SS3725: COGNITIVE NEUROSCIENCE

Effective Term
Semester A 2024/25

Part I Course Overview

Course Title
Cognitive Neuroscience

Subject Code
SS - Social and Behavioural Sciences
Course Number
3725

Academic Unit
Social and Behavioural Sciences (SS)

College/School
College of Liberal Arts and Social Sciences (CH)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
SS2033 Research Methods for Behavioral Sciences; and SS3707 Design & Analysis for Psychological Research I

Precursors
Nil

Equivalent Courses
Nil

Exclusive Courses
Nil

Part II Course Details

Abstract
Cognitive neuroscience is a rapidly expanding field of study over the past few decades receiving considerable amount of attention from diverse disciplines including cognitive science, computer science, linguistics, neurology, philosophy,

psychology, and beyond. This course aims to provide students with a solid foundation in cognitive neuroscience (i.e., how cognition arises from our brain), with a broad survey of the basic concepts, methodologies, empirical evidence, theoretical models, applied and ethical issues in the field. The neural underpinning of a wide range of psychology phenonmenon will be covered. The strengths and weaknesses of different research methodologies, and the logic and assumption behind different theoretical approaches will be discussed. Upon completion of this course, students will show ability to critically evaluate issues related to cognitive neuroscience and to apply relevant knowledge to everyday life.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe basic concepts and major theories in cognitive neuroscience	20	x		
2	Explain the various research approaches in cognitive neuroscience and analyse their strengths and weaknesses	25	x	x	
3	Apply knowledge of how our brain works to explain everyday life experiences	25		x	x
4	Synthesize learning throughout the course to gain a holistic understanding of the link between human brain and mind	30		x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage in lectures to describe and explain major theories and concepts across various topics in cognitive neuroscience. Students will learn and discuss dominant methodological approaches to the study of brain functioning. Students also will learn to apply their knowledge to ethical issues related to cognitive neuroscience.	1, 2, 3, 4	

2	Group discussions and in-class learning activities	Students will explain how to apply the knowledge to everyday life experiences and discuss important issues in mind-body relationship. Through in-class discussions and learning activities, students will discover the linkage between cognitive neuroscience and other disciplines.	3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Reaction paper	1, 2	10	
2	Mid-term quiz	1, 2, 3, 4	25	
3	Presentation	1, 2, 3, 4	30	
4	Final exam	1, 2, 3, 4	35	

Continuous Assessment (%)

100

Examination (%)

0

Assessment Rubrics (AR)

Assessment Task

1.Reaction paper

Criterion

Ability to analyse critically the case/scenario based on the course materials and the quality of reflection.

Excellent (A+, A, A-)

Demonstration of an excellent ability to analyse and explain the case/ scenario by integrating and synthesizing with what have been covered in this course with an in-depth reflection on a related topic.

Good (B+, B, B-)

Showing a good capability to analyse and explain the case/ scenario by integrating and synthesizing with what have been covered in this course with a reasonably in-depth reflection on a related topic.

Fair (C+, C, C-)

Limited capability to analyse and explain the case/ scenario by relating to what have been covered in this course with some attempts to reflect on a related topic.

Marginal (D)

Limited familiarity with the subject issue in analysing the case/ scenario and reflecting on a related topic.

Failure (F)

Little evidence of familiarity with the subject issue.

Assessment Task

2.Mid-term

Criterion

Ability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience and the different methodologies.

Excellent (A+, A, A-)

Demonstration of an excellent ability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience. Excellent grasp of the principles underlying different methodological approaches.

Good (B+, B, B-)

Showing a good capability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience. Reasonably good understanding of the principles behind different methodological approaches.

Fair (C+, C, C-)

Limited capability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience. Limited evidence of showing good understanding of the principles behind different methodological approaches.

Marginal (D)

Limited familiarity with the subject issue in cognitive neuroscience and the related methodological approaches.

Failure (F)

Little evidence of familiarity with the subject issue.

Assessment Task

3.Presentation

Criterion

Ability to critically evaluate and synthesize the two selected research papers, and integrate with the course materials to apply to real-life situations, and the quality of the presentation session.

Excellent (A+, A, A-)

Demonstration of an excellent ability to evaluate and synthesize the two selected research papers, and to integrate with what have been covered in this course together with an emphasis on applying to real-life issues. The presentation is extremely clear and engaging along with a useful and thought-provoking discussion.

Good (B+, B, B-)

Showing a good capability to evaluate and synthesize the two selected research papers, and to integrate with what have been covered in this course together with an emphasis on applying to real-life issues. The presentation is reasonably clear and engaging along with a useful discussion.

Fair (C+, C, C-)

Limited capability to evaluate and synthesize the two selected research papers, and to integrate with what have been covered in this course together with attempts to apply to real-life issues. The presentation and discussion is fairly clear and engaging.

Marginal (D)

Limited familiarity with the subject issue in cognitive neuroscience. The presentation and discussion is poorly delivered.

Failure (F)

Little evidence of familiarity with the subject issue.

Assessment Task

4.Final exam

Criterion

Ability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience and the different methodologies.

Excellent (A+, A, A-)

Demonstration of an excellent ability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience. Excellent grasp of the principles underlying different methodological approaches.

Good (B+, B, B-)

Showing a good capability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience. Reasonably good understanding of the principles behind different methodological approaches.

Fair (C+, C, C-)

Limited capability to describe, explain, integrate, and apply major concepts and theories in cognitive neuroscience. Limited evidence of showing good understanding of the principles behind different methodological approaches.

