THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Introduction to Cognitive Science

CSE 5531

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate

Course Components:
Lecture

Course Description:
Interdisciplinary survey of the fields of artificial intelligence, linguistics, neuroscience, philosophy of mind, and psychology; various aspects of cognitive perception, representation, and computation.

Prerequisites and Co-requisites:
Prereq: At least 12 cr hrs in at least two of these four subjects (only 6 cr hrs from any one subject): CSE, Ling, Philos, Psych.

Course Goals / Objectives:
- Master the lingua franca of cognitive science - the language of information processing
- Master specific concepts, theories, and experimental results in cognitive science
- Master multiple definitions of the foundational concepts of computation and representation and be able to discuss them from multiple points of view
- Be competent with the interdisciplinary nature of cognitive science, the diversity of viewpoints, the controversies and the areas of nascent consensus
- Be competent with reading and discussing research papers from multiple disciplines
- Be familiar with brain anatomy and physiology
- Be familiar with the basic cognitive architecture - how perception, memory, language, motor control, and so forth come together to produce adaptive behavior
- Be familiar with the components of a grammar: phonology, morphology, syntax, and semantics
- Be familiar with writing critical essays on topics outside one?s area of specialization
- Be exposed to each of the five constituent disciplines and be familiar with its methods, key concepts, and focus of investigation

Course Topics:

- Introduction
- Philosophy: Overview. Nativism vs. empiricism. Mind-body problem. Functionalism. Turing Test. Modularity of mind. Consciousness.
- Neuroscience: Overview. Brain anatomy. Neuroimaging. Neurophysiology. Synaptic plasticity. Biological basis of learning. Brain damage. Amnesia. Aphasia. Agnosia.
- Artificial Intelligence: Overview. Turing machines. Physical symbol systems. Heuristic search. Connectionism. Machine Learning.
- Psychology: Overview. Behaviorism vs. cognitive psychology. Perception and psychophysics. Multiple memory systems. Executive control. High-level cognition.
- Linguistics: Overview, Components of a grammar. Phonology. Syntax. Compositionality, systematicity, and productivity. Semantics. Language acquisition. Is language innate?
- Integration: What is representation? Answers from all 5 disciplines. Cognitive architectures. ACT-R. Leabra.
- Robotics and Embodied Cognition: Overview. Symbol grounding.
- Advanced Topics
- Exams

Designation:

Elective