Cognitive Science

- Philosophy
- Linguistics
- Psychology
- Neuroscience
- Computer Science & Robotics
- Anthropology
What is Cognitive Science?

Cognitive science is an interdisciplinary field that strives to provide a unifying framework to the various facets of the inquiry into the nature of the human mind.

The field represents the point of convergence of several other disciplines, including philosophy (knowledge representation, logic), psychology (basic human cognition, perception, and performance), computer science (computational theory, artificial intelligence, and robotics), linguistics (theories of language structure) and cognitive neuroscience (brain mechanisms for intelligent behavior).

Typical research areas of cognitive science include reasoning and decision making, language comprehension and production, language acquisition, vision, attention, learning & memory, goal-directed movement in complex environments, and consciousness. In more recent times, Cognitive Science has also brought together various fields of engineering by providing insights about user (humans) behavior and cognitive processes to help in human-computer interface design and enhancing the usability of various products, i.e. usability engineering. It also studies behavioral deficits caused by congenital issues or traumatic brain injury. Defining protocol and aiding policies, form another important facet of this science.

“Breakthrough innovation occurs when we bring down boundaries and encourage disciplines to learn from each other”

— Gyan Nagpal,
TALENT ECONOMICS: THE FINE LINE BETWEEN WINNING AND LOSING THE GLOBAL WAR FOR TALENT
Beginnings...

Cognitive Science Interdisciplinary Programme at IIT-Kanpur was the result of coming together with faculty members from several different departments and domains of scientific study, with a drive to investigate the human mind.

The aim was to leverage the technical talent and infrastructure available at the institute to push forward frontiers of research in the field using a combination of computational and behavioral research.

The Cognitive Science Program at IITK was one of the first of a handful of such offerings in India, and several other reputed universities, including other IITs, have since followed suit. The interdisciplinary nature of the program sets it apart from other cognitive science programs in the country, including other IITs. It is highly research-intensive and students undertake multiple projects before beginning work on their thesis.

Cognitive Science graduates from a highly research-oriented program like the IDP at IIT-K are capable of a varied range of career profiles, in both academia and the industry.

We seek employment opportunities in several up and coming areas like cognitive computing, natural language processing, design, usability research, human factors, human-computer interaction (HCI), neuro-economics, decision making, cognitive and behavioral rehabilitation, advertising, and UX & UI design.

The focus is on creating researchers with a holistic knowledge of cognitive phenomena and tools used to study them.

- CGS
  IIT KANPUR
One of the major strengths of an IDP in Cognitive Science at IIT-Kanpur is the participation of distinguished faculty from so many departments/disciplines at once.

Our program has surpassed the existing standards, with the degree of interdisciplinary breadth that our program offers. Currently, the participating departments include Computer Science Engineering, Humanities and Social Sciences (Philosophy, Psychology and Linguistics), Electrical Engineering, Mechanical Engineering, Biosciences and Biological Engineering, Chemistry and Mathematics.

A. V. Ravishankar Sarma
Associate Professor, Department of Humanities and Social Sciences (Philosophy)

Research Areas: Belief Revision, Causality, Scientific Theory Change

Achla Misri Raina
Professor, Department of Humanities and Social Sciences (Linguistics)

Research Areas: Cognitive Linguistics, Pragmatics, Lexical Semantics, Sign Linguistics, Indic Linguistics

Ark Verma
Assistant Professor, Department of Humanities and Social Sciences (Psychology)

Research Areas: Visual recognition, Corpus linguistics, Laterality of cognitive functions, Self, Attention, Perception and Social Cognition, Bilingualism

Bishakh Bhattacharya
Professor, Mechanical Engineering Department Head, Cognitive Science Programme

Devpriya Kumar
Assistant Professor, Department of Humanities and Social Sciences (Psychology)

Research Areas: Cognitive processing of perception and action, Intentionality and Sense of Agency.

