

國立清華大學課程大綱

科號 Course Number		學分 Credit		人數限制 Class Size	
中文名稱 Course Title	認知神經科學				
英文名稱 Course English Title	Cognitive Neuroscience				
任課教師 Instructor	姚在府 Zai-Fu Yao				
上課時間 Time		上課教室 Room			

課程簡述(必填) (最多 500 個中文字) 本欄位資料會上傳教育部課程網

Brief Course Description (required) (50-200 words if possible, up to 1000 letters)

This course will introduce a broad overview of the latest theories and findings in all the key topics in cognitive neuroscience, including perception, attention, learning, memory, problem solving, thinking, reasoning, speech, language, literacy, numeracy, executive function, social and emotional behavior. Specifically, I will focus on theoretical innovation and recent advances in the measurement, modeling, and characterization of the neural basis of the mind to the question of how cognition is supported by the brain, especially from brain imaging studies. Understanding these processes through the study of cognitive neuroscience is essential for understanding human behavior.

本課程將簡介認知神經科學所有關鍵主題的最新理論和發現，包括知覺、注意力、學習、記憶、解決問題、思考、推理、語言、讀寫能力、計算能力、執行功能、社會和情緒行為。具體來說，我將重點聚焦在心智的神經基礎的量測、模型和表徵方面的理論創新和最新進展，尤其是從腦造影研究角度探討關於大腦如何形塑認知等問題，通過認知神經科學研究了解這些歷程對於理解人類行為至關重要。

請輸入課程內容「中文暨英文關鍵字」至少 5 個，每個關鍵字至多 20 個中文，以半形逗點分隔 (必填)

Please fill in at least 5 course keywords (up to 40 letters for each keyword) and use commas to separate them.(required)

中文關鍵字: 認知, 大腦, 人類行為, 心智, 神經基礎

Keywords: Cognition, Brain, Human Behavior, Mind, Neural basis

課程大綱 Detailed Course Syllabus

Ethical Statement in NTHU course syllabi: As per the Guidelines for Collaboration, Co-learning, and Cultivation of Artificial Intelligence Competencies in University Education, this course adheres to a policy of conditional openness. In order to comply with this policy, students are required to provide a brief explanation in the footnotes of the title page or after the reference in their assignments or reports, detailing how generative AI (e.g. usage of ChatGPT) was utilized for topic ideation, sentence refinement, or structural reference.

● 課程說明(Course Description)

The course is organized around the history of thinking about the mind and its relation to the world. Precisely, I will balance traditional approaches to cognition and cutting-edge cognitive neuroscience and neuropsychology. Covering all the key topics within understanding, this comprehensive overview is essential reading for all students with interdisciplinary backgrounds. It summarizes fundamental issues in characterizing and measuring human cognition and surveys multidisciplinary research consortia and large-scale data repositories for studying the human mind. Using extended case studies to address the most important themes, ideas, and findings, this course suits an undergraduate and graduate student interested in the human brain and cognition. It is also ideal for general readers interested in an accessible treatment of cognitive science and its practical implications. This course will be mainly lecturing format, with as much discussion as possible. There will be weekly readings, short-answer questions, mid-term, and final exams. Class participation will be critical to your success in the course.

● 指定用書(Text Books)

1. [書名 Title: Cognitive Neuroscience: The Biology of the Mind. Fifth Edition 2018; 作者 Author: Michael Gazzaniga, Richard B. Ivry, George R. Mangun Ph.D.; 出版社 Publisher: W. W. Norton & Company]

● 參考書籍(References)

1. [書名 Title: Cognitive Development and Cognitive Neuroscience. 2nd Edition 2019; 作者 Author: Usha Goswami Ph.D.; 出版社 Publisher: Routledge]

2. [書名 Title: The Student's Guide to Cognitive Neuroscience. 4th Edition 2019; 作者 Author: Jamie Ward Ph.D.; 出版社 Publisher: Routledge]

3. [書名 Title: Fundamentals of Cognition. 3rd Edition 2018; 作者 Author: Michael W. Eysenck, Marc Brysbaert Ph.D.; 出版社 Publisher: Routledge]

● 教學方式(Teaching Method)

In this course, the student will study a scholarly paper every week on a designated topic with reading reflection or short answer questions to evaluate the understanding of the content. Instructors would deliver knowledge to students through lectures and direct instruction and aim to measure the results through testing and assessment.

