ARTIFICIAL INTELLIGENCE (A-I)

A-I 500: Quantitative Methods

3 Credits

This course aims to provide essential quantitative skills required for advanced studies and practical applications that are important in algorithm optimization, signal processing, data manipulation, analysis, and data-driven decision making under uncertainty. It covers a range of topics including vector and matrix operations, advanced calculus with a focus on differentiation and integration techniques, Fourier transformations, and basic statistics and probability.

Cross-listed with: DAAN 500

A-I 570: Deep Learning

3 Credits

Deep Learning has become a prevalent area and accomplished near-human level in image classification, speech recognition, and autonomous driving. This course will cover the foundations on Neural Networks and Deep Learning Networks and give students a practical understanding of the field of Deep Learning. It covers the core concepts of Deep Neural Networks, including the Convolutional Neural Networks for image recognition, Recurrent Neural Networks for sequence generation, and Generative Adversarial Networks for image generation, and more!

Prerequisite: STAT 500 Recommended Prep: Requires basic math-college calculus & linear algebra. Should be able to take multivariable derivatives & understand matrices, vectors operations & notations. Preliminary programming skills in Python are required.

A-I 572: Reinforcement Learning

3 Credits

Reinforcement learning, along with supervised learning and unsupervised learning, is one of the three basic types of machine learning. Applications of reinforcement learning span across medical intervention, robotics, game playing, autonomous driving, financial trading, and marketing, among many others. This course will cover the main theory and approaches of reinforcement learning, along with deep learning and common software libraries and packages.

Recommended Preparation: STAT 500 or equivalent: probabilities, gaussian distributions, mean, standard deviation, etc. Able to take multivariable derivatives and understand matrices and vectors operations and notations. Preliminary skills in Python.

A-I 574: Natural Language Processing

3 Credits

Natural Language Processing (NLP) is a subfield of Artificial Intelligence. This course covers basic as well as advanced concepts to gain a detailed understanding of NLP tasks such as language modeling, text to speech generation, natural language understanding, and natural language generation. Students will learn the necessary skills to design a range of applications, including sentiment analysis, translating between languages, and answering questions. Throughout the course, the practical implementation of these applications with deep neural networks is also discussed.

A-I 596: Individual Studies

1-9 Credits/Maximum of 9

Creative projects, including nonthesis research, that are supervised on an individual basis, and which fall outside the scope of formal courses.

A-I 600: Thesis Research

1-15 Credits/Maximum of 999

No description.

A-I 801: Foundation of Artificial Intelligence

3 Credits

Artificial Intelligence (AI) is the discipline that attempts to build and understand intelligent entities. Computers with human level intelligence would have a huge impact as intelligent systems with natural language processing, robotics, building networked assistants, speech recognition, and autonomous driving. This course will teach the foundations of AI and give students a practical understanding of the field. This course gives an overview of the core concepts of AI, including the intelligent agents, knowledge and reasoning, reinforcement learning, planning and acting, belief networks, computational learning, Markov decision process, and more!

A-I 804: Ethics of Artificial Intelligence

3 Credits

Artificial Intelligence (AI) is the use of machines to do tasks that seem to require human intelligence and cognitive skills (thinking, natural language, inference, decision making etc.) The Ethics of Artificial Intelligence is the young branch of applied ethics that seeks to study the far-reaching and diverse ethical issues that arise with the widespread and rapid integration of AI technologies into various aspects of our lives. The challenge is that we are in an uncharted ethical territory with regard to AI: we need to radically adjust our existing ethical paradigms or introduce new ones as we experience and acquire a better grasp of the problems involved in AI-human interaction. A large portion of these issues reflect our concerns about the harm that the use and misuse of AI might cause for humanity. Such issues range from threats to individual privacy and freedom to wider social implications regarding economic justice and race and gender equality. However, as AI systems develop and attain higher levels of intelligence, questions about their moral status become more pressing. If these systems are capable of moral agency, then not only do they have responsibilities towards other moral agents like us, but they also have rights that we should respect in our conduct towards them. This course offers an overview of the nature and extent of the ethical issues arising from AI-human interaction as well as the philosophical background (particularly, in ethics and philosophy of mind) required to develop an informed methodology in approaching these issues, with the help of the flourishing literature on the subject.

Cross-listed with: PHIL 804

A-I 879: Machine Vision

3 Credits

This course will focus on the design of computer-based, machine vision systems using appropriate algorithms and best practices. Students will study various techniques for image representation and structuring, feature extraction and segmentation, information extraction, filtering and analysis.

A-I 894: Capstone Experience

3 Credits

The capstone course in the MPS in Artificial Intelligence program. A practical experience in which students, working in teams, employ contemporary methods, process, and tools in the design and implementation of an AI-enabled system including problem identification, methodology selection, data identification and gathering, implementation, training, and deployment. As the culminating experience in the AI program, students demonstrate their ability to design and implement a full AI-enabled systems using a real-world dataset applying the tools and techniques explored throughout their preceding studies.

A-I 897: Special Topics

1-3 Credits/Maximum of 3

Formal courses given on a topical or special interest subject with a professional orientation that may be offered infrequently.