

25UAMT415	COGNITIVE INFORMATICS	Category	L	T	P	R	Credit	Year of Introduction
		PEC	3	0	0	0	3	2025

Preamble: This course introduces the fundamental concepts of Cognitive Science, focusing on core cognitive processes such as perception, attention, learning, memory, language, and reasoning. It highlights the interdisciplinary foundations of cognition from psychology, neuroscience, artificial intelligence, linguistics, and philosophy. The course enables learners to apply basic cognitive models to analyze human behavior and simple real-world problems, supporting further studies in AI, HCI, data science, and intelligent systems.

Prerequisite: Nil

Course Outcomes: After the completion of the course, the student will be able to:

CO	Course Outcomes	Knowledge Level
CO 1	Explain the scope, historical development, interdisciplinary foundations, and core approaches of cognitive science.	K2 Understand
CO 2	Describe key cognitive processes, including perception, attention, learning, memory, and language, using basic models and theories.	K2 Understand
CO 3	Apply fundamental cognitive theories and models to analyze human behavior, problem-solving, and simple decision-making tasks.	K3 Apply
CO 4	Apply concepts of cognition to basic applications in artificial intelligence, human–computer interaction, and intelligent systems.	K3 Apply

Mapping of course outcomes with program outcomes and program specific outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	2	-	-	-	-	-	-	-	2	3	2
CO2	3	3	2	-	-	-	-	-	-	-	3	3	2
CO3	3	3	3	2	-	-	-	-	-	-	3	3	3
CO4	3	3	3	3	-	-	-	-	-	-	3	3	3
Avg	3	3	2.5	2.5	-	-	-	-	-	-	2.75	3	2.5

Mapping of course outcomes with Knowledge and Attitude Profile (WK)

	WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
CO1	*	*	*	*	*			*	
CO2	*	*	*	*	*			*	
CO3	*	*	*	*	*			*	
CO4	*	*	*	*	*			*	

WKs Mapped with the course

WK1	WK2	WK3	WK4	WK5	WK6	WK7	WK8	WK9
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Mark Distribution:

Total Marks	CIE Marks	ESE Marks	ESE Duration
100	40	60	2.5 hrs

Continuous Internal Evaluation Pattern:

Attendance	: 5 marks
Continuous Assessment Test	: 20 marks
Continuous Assessment Assignment	: 15 marks

SYLLABUS

Module 1 (9 hrs)

Introduction to cognitive science: definition, objectives, and scope. Historical evolution of cognitive science. Interdisciplinary contributions from psychology, neuroscience, artificial intelligence, linguistics, and philosophy. Core theoretical approaches: behaviorism, cognitivism, and connectionism. Levels of cognitive analysis. Basic research methods in cognitive science.

Module 2 (12 hrs)

Perception as information processing. Visual perception: color, depth, motion, and object recognition. Auditory perception and speech processing. Gestalt principles of perception. Attention: selective, divided, and sustained attention. Bottom-up and top-down processing. Applications of perception and attention in interface and multimedia design.

Module 3 (11 hrs)

Learning theories: classical conditioning, operant conditioning, and observational learning. Memory systems: sensory memory, short-term memory, working memory, and long-term memory. Processes of encoding, storage, and retrieval. Forgetting and memory errors. Application of memory models to learning environments and system design.

Module 4 (10 hrs)

Language and cognition: structure of language, language acquisition, comprehension, and production. Relationship between language and thought. Reasoning and problem-solving: deductive and inductive reasoning, heuristics, and biases. Introduction to cognition in artificial intelligence and human-computer interaction. Simple applications of cognitive principles in intelligent systems.

Text Books:

1. Eysenck, M. W., & Keane, M. T. (2020). *Cognitive psychology: A student's handbook* (8th ed.). Psychology Press.
2. Thagard, P. (2005). *Mind: Introduction to cognitive science* (2nd ed.). MIT Press.
3. Miller, G. A. (2003). *The cognitive revolution: A historical perspective. Trends in Cognitive Sciences*.

Reference Books:

1. Goldstein, E. B. (2019). *Cognitive psychology: Connecting mind, research, and everyday experience* (5th ed.). Cengage Learning.
2. Stillings, N. A., et al. (1995). *Cognitive science: An introduction* (2nd ed.). MIT Press.

END SEMESTER EXAMINATION – MODEL QUESTION PAPER

Course Code	25UAMT415
Course Name	COGNITIVE INFORMATICS
Max. Marks: 60	Duration: 2.5 Hours

Part A (Answer all questions. Each question carries 3 marks)				
Qn No.	Question	Marks	CO	BL
1.	Explain the scope and interdisciplinary foundations of cognitive science.	3	CO1	L2
2.	Describe the core theoretical approaches of behaviorism, cognitivism, and connectionism.	3	CO1	L2
3.	Explain the Gestalt principles of perception with suitable examples.	3	CO2	L2
4.	Differentiate between selective, divided, and sustained attention with examples.	3	CO2	L2
5.	Compare classical conditioning and operant conditioning with examples.	3	CO3	L2
6.	Explain the processes of encoding, storage, and retrieval in memory.	3	CO3	L2
7.	Describe the relationship between language and thought.	3	CO4	L2
8.	Explain the application of cognitive principles in human–computer interaction.	3	CO4	L3

Part B (Answer any one full question from each Module. Each carry 9 marks)				
Qn	Question	Marks	CO	BL

No.				
Module I				
9.a	Explain the historical evolution of cognitive science and its interdisciplinary contributions from psychology, neuroscience, and artificial intelligence.	5	CO1	L2
9.b	Describe the levels of cognitive analysis and the basic research methods used in cognitive science.	4	CO1	L2
OR				
10.a	Compare the theoretical approaches of behaviorism, cognitivism, and connectionism in explaining cognitive processes.	5	CO1	L2
10.b	Explain the definition, objectives, and scope of cognitive science with suitable examples.	4	CO1	L2
Module II				
11.a	Explain visual perception in detail covering color, depth, motion, and object recognition.	5	CO2	L2
11.b	Describe bottom-up and top-down processing with applications in interface design.	4	CO2	L2
OR				
12	Explain auditory perception and speech processing. Discuss Gestalt principles of perception and their significance in multimedia design.	9	CO2	L2
Module III				
13	Illustrate the memory systems: sensory memory, short-term memory, working memory, and long-term memory. Discuss encoding, storage, retrieval, and memory errors.	9	CO3	L2
OR				
14.a	Apply classical and operant conditioning principles to explain learning in educational environments.	5	CO3	L3
14.b	Explain the application of memory models to system design.	4	CO3	L3
Module IV				
15.a	Explain deductive and inductive reasoning and how heuristics and biases affect problem-solving.	5	CO4	L3
15.b	Describe the application of cognitive principles in intelligent systems with suitable examples.	4	CO4	L3
OR				
16	Apply cognitive theories to analyze human behavior and decision-making tasks. Discuss the role of language acquisition	9	CO4	L3

	and comprehension in cognitive science.			
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