Introduction to Artificial Intelligence

High School - One Semester (75 Contact Hours)

Course Overview and Goals

The Introduction to Artificial Intelligence course teaches students important programming concepts that enable the use of Artificial Intelligence in computer science and society at large. Students will learn how to incorporate basic Artificial Intelligence algorithms in their own work, and consider the social and ethical implications of how Artificial Intelligence is used, and how it plans to be used. Students will develop a series of projects that illustrate the variety of ways Artificial Intelligence can be used to optimize and predict information and processes.

Learning Environment

The course utilizes a blended classroom approach. The content is fully web-based, with students writing and running code in the browser. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students. Each unit of the course is broken down into lessons. Lessons consist of video tutorials, short quizzes, example programs to explore, and written programming exercises. Each unit contains a large scale project that students will gradually add to as they learn new content.

Programming Environment

Students write and run python programs in the browser using the CodeHS editor.

More Information

Browse the content of this course at https://codehs.com/course/8264.

Prerequisites

This course is intended for students who have taken *Introduction to Python 3* on CodeHS. It contains some advanced programming concepts that require students to have familiarity with lists, tuples, and using libraries. For students who have taken another introductory class, there are tutorials throughout the course that can be used to teach or re-teach the programming concepts that are needed for any given exercise.

Course Breakdown

Unit 1: What is Artificial Intelligence? (2 - 3 weeks)

Students will learn what defines Artificial Intelligence, how it is used, how it plans to be used, and the social and ethical implications of its use in society. Students will develop a case study exploring an ethical issue in Artificial Intelligence, highlighting the competing arguments on both sides of the issue, and ultimately choosing a side in the debate.

Objectives / Topics Covered	• What is Artificial Intelligence? • Types of Artificial Intelligence • The Ethics of Artificial Intelligence • Exploring an Ethical Issue in AI

Example Assignments / Labs	● Drawing with AI ○ Students play a game of pictionary against one of their classmates and time how long it takes for their classmate to determine what the image is. Students then play the same game against an AI that predicts what a user is drawing. Students compare the time rates, and explore the value of these predictive systems. ● Ethical Roundtable ○ Students participate in a fishbowl activity, where students share their perspectives on a series of ethical questions in AI. Students must prepare answers and questions to these ethical problems, and reflect on their classmates' perspectives. ● Project: The Ethics of AI ○ Students pick a topic on a specific ethical issue in AI and explore the different sides of the ethical argument. Students must ultimately pick a side, and present their project to their classmates.

Unit 2: Artificial Intelligence in Gaming (2 - 3 weeks)

Students learn how to create interactive computer programs, where a computer "player" responds to the actions of a user. In the first few lessons, students build a playable game of Tic Tac Toe. Students are then introduced to the AI recursive function minimax that allows for game logic, and how AI in gaming should mirror human processing, instead of always optimizing their possible moves.

Objectives / Topics Covered	● Artificial Intelligence in Gaming ○ Finite States ○ Search Trees ● Creating an Non Player Character ● Search Trees and Recursion ● Minimax ● Depth and Alpha Beta Pruning
Example Assignments / Labs	● Building Tic Tac Toe: ○ Students will build a game of Tic Tac Toe, where the computer isn't learning or strategizing how to play the game, but rather is being programmed directly to do so. ● Implementing Minimax ○ Students are introduced to the recursive function minimax, which allows a computer to search through all possible moves in a game and pick the most optimal move. Students then implement this function in their existing version of Tic Tac Toe to create an unbeatable version of the game. ● Implementing Depth ○ Students consider the purpose of optimization, and whether game play should include such measures. Students then learn how to limit the depth of search that minimax makes, making it so that the game can be beaten if a player makes optimal moves. Students then implement depth search in their existing Tic Tac Toe game.

Unit 3: AI and Chatbots (2 - 3 weeks)

Students learn how chatbots are developed to interact with humans, and what forms of Artificial Intelligence are used to get them to operate. Students will create a chatbot of their own to aid a business or app to finish the module.

Objectives / Topics Covered	● What are Chatbots? ● Implementing a Simple Chatbot ● Creating an AI Chatbot ● Chatbot Project
Example Assignments / Labs	● Implementing a Simple Chatbot ○ Students develop a chatbot using simple if/else statements. Students then develop a chatbot using AI, and compare the efficacy of both. ● Project: Build a Chatbot ○ Students will develop an informational chatbot. Students will be required to add a specific number of prebuilt conversations into the chatbot.

Unit 4: Creating Predictive Models (3 - 4 weeks)

Students will learn how to make predictive models using linear and logistic regression. Students will explore correlation and causation, and determine if certain attributes are correlated to a specific outcome. Students will then create their own predictive models using complex data sets.

Objectives / Topics Covered	● What are Predictive Models? ● Linear Regression and Building Models ● Correlation vs. Causation ● Logistic Regression ● Building Complex Linear Models ● Building Complete Predictive Models ● Project: Build Your Own Predictive Model
Example Assignments / Labs	● Linear Regression and Building Models ○ Students learn how linear regression works, and how regression models are used in the real world to make predictions and analysis. Students will attempt to create lines of best fit by using simple linear algebra and the eye test, and compare their analysis to the ones created by machine learning algorithms. ● Correlation vs. Causation ○ Students explore the difference between correlation and causation, and learn how to use sklearn's .correlation property to determine if two datasets are correlated. ● Programming Predictive Models ○ Students create simple multivariable linear regression models to predict outcomes. ● Building Unsupervised Models ○ Students will explore clustering and develop a clustering model using sklearn’s k-means algorithm.