PSYC 237 (formerly PSYC 228), Introduction to Cognitive Science (3 credits)

Psychology students: note change of course from category to category 3

Coordinator: Zahra Hussain
Department: Psychology
Office, extension: Jesup 103A, 4529
Email: zahra.hussain@aub.edu.lb
Office hours: Thursday 10:00 am-12:00 pm

Class times: TR 2:00-3:15 pm
Location: Nicely 320
Evaluation: Four written take-home assignments (4 x 10% = 40%), one midterm exam (30%), one final exam (30%)
Course material: There is no textbook for this course. Readings will be assigned by the instructors for each section, and posted on Moodle. The reading list is given below, and may be modified during the semester. Please check Moodle regularly for course updates.

Course description: Cognitive science is the study of human and artificial intelligence, from perception and action to language, reasoning and consciousness. The field draws on diverse disciplines including psychology, linguistics, computer science, neuroscience and philosophy. These subdisciplines share the goal of "understanding the representational and computational capacities of the mind, and their structural and functional representation in the brain" (Sloan Report, 1978). In this course, we will examine the contributions of these disciplines toward understanding various aspects of cognition, and trace the development of the field from its origins to the present.

Learning outcomes:
1. Apply the concepts of information, representation and computation to different types of cognition
2. Delineate the conceptual developments in the field of cognitive science
3. Identify the goals and problems of different approaches toward the study of cognition
4. Differentiate the methods used across disciplines in the study of cognition

Course policy: The course will be taught by instructors from various departments of the Faculty of Arts and Sciences and the Faculty of Medicine, AUB. Please see list and contact details below. Please be on time to class, read the assigned readings and come prepared for discussion with questions and ideas of your own. Attendance is mandatory and will be taken with a sign-up sheet. If you are going to miss class or be late, please inform the instructor in advance via email or in person. If you are absent for more than five lectures, you may be withdrawn from the course. Cellphones and laptops may not be used in class. The instructors and course coordinator maintain the right to modify course content, method of evaluations, or the grade distribution at any point in the semester. You are responsible for keeping track of course content posted on Moodle, and for the readings assigned.

Missed tests and assignments: There will be no makeup exams or opportunities for missed midterms. Missed midterms without adequate documentation will be given a mark of zero. For a missed midterm with adequate documentation, the weight of the midterm will be carried forward to the final exam. For medical excuses, adequate documentation comprises a medical certificate from AUBMC.

Grading policy: Grading will be criterion-based. Adjustments may be made to the final distribution of grades depending on class performance.

Course schedule

Date	Topic	Instructor	Evaluation
Jan 30, Feb 1	Introduction	Zahra Hussain	
Feb 6, 8	Philosophy	Patrick Lewtas	
Feb 13, 15	Perception I	Zahra Hussain	
Feb 20, 22	Perception II	Yasmina Jraissati	
Feb 27, Mar 1	Artificial Intelligence	Shady Elbassuoni	Feb 27: Assignment 1 due
Mar 6, 8	Artificial Intelligence	George Turkiyyah	
Mar 13	Psycholinguistics	Lina Choueri	
Mar 15, 20	Psycholinguistics	Niamh Kelly	
Mar 22	Conceptual development	Tamer Amin	
Mar 24 (Saturday):	**Midterm 1**		
Mar 27, 29	Computational Neuroscience I	Arij Daou	
Apr 3, 5	Computational Neuroscience II	Fadi Karameh	April 3: Assignment 2 due
Apr 10, 12	Neuropsychology	Hala Darwish	
Apr 17, 19	Neuroimaging	Julien Besle	
Apr 24, 26	Judgement and reasoning	Zahra Hussain	April 24: Assignment 3 due
May 1 (holiday), 3	Morality	Bana Bashour	
May 8	Morality	Bana Bashour	May 19: Assignment 4 due

Reading list

Note: This list may be modified by instructors before or during their section. Some instructors will provide additional supplementary readings not shown in this list. Please check Moodle regularly for updates.

Introduction (Hussain - Jan 30, Feb 1)

Bermudez JL. (2010). The prehistory of cognitive science. In *Cognitive science: An introduction to the science of the mind* (pp. 5-27). Cambridge: Cambridge University Press.

Bermudez JL. (2010). The discipline matures: Three milestones. In *Cognitive science: An introduction to the science of the mind* (pp. 29-47). Cambridge: Cambridge University Press.

Miller GA. (2003). The cognitive revolution: a historical perspective. *Trends in Cognitive Sciences, 7*(3), 141-144.

Supplementary: Bechtel W, Abrahamsen A, Graham, G. (1998). The life of cognitive science. In W Bechtel & G Graham (Eds.), *A companion to cognitive science* (pp. 2-104). Oxford: Blackwell Publishing Ltd.

