

ARTIFICIAL INTELLIGENCE (A-I)

A-I 100: Artificial Intelligence: Automated Thinking to Augment Human Intellect

3 Credits

This course introduces students to key artificial intelligence (AI) capabilities and their broad real-world applications. It first introduces students to the interdisciplinary intellectual underpinnings of artificial intelligence and the high-level computational architectures of intelligence. This foundational knowledge prepares the stage for introducing students to representative examples of artificial intelligence in action (from the lenses of "what, why, and social and ethical implications"), including playing games, learning from data, perception, language processing and question answering, making decisions, planning actions, interacting in multi-agent teams, and creative composition of text, music, and art/imagery. The course will also introduce ethical implications of AI and its impacts on society. Upon successful completion of the course, students will be able to articulate the big picture of AI, including basic understanding of AI's key capabilities such as natural language understanding, visual perception, prediction, learning, as well as ethics issues related to AI.

General Education: Social and Behavioral Sciences (GS)
 GenEd Learning Objective: Integrative Thinking
 GenEd Learning Objective: Key Literacies
 GenEd Learning Objective: Soc Resp and Ethic Reason

A-I 341W: Responsible Artificial Intelligence

3 Credits

This course aims to equip students with the necessary conceptual frameworks, best practices, and technical tools for addressing challenges of designing and deploying systems that maximize the benefits of AI while minimizing their potential for harm. By examining case studies, students will be introduced to real-world examples related to AI fairness, privacy protection in relation to AI, generative AI, and accountability of AI systems. In addition, students will learn relevant methods, approaches, and best practices that can address related ethical considerations. Through this course, students will develop an awareness and understanding of the key social and ethical challenges that AI poses—issues of fairness, privacy, autonomy, trust, and democratic accountability, as well as become equipped to play an active role in addressing and overcoming such challenges in their future work. As a Writing Across the Curriculum course, students will be given individual writing assignments that are spaced at regular intervals to encourage active, regular writing. The students will write a draft for each individual assignment, receive peer and instructor feedback, revise their drafts, and then get final feedback from the instructor.

Enforced Prerequisite at Enrollment: A-I 100 Enforced Concurrent at Enrollment: A-I 370 and (DS 310 or CMPSC 448 or CMPSC 445) Writing Across the Curriculum

A-I 370: Problem Formulation and Automated Problem Solving

3 Credits

This course introduces students to methods for automated problem solving requiring intelligence by formulating and solving problems as search, optimization, or constraint satisfaction problems. Topics of the course include but are not limited to: Problem-solving as state space search, Basic search algorithms and their properties, Finding optimal solutions (Best first search, A* Search, Heuristic search); Problem Solving through Problem Reduction, Search in non-deterministic environments, Problem solving in partially observable environments, Problem solving as Constraint Satisfaction, and Adversarial problem solving (optimal decisions in games; minimax search; etc.). Laboratory assignments will be used to provide students with hands-on experience in implementing and experimenting with AI problem solving methods. Upon successful completion of the course, students will be able to formulate and solve real-world problems of moderate complexity using modern search algorithms.

Enforced Prerequisite at Enrollment: A-I 100 and CMPSC 132 and (STAT 200 or DS 200) and (CMPSC 360 or Math 311W) Enforced Concurrent at Enrollment: (DS 305 or CMPSC 465 or CMPSC 462) and STAT 401

A-I 375: Knowledge Representation and Inference

3 Credits

This course is designed to introduce students to the principles and practice of representing and reasoning with knowledge for the design of AI systems. The course will cover logical, probabilistic, and decision-theoretic knowledge representations and their applications in query answering, decision making, and planning. Upon successful completion of the course, the students will be able to choose, design and apply appropriate modern knowledge representation and inference techniques to solve AI problems. Topics include logical knowledge representations, probabilistic knowledge representations, decision-theoretic knowledge representations, action representations and their use in planning, concept of ontologies, knowledge graphs, graph alignment and reasoning. Laboratory assignments will be used to provide hands-on experience with knowledge representation-based solutions to real-world AI problems of moderate complexity.

Enforced Prerequisite at Enrollment: A-I 370 and STAT 401

A-I 494: Research Project

1-12 Credits/Maximum of 12

Supervised student activities on research projects identified on an individual or small-group basis

A-I 495: Internship

1-18 Credits/Maximum of 18

Supervised on or off-campus, nongroup instruction including field experiences, practica, or internships. Written and oral critique of activity required.