Harish Karnick
Emeritus Fellow, Department of IDP for Cognitive Science

Research Areas: AI, Computational modelling of cognitive behavior

Jonaki Sen
Associate Professor, Department of Biological Sciences and Bioengineering

Research Areas: Neurogenesis, Neuronal Differentiation and Migration, Embryonic development of neuronal connections

K. M. Sharika
Visiting Assistant Professor, Department of IDP for Cognitive Science

Research Areas: Predictive Analysis of visible social Behavior, Valence based social decision-making, Control and influencing of attention and awareness, Emotion perception

Narayanan Srinivasan
Professor, Department of IDP for Cognitive Science

Research Areas: Attention, Consciousness, Self and Agency, Time perception, Emotions, Decision making

Vineet Sahu
Assistant Professor, Department of Humanities and Social Sciences

Research Areas: Philosophy of Mind, Ethics - moral thinking in the Indian tradition
Debabrata Goswami  
Professor, Department of Chemistry  
*Research Areas:* Quantum Computing, Spatio-temporal Control

Mohua Banerjee  
Professor, Department of Mathematics and Statistics  
*Research areas:* Human Cognitive Reasoning, Modal Logics

Nishchal K. Verma  
Professor, Department of Electrical Engineering  
*Research Areas:* AI and Machine Learning, Industrial automation and control, Cyber-physical systems, Fuzzy systems, Intelligent fault diagnosis, Health management of unmanned vehicles

Nisheeth Srivastava  
Assistant Professor, Department of Computer Science  
*Research Areas:* Decision making, Preference reversal, AI and autonomous control, Representation models for object recognition, Human factors in computing

Nitin Gupta  
Assistant Professor, Department of Biological Sciences and Bioengineering  
*Research Areas:* Insect Olfaction, Neural circuits in the olfactory system, Mental health and therapy, Digital CBT (TreadWill)

Shikha Dixit  
Professor, Department of Humanities and Social Sciences (Psychology)  
*Research Areas:* Health Psychology, Social Representations, Illness Narratives, Social Cognition, Organizational Cognition, Mental Models
Overview of Programmes Offered

CGS, IIT KANPUR

MS in Cognitive Science
Ph.D. in Cognitive Science

Our students come from a variety of backgrounds, not limited to a Bachelors or Masters Degree in Cognitive Science, and or related disciplines including Psychology, Neuroscience, Bio-sciences, Mathematics, Physics, Engineering, Medicine, etc.

Given the interdisciplinary nature of cognitive science and the amount of emphasis on research, there are two components in the programs offered, i.e. a course component and a research component.

- The course component requires the students to take a number of compulsory courses and choose from a variety of electives thereby, helping the students gain necessary footing for a uniform entry into Cognitive Science.

- The research component requires students to complete a research thesis under the supervision of one or more participating faculty, addressing a problem in the field of cognitive science using empirical, theoretical/computational, or a mixed approach.

Additional coursework may be credited or audited as per the current requirements for their respective research areas.

Core Coursework
- Neurobiology
- Foundations in Cognitive Science
- Methods and Tools in Cognitive Science
- Computational Tools in Cognitive Science
- Basic Statistics, Data Analysis, Inference

Electives Offered
- Learning, Memory, and Cognition
- Introduction to Natural Language Processing
- Computational Cognitive Science
- Topics in Cognitive Neuroscience
- Human Cognitive Processes
- Logic in Cognitive Science
- Bilingualism
- Philosophy of Mind
RESEARCH FACILITIES

To assist in the experimental work and other research components of our program, we provide quality infrastructural support to our students and faculties. Some of them include,

- Multiple high-performance servers for computational research.
- NAO - a robot for research into child-robot interaction.
- High-end workstations for psychophysics experiment and data analysis.
- Remote eye-tracking system.
- EEG wearable with both, 128 and 256 electrodes.
- Dedicated laboratories for conducting experiments using the above-mentioned equipment.
CORE SKILLS

- Programming: Python, MATLAB, R
- Design and Conduction of Experimental Studies (Online and Offline)
- Behavior Analysis
- Data Analysis and Visualisation
- Mathematical Modeling
- Conducting Original Research
- Technical and Academic Writing Expertise

ACTIVE RESEARCH AREAS

- Bio-Inspired Algorithm Optimization
- Human Reasoning and Decision Analysis
- Brain-Inspired Robotics
- Language Comprehension and Production
- Visual Perception and Attention Processes
- Concept Categorization
- Social Interaction and Group Dynamics
- Affective Cognition
- Usability Engineering and Digital Wellbeing
Get in Touch!

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