Philosophy (Lewtas - Feb 6, 8)

Papineau D. (2001). The rise of physicalism. In C Gillett & BM Loewer (Eds.), *Physicalism and its Discontents*. Cambridge University Press.

Ravenscroft I. (2005). Physicalism and supervenience. In *Philosophy of mind: A beginner's guide* (pp. 117-124).Cambridge: Cambridge University Press.

Ravenscroft I. (2005). Behaviorism. In *Philosophy of mind: A beginner's guide* (pp. 25-38).Cambridge: Cambridge University Press.

Ravenscroft I. (2005). The identity theory. In *Philosophy of mind: A beginner's guide* (pp. 39-49).Cambridge: Cambridge University Press.

Ravenscroft I. (2005). Functionalism. In *Philosophy of mind: A beginner's guide*. (pp. 50-63).Cambridge: Cambridge University Press.

Perception - neural architecture of vision and object recognition (Hussain - Feb 13, 15)

RH Wurtz, ER Kandel. (2000). Central visual pathways. In *Principles of neural science* (pp. 524-571). New York: McGraw-Hill.

Shepard RN, Metzler J. (1971). Mental rotation of three-dimensional objects. *Science, 171*(3972), 701-703.

Marr D. (1982). The philosophy and the approach. In *Vision: A computational investigation into the human representation and processing of visual information* (pp. 8-38). San Francisco: WH Freeman.

Perception - categorization and multisensory perception (Jraissati - Feb 20, 22)

Rosch E. (1978). Principles of Categorization. First published in E Rosch & B Lloyd (Eds.),*Cognition and categorization* (pp. 27-48). Hillsdale NJ: Lawrence Erlbaum.

Regier T, Kay P, Gibert A, Ivry RB. (2010). Language and thought: Which side are you on anyway? In B Malt & P Wolff (Eds.), *Words and the mind: How words capture human experience* (pp. 165-182). Oxford: Oxford University Press.

Whorf BL. (1940). Science and linguistics. *Technology Review, 42*, 229-231, 247-248.

Wallace MT. (2004). The development of multisensory processes. *Cognitive Processing, 5*(2), 69-83.

Wallace MT, Ramachandran R, Stein BE. (2004). A revised view of sensory cortical parcellation. *Proceedings of the National Academy of Sciences USA, 101*(7), 2167-2172.

Stein BE, Stanford, TR, Rowland BA. (2009). The neural basis of multisensory integration in the midbrain: its organization and maturation. *Hearing research, 258*(1), 4-15.

Artificial Intelligence (Elbassuoni and Turkiyyah - Feb 27, Mar 1, 6, 8)

Turing AM. (1950). Computing machinery and intelligence. *Mind, 49*, 433-460.

McCarthy J, Minsky ML, Rochester N, Shannon CE. (1955). A proposal for the Dartmouth summer research project on artificial intelligence. 1-10.

Rosenblatt F. (1958). The perceptron: A probabilistic model for information storage and organization in the brain. *Psychological Review, 65*(6), 386-408.

Searle J. (1980). Minds, brains and computers. From *The Behavioral and Brain Sciences, 3*, 349-356.

Additional readings TBD

Psycholinguistics (Choueiri - Mar 13)

Crane S, Pietroski P. (2001). Nature, nurture and universal grammar. *Linguistics and Philosophy, 24*, 139-186.

Berwick RC, Pietroski P, Yankama B, Chomsky N. (2011). Poverty of the stimulus revisited. *Cognitive Science, 35*, 1207-1242.

Jackendoff R. (2011). *Patterns in the mind: Language and human nature*, 3-35.

Psycholinguistics (Kelly - Mar 15, 20)
Sedivy J. (2014). Learning sound patterns. In *Language in mind: An introduction to psycholinguistics* (pp. 105-184). Sunderland, Massachusetts: Sinauer Associates.

Sedivy J. (2014). Language diversity. In *Language in mind: An introduction to psycholinguistics* (pp. 471-519). Sunderland, Massachusetts: Sinauer Associates.

Saffran JR, Aslin RN, Newport EL. (1996). Statistical learning by 8-month-old infants. *Science, 274*(5294), 1926-1928.

Morton JB, Harper SN. (2007). What did Simon say? Revisiting the bilingual advantage. *Developmental Science, 10*, 719-726.

Conceptual development: the case of number (Amin - Mar 22)
Carey S. (2004). Bootstrapping and the origin of concepts. *Daedalus, 133*(1), 59-68.

Computational Neuroscience (Daou - Mar 27, 29)
Topics: Electrophysiology of the neuron, Hodgkin-Huxley model of intracellular data, neural network modeling.
Readings TBD.

Computational Neuroscience (Karameh - Apr 3, 5)
Topics: Connectivity measures in the brain: models and analytical tools.
Readings TBD.

