# Digital Citizenship and Artificial Intelligence

High School (115 hours)

## Course Overview and Goals

In this course, students build a strong understanding of the digital world they use every day while exploring how emerging technologies are shaping the future. They learn how to protect data and prevent unauthorized access, and they study the fundamentals of computer programming to develop logical thinking and problem-solving skills. Students design, code, and test their own programs while applying key math concepts. The course also introduces core ideas in artificial intelligence, including machine learning, large language models, bias, ethics, and prompt engineering. Through hands-on projects and thoughtful discussions, students build AI literacy and practice using tools such as ChatGPT, Gemini, and Teachable Machine in responsible and informed ways.

### Learning Environment

This course utilizes a blended classroom approach. The content is fully web-based, with students working within the CodeHS platform as well as third-party tools. Each module of the course is broken down into lessons. Lessons consist of content delivered through video and article connections, reflections, and hands-on tool explorations. Units end in a project, unit quiz, or both.

### Technology Requirements

Students will interact with third-party tools. Tools include:

- ChatGPT
- Gemini
- Hugging Face
- Teachable Machine
- Lakera
- Quick Draw
- Soundraw.io

### Prerequisites

This course is designed for complete beginners with no previous background in computer science or AI, but can be taken by students who have experience with these fields.

### Course Differentiation

Several coding options are available in the supplemental modules and may be swapped as needed (more guidance is provided at the end of the syllabus). The default coding language is Python. Alternatively, students may complete the coding components using Tracy the Turtle, which offers a more accessible introduction, or JavaScript, which is comparable in difficulty to Python. If students require additional time for coding, project activities may be omitted.

### More Information

Browse the content of this course at https://codehs.com/course/28059/explore

## Course Breakdown

### Module 1: Cybersecurity and You (2 weeks/10 hours)

In this module, students explore key areas such as personal data collection, the reliability of online information, cyber ethics and laws, personal data security, cybersecurity essentials, and strategies to combat common cyber threats and their prevention, equipping individuals with the knowledge to navigate the digital landscape responsibly and securely.

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| Topics Covered | ● Digital Footprint and Responsibility<br>● Personal Data Collection and Security<br>● Cyber Ethics and Laws<br>● Cybersecurity Essentials<br>● Common Cyber Attacks and Prevention |
| Example Assignments | ● Digital Footprint and Responsibility<br>○ Students explore the impact of social media and technology on teenagers, covering topics like digital footprints, the rise of social media screenings, cyberbullying, and the importance of updating privacy settings.<br>● Personal Data Collection and Security<br>○ This lesson delves into the use and security of personal data, discussing how companies like Google utilize user information, the implications of location tracking, and legal aspects of privacy, and encourages critical thinking through reflections, checks for understanding, and explorations of browser security settings and the trade-offs of security measures.<br>● Cyber Ethics and Laws<br>○ This lesson navigates through cyber ethics, differentiating between ethics and laws, exploring legal consequences, copyright in education, the process of obtaining permissions, and the pros and cons of intellectual property laws.<br>● Cybersecurity Essentials<br>○ This lesson covers cybersecurity, featuring activities on the AAA Security Framework and the CIA Triad, along with exploring the impact of the Internet of Things on data security. |

## Module 2: Technology and Society (1.5 weeks/8 hours)

In this module, students examine how the internet and digital technologies impact various aspects of modern life, from personal behavior to global communication. Through readings, reflections, and interactive routines, learners explore both the benefits and challenges of a digitally connected world.