● 教學進度(Syllabus)

週次 (Week)	主題Topic/Agenda	週次(Week)	主題Topic/Agenda
1	導論: 歷史視角 Introduction: Historical perspective	9	記憶與學習 Memory & Learning
2	中樞神經系統: 結構與功能 Central Nervous System: Structure and Function	10	執行功能 Executive Function
3	認知神經科學研究方法及原理 General methods & principles of cognitive neuroscience	11	情緒 Emotion
4	神經計算、認知歷程及感官表 徵理論、模型及假設	12	語言 Language

	Theories, models, and hypotheses of neural computation, cognitive process, and sensory representation		
5	腦傷病人研究 Brain lesion studies	13	思考、決策及推理 Thought, decision making & reasoning
6	知覺及感官 Perception & Sensation	14	社會認知 Social cognition
7	注意力 Attention	15	文化認知 Cultural cognition
8	動作及運動 (mid-term oral or essay) Action and Motion (Oral)	16	意識 (期末考) Consciousness (Final)

● 成績考核(Evaluation)

1.. 課堂表現(attendance and performance)25%: 學生課堂出席及互動、邏輯思辯能力。不定期課堂週間進行指定閱讀反思作業(或簡答題)線上繳交。Interaction during class and constructive criticism in the way of logic. Reading reflections (short answer questions) are submitted online during each class and after completing a reading assignment.

2. 口頭報告(oral presentation) or 期中評論報告(opinion essay)30%: 學生就相關文獻掌握程度、報告流暢度、結構嚴謹度及組織性進行綜合評量。Criteria include Structure, organization, fluency, and coherence of presentation. 期中評論報告(opinion essay): 繳交一篇針對認知神經科學領域的最新研究(三年內發表)進行評論。一篇評論觀點文章主要三個評分重點: 對所評論的研究中所涉及的主題和問題的簡短概述; 對主要發現的描述; 並簡要解釋研究發現及該領域的貢獻。報告簡潔扼要 1500 字以內。Please submit an essay providing a scholarly review of recent studies in cognitive neuroscience published within the last three years. Your opinion essay should consist of three parts: a brief overview of the topic and questions addressed in the reviewed paper, a description of the key findings, and a concise explanation of how these findings contribute to the field. While critical reviews are welcome, please ensure that your comments are accurate, well-reasoned, and diplomatic. Additionally, we encourage you to focus on what was learned and what could have been done differently. Please keep your submission concise, limited to 1,500 words. The deadline for fulfilling this requirement is the last day of the semester,

Friday, January 12, 2024.

* All assignments will be evaluated on the basis of content (completeness, correctness, depth, substance, relevance, logical conclusions, creativity, etc.) and format (in accordance with the assignment guidelines, including grammar, punctuation, and spelling).

3. 期末考試 (Final Exam)40%: 評量學生對於課程內容重點及觀念的理解 To evaluate students' understanding of the course content and main ideas.

4. 研究參與體驗 (Research participation for final grade) 5%: 學生可選擇實際參與研究·體驗人類行為的奧秘·或書面報告作為期末總成績 5%的成績 Students earn 5 percent of their final grade either by participating in research studies or by studying for and writing an exam in lieu of participation. Students in this course is strongly encouraged to participate in 3 hours of research as part of their final grade via SONA platform of NTHU. Option 1: Students will receive course credit, not money, for participating in the studies included in this participant pool. Option 2: Research opt-out exam: Students who choose not to participate in research can write an exam (please contact the instructor for more detail) as an alternative to participating in research. The deadline to fulfill this requirement is the last day of semester, Friday, January 12, 2024.

● 可連結之網頁位址 相關網頁(Personal Website)