Psychology in the Community ]

* PSYC 375b / CGSC 375b, Linguistic Meaning and Conceptual Structure Staff
The meaning of a word or sentence is something in the human mind that has specific properties: it can be expressed (written/signed/spoken forms); it can be combined with other meanings; its expression is not language dependent; it connects with the world; it serves as a vehicle for inference; and it is hidden from awareness. The course explores these properties in some detail and, in the process, provides the students with technical vocabulary and analytical tools to further investigate them. The course is thus intended for those students interested in undertaking a research project on the structure of meaning, the nature of lexico-conceptual structure, that is, the structure of concepts which we refer to as "word meanings", and how they may be combined through linguistic and non-linguistic means. Its ultimate objective is to bridge models of conceptual structure and models of linguistic semantic composition, identify their respective strengths and weaknesses and explore some of the fundamental questions that any theory of linguistic meaning composition must answer. Evidence discussed will emerge from naturalistic, introspective, and experimental methodologies. Prerequisites: LING 110, CGSC 110, LING 217, or LING 263. SO

[ PSYC 405, Social Emotions ]

[ PSYC 411, Systems Neuroscience ]

* PSYC 420a or b / CGSC 420a or b / NSCI 440a or b, Topics in Clinical Neuroscience Avram Holmes
An overview and examination of the neuroscience of psychiatric illness. We focus on cutting-edge research in humans and animals aimed at understanding the biological mechanisms that underlie psychiatric illness. Although these questions date back to early philosophical texts, only recently have experimental psychologists and neuroscientists begun to explore this vast and exciting domain of study. We discuss the evolutionary and developmental origins of individual differences in human personality, measurement issues, fundamental dimensions of psychopathology, stability/plasticity, heritability, and implications therapeutic interventions as well as the associated broader implications for public policy. A major focus is on the neurobiology of fear and anxiety, including brain circuits, molecular genetic pathways, and epigenetics. A secondary focus is on differences in behavior and biology that confer risk for the development of depression and addiction, including the biological systems involved in hedonic pleasure, motivated goal pursuit, and the regulation of impulses in the face of everyday temptation. Students should have some background in psychology; PSYC 110 and PSYC 160 preferred. SO

Introduction to the emerging field of moral cognition. Focus on questions about the philosophical significance of psychological findings. Topics include the role of emotion in moral judgment; the significance of character traits in virtue ethics and personality psychology; the reliability of intuitions and the psychological processes that underlie them. HU

* PSYC 425b / CGSC 425b, Social Perception Brian Scholl
Connections between visual perception, among the earliest and most basic of human cognitive processes, and social cognition, among the most advanced forms of higher-level cognition. The perception of animacy, agency, and goal-directedness; biological motion; face perception (including the perception of facial attractiveness); gaze processing and social attention; "thin-slicing" and "perceptual stereotypes"; and social and cultural influences on perception. SO
Psychology senior essay requirement. Individual faculty members may set alternative equivalent requirements. May be elected for one or two terms. May not be used for the date indicated on the form. The normal minimum requirement is a written report of the completed research or literature review, but undergraduate/undergraduate-major-forms, complete it with the adviser, and submit it to the director of undergraduate studies by the and supervises the student's progress. To register, the student must download a tutorial form from http://psychology.yale.edu/

* PSYC 495a or b, Research Topics

Essays in empirical research projects or literature review. A student must be sponsored by a faculty member, who sets the requirements and supervises the student's progress. To register, the student must download a tutorial form from http://psychology.yale.edu/undergraduate/undergraduate-major-forms, complete it with the adviser, and submit it to the director of undergraduate studies by the deadline listed on the form. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. May be elected for one or two terms. May not be used for the Psychology senior essay requirement. ½ Course cr

