

PSYC 237, Introduction to Cognitive Science (3 credits)

Psychology category 3 course; required course for minor in Cognitive Science

Coordinator: Zahra Hussain

Department: Psychology

Office, extension: Jesup 103A, 4529

Email: zahra.hussain@aub.edu.lb

Office hours: Thursday 3:30-5:00 pm

Class times: TR 2:00-3:15 pm

Location: Nicely 322

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 key concepts, goals and problems of different approaches toward the study of the mind
4. Differentiate the methods used across disciplines in the study of the mind

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 If you are absent for more than five lectures, you may be withdrawn from the course.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, or distributed between the assignments and 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	Assignment dates
T Jan 22	Introduction	Zahra Hussain	
RTR Jan 24, 29 31	Philosophy	Pat Lewtas	
TR Feb 5, 7	Perception	Zahra Hussain	
R Feb 14	Holiday: No class		
TTR Feb 12, 19, 21	AI	Mohamed Nassar	#1 Feb 19 (Intro-AI); due Feb 26
TRT Feb 28, Mar 5	Language acquisition	Lina Choueiri	
RTR Mar 7, 12, 14	Language acquisition	Niamh Kelly	#2 Mar 12 (Language); due Mar 17
TR Mar 19, 21	Conceptual development	Tamer Amin	
Saturday March 23	Midterm (Intro -> Language)		
TRT Mar 26, 28, Apr 2	Computational Neuroscience	Julien Besle	
RTR Apr 4, 9, 11	Cognitive Neuroscience I	Hala Darwish	#3 Apr 9 (Concept - Cog Neu. I); due Apr 16
TRT Apr 16, 18, 23	Neuroimaging	Julien Besle	
RT Apr 25, 30	Decision making	Zahra Hussain	#4 Apr 25, due May 2

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 22)

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.

Miller GA. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. *The Psychological Review*, 63(2), 81-97.

Recommended: 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, Jan 24 - 31)

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 - Edge detection and object recognition (Hussain, Feb 5 - 12)

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.

Supplementary: Poggio T. (1982). Afterword: Marr's vision and computational neuroscience. In *Vision: A computational investigation into the human representation and processing of visual information* (pp. 362-367). San Francisco: WH Freeman.

Palmer SE. (1999). Processing image structure. In *Vision: Photons to phenomenology* (pp. 146-148, 171-183). Cambridge: MIT Press.

Tarr MJ, Vuong QC. (2002). Visual object recognition. In H Pashler (Series ed.) & S Yantis (ed.), *Stevens' Handbook of Experimental Psychology: Vol. 1. Sensation and Perception*(3rd ed., Vol. 1, pp. 287-314). New York, NY: John Wiley & Sons, Inc.

Hayward WG. (2003). After the viewpoint debate: where next in object recognition? *Trends in Cognitive Science*, 7(10), 425-427.

Artificial Intelligence (Nassar, Feb 14 - 26)

Russell SJ, Norvig P. (2016). Introduction. In SJ Russell & P Norvig (Eds.) *Artificial Intelligence: A Modern Approach* (pp. 1-29). Essex: Pearson Education Limited.

Russell SJ, Norvig P. (2016). Learning from Examples. In SJ Russell & P Norvig (Eds.) *Artificial Intelligence: A Modern Approach* (pp. 693-757). Essex: Pearson Education Limited.

Russell SJ, Norvig P. (2016). Quantifying Uncertainty. In SJ Russell & P Norvig (Eds.) *Artificial Intelligence: A Modern Approach* (pp. 480-503). Essex: Pearson Education Limited.

Russell SJ, Norvig P. (2016). Probabilistic Reasoning. In SJ Russell & P Norvig (Eds.) *Artificial Intelligence: A Modern Approach* (pp. 519-522). Essex: Pearson Education Limited.

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

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

Language acquisition (Choueiri, Feb 28 - Mar 5)

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.

Language acquisition (Kelly, Mar 7 - 14)

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 19 - 21)

Carey S. (2004). Bootstrapping and the origin of concepts. *Daedalus*, 133(1), 59-68.

Computational Neuroscience (Besle, Mar 26 - Apr 2)

To be determined

Topics: Electrophysiology of the neuron, Hodgkin-Huxley model of intracellular data, neural network modeling.

Cognitive Neuroscience I: Learning and memory (Darwish, Apr 4 - 11)

To be revised

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.

Cognitive Neuroscience II: Neuroimaging (Besle, Apr 16 - 23)

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 25 - 30)

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.

Contact list

Instructor	Department	Email
Zahra Hussain (coordinator)	Psychology	zahra.hussain@aub.edu.lb
Patrick Lewtas	Philosophy	p103@aub.edu.lb
Mohamed Nassar	Computer Science	mn115@aub.edu.lb
Niamh Kelly	English	nk114@aub.edu.lb
Lina Choueiri	English	lc01@aub.edu.lb
Tamer Amin	Education	ta08@aub.edu.lb
Hala Darwish	Faculty of Medicine, Nursing	hd30@aub.edu.lb
Julien Besle	Psychology	jb66@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 Ethics-Point at www.aub.ethicspoint.com.