Applications of AI and Machine Learning Syllabus

High School - One Month (20 hours)

Course Overview and Goals

Artificial Intelligence (AI) is a quickly growing field. In this course, students will have a chance to explore one of the key aspects behind AI, machine learning. Students will learn about neural networks, deep learning, and their role in AI. They will have an opportunity to build their own machine-learning models focusing on topics such as image classification and natural language processing (NLP).

Learning Environment

This course utilizes a blended classroom approach. The content is fully web-based, with students working with Google Colabs and the CodeHS platform. Each module of the course is broken down into lessons. Lessons consist of video tutorials, short quizzes, guided lab activities in Google Colab, and self-directed labs.

Prerequisites

This is an advanced course because it covers advanced concepts, not because it covers advanced coding. Students will use Python, but will not need to generate Python code from scratch. They will need to take pieces of code and put them together while making updates to parameters.

Technology Requirements

To complete this course, students will need access to the following third-party AI tools:

- Google Colab Notebook
  Google Colab is a free cloud service provided by Google that allows users to run Python code real-time in a browser-based environment. It offers a convenient way to write, execute, and share Python code along with its output. Learn more.
- Google Teachable Machine
  This tool allows students to create machine learning models without any coding or technical expertise. Without this tool, several lessons will need to be modified.

See the course whitelist for a list of all third-party websites: codehs.com/lms/course_whitelist/ai_app

More Information

Browse the content of this course at https://codehs.com/course/21504/explore

Course Breakdown

Module 1: The World of Artificial Intelligence (4 hours)

Students learn the basics of what Artificial Intelligence is and dig into different aspects of AI, including neural networks. Students will be introduced to concepts in this lesson and explore deeper in future lessons.

Objectives / Topics Covered	• Introduction to Artificial Intelligence • Artificial Intelligence, Machine Learning, and Neural Networks • The Ethics of Artificial Intelligence

Example Assignments	• Generative AI: Write a Poem
	  ○ Students explore different types of AIs
	• Supervised Teachable Machine
	  ○ Students explore Google's Teachable Machine to create a basic AI
	• Neural Network Parameters
	  ○ Using a sandbox environment, students explore the impacts of various parameters

Module 2: Creating an Image Recognizing AI (5-7 hours)

Students explore machine learning models using TensorFlow to create image recognition models. Along the way, students will explore how different model parameters impact model accuracy.

Objectives / Topics Covered	• Introduction to TensorFlow • Creating an Image Prediction Model • Selecting Valid Datasets

Example Assignments	• Introduction to Google Colabs
	• Create a Dog vs Cats Image Classification Mode
	  ○ Students will use TensorFlow to create a model
	• Lab: Face Recognition and Datasets
	  ○ Students explore how bias datasets impact AI results

Module 3: Using Natural Language Processing (4-5 hours)

Students explore machine learning models using TensorFlow to create Natural Language Processing (NLP) models to analyze and generate text.

Objectives / Topics Covered	• Creating a Sentiment Model • Generating New Text

Example Assignments	• Creating a Hotel Review AI
	  ○ Students use a sentiment model to create an AI that can respond to various feedback
	• Creating a Movie Review
	  ○ Students explore a text-generation model that can create a movie review

Final Project (3-5 hours)

Students will use what they have learned in the course to create their own AI using a machine-learning model created in TensorFlow. Students are given several options as a starting point (or can use their own dataset) to create an AI using a machine learning model in TensorFlow.