* PSYC 439a / CGSC 439a, The Kinds We Keep: Sorting and Distorting Reality

Frank Keil

Sorting the world into kinds is crucial human cognition. It grounds concepts, the currency of thought. But this cognitive asset can corrode our humanity and become a curse if we fail to understand the attendant biases. We first consider some metaphysical assumptions about causal patterns in the world that sustain relatively stable kinds and how these provide grounds for building early categories. We then examine why humans, and most AI systems, must sort individuals into kinds to learn and think about the world. But while categorization greatly amplifies the power of thought, it also distorts what is sorted and how the resulting kinds are construed. We explore why learning is impossible without such distortions of and consider different sets of distortions and when they occur. We focus on thought about fundamental, or ontological kinds, many of which are first apprehended in infancy or early childhood. These include non-living natural kinds, goal-directed entities, thinking things, living things, and artifacts. We ask how human and artificial agents might take more care with the kinds they use. How can we embrace the kinds that inspire exploration and discovery without having our mis-construals turn them towards darker ends? Prerequisites: PSYC 110 or CGSC 110 and two additional courses relevant to cognition. SO

* PSYC 437b / CGSC 437b, Minds, Brains, and Machines

Julian Jara-Ettinger

Exploration of the implications that the brain is a kind of computer that gives rise to the mind. Readings combine classical and cutting-edge research in psychology, philosophy, and artificial intelligence. SO RP

* PSYC 438a / NSCI 441a, Computational Models of Human Behavior

Robb Rutledge

Why do we do the things we do? How do we adapt to changes in the environment? And how does our happiness depend on our choices and what happens to us? How can computational models help us to gain new insights into psychological processes? The goal of this course is to use computational models to understand human behavior and its relationship to our emotions. Data is collected in a variety of tasks including new experiments designed by students, and is analyzed using computational models. CPSC 112 or other course involving programming (e.g., C++, Java, Python, Matlab), or permission of instructor. SC

* PSYC 439a / CGSC 439a, The Psychology of Social Construction

Yarrow Dunham

We live in a world replete with "forgeries that become genuine": pieces of paper that become money, words that become promises, lines in the sand that become borders. Nearly every aspect of our lives is shaped and constrained by these kinds of socially constructed entities, things as real as mountains but far more mysterious. How do such entities come to be, and how do (and how should) we understand them? How are they made and how can they be contested when they go astray? Answering these questions requires ranging across diverse literatures beginning with psychology but including philosophy, anthropology, economics, and game theory. Prerequisite: PSYC 110 or CGSC 110. SO

* PSYC 440a / NSCI 440a, Neuroscience of Social Interaction

Steve Chang

This seminar covers influential studies that inform how the brain enables complex social interactions from the perspectives of neural mechanisms. Students thoroughly read selected original research papers in the field of social neuroscience across several animal species and multiple modern neuroscience methodologies. In class, the instructor and students work together to discuss these studies in depth. Focused topics include neural mechanisms behind brain-to-brain coupling, empathy, prosocial decision-making, oxytocin effects, and social dysfunction. Prerequisite: PSYC 160 or permission of instructor. SC

* PSYC 493a or b, Directed Research

Yarrow Dunham

Empirical research projects or literature review. A student must be sponsored by a faculty member, who sets the requirements and supervises the student's progress. To register, the student must download a tutorial form from http://psychology.yale.edu/undergraduate/undergraduate-major-forms, complete it with the adviser, and submit it to the director of undergraduate studies by the deadline listed on the form. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. May be elected for one or two terms. May not be used for the Psychology senior essay requirement.

* PSYC 493a or b, Research Topics

Yarrow Dunham

Empirical research project or literature review. A student must be sponsored by a faculty member, who sets the requirements and supervises the student's progress. To register, the student must download a tutorial form from http://psychology.yale.edu/undergraduate/undergraduate-major-forms, complete it with the adviser, and submit it to the director of undergraduate studies by the date indicated on the form. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. May be elected for one or two terms. May not be used for the Psychology senior essay requirement. ½ Course cr
* PSYC 499a or b, Senior Essay  Yarrow Dunham  
Independent senior research project (either empirical research or literature review), conducted under the guidance of a faculty adviser who sets the requirements and supervises the research. To register, the student must download a tutorial form from http://psychology.yale.edu/undergraduate/undergraduate-major-forms, complete it with the adviser, and submit it by the deadline indicated on the form. The normal minimum requirement is a written report of the completed research or literature review, but individual faculty members may set alternative equivalent requirements. A paper of 5,000 words or more meets the writing needed for the senior requirement. To be considered for Distinction in the Major, the paper should be submitted at least one week before the last day of classes and will be graded by the adviser and a second reader assigned by the DUS.