Marginal (D)

Limited familiarity with the subject issue in cognitive neuroscience and the related methodological approaches.

Failure (F)

Little evidence of familiarity with the subject issue.

Part III Other Information

Keyword Syllabus

History and principles of cognitive neuroscience; Brain, mind, and behaviour; Structural and functional correlates in the brain; Brain imaging and stimulation methods; Brain circuits underlying sensation and perception; Brain dynamics in attention; Hippocampus, memory, and emotion; Language processing: from neuropsychology to neuroimaging; The self and the social brain; The frontal executive; The implementation of consciousness.

Reading List

Compulsory Readings

	Title
1	Textbook for this course:Gazzaniga, Ivry, Mangun, Ivry, Richard B., & Mangun, G. R. (2019). Cognitive neuroscience : The biology of the mind (Fifth ed.).
2	Marie T. Banich & Rebecca J. Compton (2018). Cognitive Neuroscience. (4th ed) Wadsworth

Additional Readings

	Title
1	Baars, B., & Gage, N. (2013). Fundamentals of cognitive neuroscience / a beginner's guide. Amsterdam ; London: Academic.
2	Coello, Y., & Bartolo, A. (2013). Language and action in cognitive neuroscience (Contemporary topics in cognitive neuroscience series). London ; New York: Psychology Press.
3	Uttal, W. (2011). Mind and Brain. The MIT Press.
4	Ward, J. (2010). The student's guide to cognitive neuroscience (2nd ed.). Hove, East Sussex ; New York: Psychology Press.

5	Zelazo, Philip David, Chandler, Michael, & Crone, Eveline. (2010). Developmental Social Cognitive Neuroscience. Psychology Press.
6	Amodio, D. M., & Frith, C. D. (2006). Meeting of minds: the medial frontal cortex and social cognition. Nature reviews neuroscience, 7(4), 268-277.
7	Bailystok, E., Craik, F., Grady, C., Wilkin, C., Ishii, R., Gunji, a., Pantev, C. (2005). Effect of bilingulaism on cognitive control in the Simon Task: evidence from MEG. NeruoImage, 24, 40-49.
8	Costa, A., Strijkers, K., Martin, C., & Thierry, G. (2009). The time course of word retrieval revealed by event-related brain potentials during overt speech. Proceedings of the National Academy of Sciences, 106(50), 21442-21446.
9	Feldman, R. (2017). The neurobiology of human attachments. Trends in cognitive sciences, 21(2), 80-99.
10	Greene, J. D., Sommerville, R. B., Nystrom, L. E., Darley, J. M., & Cohen, J. D. (2001). An fMRI investigation of emotional engagement in moral judgment. Science, 293 (5537), 2105-2108.
11	Kanwisher, N., McDermott, J., & Chun, M. M. (1997). The fusiform face area: Amodule in human extrastriate cortex specialized for face perception. Journal Of Neuroscience, 17(11), 4302-4311.
12	Kitchener, E., & Hodges, J. (1999)., Impaired knowledge of famous people andevents with intact autobiographical memory in a case of progressive right temporal lobe degeneration: implications for the organisation of remote memory. Cognitive Neuropsychology, 16, 589-607.
13	McCloskey, M. (1993). Theory and evidence in cognitive neuropsychology: A"radical" response to Robertson, Knight, Rafal and Shimamura (1993), Journal of Experimental Psychology: Learning, Memory and Cognition,19(3), 718-734.
14	Piai, V., Anderson, K. L., Lin, J. J., Dewar, C., Parvizi, J., Dronkers, N. F., & Knight, R. T. (2016). Direct brain recordings reveal hippocampal rhythm underpinnings of language processing. Proceedings of the National Academy of Sciences, 113(40), 11366-11371.
15	Qu, Q., Damian, M. F., & Kazanina, N. (2012). Sound-sized segments are significant for Mandarin speakers. Proceedings of the National Academy of Sciences, 109(35), 14265-14270.
16	Robertson, L. C., Knight, R. T., Rafal, R. & Shimamura, A. P. (1993). Cognitiveneuropsychology is more than single-case studies. Journal of ExperimentalPsychology: Learning, Memory and Cognition, 19(3), 710-717.
17	Shaywitz, S., Shaywitz, B., Pugh, K., et al. (1998). Functional disruption in theorganization of the brain for reading in dyslexia. Proc. Natl. Acad. Sci., 95, 2636-2641.
18	Wang, Y., Cheung, H., Yee, L. T. S., & Tse, C.-Y. (2020). Feedback-related negativity (FRN) and theta oscillations: Different feedback signals for non-conform and conform decisions. Biological Psychology. https://doi.org/10.1016/j.biopsycho.2020.107880
19	Wong, A. W. K., Wang, J., Ng, T. Y., & Chen, H. C. (2016). Syllabic encoding during overt speech production in Cantonese: Evidence from temporal brain responses. Brain research, 1648, 101-109.
20	Xiao, X.-Z., Shum, Y.-H., Lui, T. K.-Y., Wang, Y., Cheung, A. T.-C., Chu, W. C. W., Neggers, S. F. W., Chan, S. S.-M., & Tse, C.-Y. (2020). Functional Connectivity of the Frontotemporal Network in Pre-attentive Detection of Abstract Changes: Perturbs and Observes with Transcranial Magnetic Stimulation and Event-related Optical Signal. Human Brain Mapping. https://doi.org/10.1002/hbm.24984