Neuropsychology (Darwish - Apr 10, 12)
Zola-Morgan S, Squire LR. (1993). Neuroanatomy of memory. *Annual Review of Neuroscience,16*, 547-563.

Squire LR, Knowlton B, Musen G. (1993). The structure and organization of memory. *Annual Review of Psychology, 44*, 453-495.

Pacheco D, Sanchez-Fibla M, Duff A, Verschure PFMJ. (2017). A spatial-context effect in recognition memory *Frontiers in Behavioral Neuroscience, 11*, article 43.

Neuroimaging (Besle - Apr 17, 19)
Baars BJ, Gage NM. (2010). The tools: Imaging the living brain. In *Cognition, brain, and consciousness: Introduction to cognitive neuroscience* (pp. 95-125). Academic Press.

Bentin S, McCarthy G, Perez E, Puce A, Allison T. (1996). Electrophysiological studies of face perception in humans. *Journal of Cognitive Neuroscience, 8*(6), 551-565.

Kanwisher N, McDermott J, Chun MM. (1997). The fusiform face area: a module in human extrastriate cortex specialized for face perception. *Journal of Neuroscience, 17*(11), 4302-4311.

Judgement and reasoning (Hussain - Apr 24, 26)
Tversky A, Kahneman D. (1974). Judgement under uncertainty: Heuristics and biases. *Science, 185*(4157), 1124-1131.

Tversky A, Kahneman D. (1983). Extensional versus intuitive reasoning: The conjunction fallacy in probability judgement. *Psychological Review, 90*(4), 293-315.

Gigerenzer G, Goldstein, DG. (1996). Reasoning the fast and frugal way: Models of bounded rationality. *Psychological Review, 103*(4), 650-669.

Morality (Bashour - May 1, 8)
Haidt J. (2001) The emotional dog and its rational tail: a social intuitionist approach to moral judgment. *Psychological review, 108*(4), 814-834.

Pizarro DA, Bloom P. (2003). The intelligence of the moral intuitions: A comment on Haidt (2001). *Psychological review, 110*(1), 193-196.

Contact list

Instructor	**Department**	**Email**
Zahra Hussain (coordinator)	Psychology	zahra.hussain@aub.edu.lb
Patrick Lewtas	Philosophy	pl03@aub.edu.lb
Yasmina Jraissati	Philosophy	yasmina.jraissati@gmail.com
Shady Elbassuoni	Computer Science	se58@aub.edu.lb
George Turkiyyah	Computer Science	gt02@aub.edu.lb
Niamh Kelly	English	nk114@aub.edu.lb
Lina Choueiri	English	lc01@aub.edu.lb
Tamer Amin	Education	ta08@aub.edu.lb
Arij Daou	Biomedical Engineering	ad75@aub.edu.lb
Fadi Karameh	Electrical and Computer Engineering	fk14@aub.edu.lb
Hala Darwish	Faculty of Medicine, Nursing	hd30@aub.edu.lb
Julien Besle	Psychology	jb66@aub.edu.lb
Bana Bashour	Philosophy	bb13@aub.edu.lb

Communication: If you have questions about the course format, or specific questions about the course material, please email the course coordinator or course instructors, or arrange to meet them person. We will try to respond to emails within a 48 hour period. Please try to use office hours for clarification of material. All instructors' emails are given in the syllabus.

Academic Integrity: All written assignments must be in your own words. Please refer to AUB Student Code of Conduct: http://website.aub.edu.lb/rep/cec/spaac/Documents/RevisedStudentCodeConduct.pdf and https://www.aub.edu.lb/it/services/students/plagiarism/Pages/home.aspx, which concerns academic misconduct including cheating, plagiarism, in-class disruption, and dishonesty. Please be aware that misconduct is vigorously prosecuted and that AUB has a zero tolerance policy. Evidence of cheating or plagiarism will result in course failure.

Disability: AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a visible or invisible disability (including mental health, chronic or temporary medical conditions), please inform me immediately so that we can discuss your options. To help establish reasonable accommodations and facilitate a smooth accommodations process, contact the Accessible Education Office (AEO), preferentially in the first few weeks of the semester: accessibility@aub.edu.lb; +961-1-350000, Ext. 3246; West Hall, 314. In all cases, you must provide me with an official AUB letter of accommodation from the AEO.

Non-discrimination: AUB is committed to facilitating a campus free of all forms of discrimination including

sex/gender-based harassment prohibited by Title IX. The University's non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix. To report an incident, contact the University's Title IX Coordinator Trudi Hodges at 01-350000 ext. 2514, or titleix@aub.edu.lb. An anonymous report may be submitted online via EthicsPoint at www.aub.ethicspoint.com.