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| Topics Covered | • Impact of the Internet on Society<br>• Ethical and Social Implications of Technology<br>• Modeling and Designing Embedded Systems<br>• Data as a Valuable Resource |
| Example Assignments | • Symmetric Encryption<br>  ○ *Rail Fence Cipher:* The Rail Fence Cipher is a form of transposition cipher that uses columns and rows. The plaintext is written downwards and bounces back and forth on a diagonal. The 'rails' refer to the number of rows. Decrypt the message below using 5 rails. Using the Rail Fence Cipher, encrypt your own message and trade with a partner. See if you can decrypt the message without knowing how many rails your partner used. How could you make this cipher even stronger?<br>• Asymmetric Encryption<br>  ○ *Public Key Encryption Exploration*: You would like to send a message to your friend. Your friend will need a private key as well to add to the encryption. Complete the chart according to the rules of the public key and the two private keys.<br>• Authentication Methods<br>  ○ *Guess The Hash:* Work with a partner and take turns hiding a password, and trying to guess the password. Without letting your partner see, type in a simple word (about 3-7 letters long) as your password. You'll see the corresponding hash in the output box. Using the scrambled letters, attempt to guess the password. You will only know if you have guessed the password if the hashes shown match. |

## Module 3: Basic Python and Console Interaction (2.5 - 3 weeks/14 hours)

Students learn the basics of programming by writing programs that interact with users through the keyboard.

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| Topics Covered | • Printing<br>• Variables<br>• Types<br>• User Input<br>• Converting Input Types<br>• Arithmetic Expressions<br>• String Operators<br>• Comments |
| Example Assignments | • Printing<br>  ○ Print messages to the console<br>• Variables<br>  ○ Create variables of different types, and print them to the console.<br>• Types<br>  ○ Investigate the types of different variables<br>  ○ Convert between types<br>• Arithmetic Expressions & Converting Input Types<br>  ○ Age in One Year - Ask the user how old they are, and tell them how old they will be in one year<br>  ○ Rectangle, part 1 - Make variables for length and width and compute area and perimeter<br>  ○ Rectangle, part 2 - Ask the user for length and width and compute area and perimeter |

## Module 4: Project: Mad Libs (2 days/2 hours)

Students write a program that allows users to create their own Mad Lib stories using variables and user input.

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| Topics Covered | • Variables<br>• User Input<br>• Print Statements |
| Example Assignments | • Create a Mad Libs game where users can input different types of words to complete a story. The program should prompt the user for various types of words (e.g., noun, adjective, verb) and then construct a story using the provided words. |

## Module 5: Conditionals (2 weeks/10 hours)

Students teach their programs to make decisions based on the information they receive.

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| Topics Covered | • If Statements<br>• Boolean Values<br>• Logical Operators<br>• Comparison Operators<br>• Floating Point Numbers and “Equality” |
| Example Assignments | • If statements and boolean values<br>  ○ Is it raining? - Write a program that uses a boolean variable to determine whether or not it is raining<br>• Boolean operators, and expressions<br>  ○ Boolean variable - Take a variable and use it in an if statement<br>  ○ Legally allowed to vote - User reports age and the program tells them whether or not they can vote in the US<br>  ○ Transaction - The user reports balance and deposit/withdrawal, and the program prints a new balance or error<br>  ○ Recipe - Ask the user for ingredients, amounts per serving, and number of servings, and report the total amount of each ingredient needed |

## Module 6: Project: Quiz Game (2 days/2 hours)

Students write a program that quizzes users on a series of multiple-choice questions and checks their answers.

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| Topics Covered | • Variables<br>• Boolean Logic<br>• Arithmetic Operators<br>• Conditionals<br>• Comparison Operators |
| Project Description | • Create a simple multiple-choice quiz game using Python. The program should ask the user a series of questions and check their answers. After all the questions have been answered, the program should display the final score. |

## Module 7: Looping (2 weeks/10 hours)

Students learn how to write more efficient code by using loops as shortcuts.

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| Topics Covered | • While Loops<br>• For Loops<br>• Break and Continue<br>• Nested Control Structures |
| Example Assignments | • While Loops<br>  ○ Divisibility - Ask the user to enter a numerator and denominator, and re-prompt until the denominator is non-zero<br>• For Loops<br>  ○ Average test score - Compute the average of several test scores<br>• Break and Continue<br>  ○ Higher/ Lower - Ask the user to guess a particular number between 1 and 100. If the user's guess was too high or too low, they should be notified<br>• Nested Control Structures<br>  ○ Rolling Dice - Print out all combinations that can be made when 2 dice are rolled |

## Module 8: Project: Password Authenticator (2 days/2 hours)

Students write a program to provide feedback on whether the entered password is correct or incorrect.

