

**Centre of Behavioural and Cognitive Sciences
University of Allahabad**

D.Phil. in Cognitive Science

Entrance Exam Syllabus

General Issues and Foundations of Cognitive Science

Information processing approach, Marr's levels of processing, Representations, Dynamical approaches, Situated and Embodied cognition, Modularity, Culture and Cognition, Cognitive Development, Different methodologies used in Cognitive science, Reaction Time measurement and analysis, Signal detection theory, Eye tracking

Research Methods

Qualitative vs quantitative methods, Scientific Method, Purpose of statistics, Different kind of Variables, Probability, Distributions, Sampling, Experimental Designs (Independent samples design, Repeated measure design), Validity (Validity in Experiments and other research design, types of validity), Quasi-experiments, Analysis: Correlations, t-tests, non-parametric tests, ANOVA (factorial, mixed), Introduction to Regression

Computing

Basics of programming, algorithmic problem solving, data structures, associative structures, Basic algorithms (sorting, searching, etc)

Cognitive Neuroscience

Functional organization of the cortex, Methods (Electroencephalography/Event related potentials, functional magnetic resonance imaging), Cognitive neuroscience of perception, language, learning and memory, motor systems, emotions, and hemispheric lateralization.

Computational Models of Cognition

Introduction to Computational Modeling, Types of learning mechanisms and learning rules, Introduction to neural networks, Probabilistic reasoning, Production Systems, Cognitive Architectures

Perception and Attention

Principles of perception, Different theoretical approaches to perception (Gibson, Helmholtz, Gestalt, etc), Color Perception, Perceptual organization, Object recognition, Motion and Time perception, Selective Attention, Sustained Attention, Divided Attention, Executive Control.

Learning and Memory

Principles of classical conditioning and operant conditioning, Theories of Learning, Reinforcement schedules, Skill Acquisition and Performance, Sensory memory, Working Memory, Models of Semantic Memory, Autobiographical Memory, Retrieval, Forgetting, Implicit learning and memory.

Psycholinguistics

Introduction to Linguistics, Biological basis of language, language evolution, Design features of language, Foundations of Psycholinguistics, Methodological considerations, History, Current approaches, domains of study, Links with other disciplines, Levels of linguistic analysis: Phonology-phonetics, syntax, semantics, morphology, pragmatics, Word Recognition, Sentence processing, Language Acquisition, Bilingualism, Language-Vision interaction

Decision Making

Heuristics and Biases, Bounded rationality, Theories of utility and Paradoxes, Choice under uncertainty, Neuroeconomics of individual and collective decision making, Game theory, Computational Models of decision making.

Philosophy of Mind

Different views on mind-brain relationship, functionalism, eliminative materialism, fundamental issues on self and consciousness, representationalism, phenomenological approaches, Language and thought.

Suggested Readings:

- Baddeley, A. (2003). *Human Memory: Theory and Practice*.
Churchland, P. *Matter and Consciousness*. Cambridge: MIT Press.
Coolican, H. (2009). *Research Methods and Statistics in Psychology*. Hodder Education.
Cormen, T., Leiserson, C., Rivest, R., & Stein, C. (2002). *Introduction to Algorithms*. Prentice Hall of India, 2002.
Gazzaniga, M. S. (2009). *The Cognitive Neurosciences*, 4th Edition, MIT Press.
Harley, T. (2008). *The Psychology of Language*. Psychology Press.
Kerlinger, F. N & Lee, H. B. (2000). *Foundations of Behavioural research*. Australia: Wadsworth Thomson Learning.
Mazur, J. E. (2006). *Learning and Behaviour*. NJ: Pearson Prentice Hall.
Polk, T., & Seifert, C. (2004), *Cognitive Modelling*, MIT Press.
Russell, S., & Norvig, P. (2003). *Artificial Intelligence: A Modern Approach*, Second Edition, Prentice Hall of India.
Solso, R. L. *Cognitive Psychology*. India: Pearson Education
Eysenck, M. & Keane, M. *Cognitive Psychology: A Student's Handbook*. Psychology Press.
Palmer, S. E. *Vision Science: Photons to Phenomenology*. Cambridge: MIT Press.
Ward, J. (2006). *The Student's Guide to Cognitive Neuroscience*. Hove: Psychology Press
Yegnanarayana, B. (2009). *Artificial Neural Networks*. Prentice Hall of India.