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| Topics Covered | • Variables<br>• User Input<br>• Boolean Operations<br>• Loops<br>• Control Structures |
| Project Description | • Create a password authentication program that prompts the user to enter a password. The program should compare the entered password with a predefined correct password and provide feedback on whether the entered password is correct or incorrect. The program should allow the user to try again a limited number of times before locking them out. |

## Module 9: Project: Remix a Program (2 days/2 hours)

Students will be introduced to the concept of code reuse and modification by remixing a program created by another student. They will learn about attribution and the importance of giving credit to the original creators of code.

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| Topics Covered | • Code Reuse<br>• Remixing a Program<br>• Attribution |
| Project Description | • In this project, you will remix another student's program! To remix a program, you take a program developed by someone else and change it by adding, removing, or altering the code. For the original program, you can share and trade projects with a student in your class, or choose a project that has been posted online in Student Projects. |

## Module 10: Intro to AI (9-10 hours)

In this module, students will gain an understanding of the main concepts and vocabulary around AI.

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| Objectives / Topics Covered | • How to Use AI Tools Safely<br>• Human and Artificial Intelligence<br>• Generative vs Predictive AI<br>• Large Language Models<br>• Prompt Engineering<br>• Prompt Practice & Refinement<br>• Who Builds AI? |
| Example Assignments | • Generative vs Predictive<br>  ○ Students explore different applications of AI<br>• Large Language Models: Chatbot Arena<br>  ○ Students compare LLMs through the Chatbot Arena tool<br>• Prompt Engineering: Generate an Image<br>  ○ Students use prompt engineering techniques to generate an image |
| AI Tools/Permissions | • ChatGPT/Gemini<br>• Hugging Face<br>• Quick, Draw!<br>• Google Experiments<br>• Soundraw.io |

## Module 11: Machine Learning (7-8 hours)

Students will learn the fundamentals of machine learning, covering its lifecycle, supervised, unsupervised, and reinforcement learning, and explore bias within learning models.

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| Objectives / Topics Covered | • Introduction to Machine Learning<br>• Supervised Learning<br>• Unsupervised Learning<br>• Reinforcement Learning<br>• Data's Role in Machine Learning<br>• Project: Build a Sorting Machine |
| Example Assignments | • Introduction to ML: CNN Visualization<br>  ○ Students observe how a CNN gathers data on an image and makes a prediction as to what it could represent<br>• Supervised Learning: Apples vs Bananas<br>  ○ Students train a model that categorizes apples and bananas<br>• Unsupervised Learning: Bird Sounds<br>  ○ Students explore how an AI used unlabeled data to categorize bird sounds<br>• Reinforcement Learning: Reinforcement Learning Game<br>  ○ Students engage with a visual depiction of reinforcement learning. |
| AI Tools/Permissions | • ChatGPT/Gemini<br>• Teachable Machine |

## Module 12: Training AI Models (7-8 hours)

In this hands-on module, students will learn how to train AI models and will explore the use cases for AI in various industries.

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| Objectives / Topics Covered | • How Are AI Models Trained?<br>• AI Models in Industry<br>• Bias in Training<br>• Ethics and AI<br>• Project: Ethics Case Study |
| Example Assignments | • How Are AI Models Trained: Turning on a Light<br>  ○ Students  train and use an AI model to control a program<br>• AI Models in Industry<br>  ○ Students pick an industry to explore use cases of AI<br>• Bias in Training<br>  ○ Students explore multiple ways bias creeps into AI programs through the use of bad training data |
| AI Tools/Permissions | • Survival of the Best Fit<br>• Teachable Machine |

## Module 13: Risks of AI (10-11 hours)

Students will explore the ethical implications and risks of AI technology, including bias, hallucinations, security, misinformation, and legal challenges. Students will engage in a debate about AI and create their own AI policies.

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| Objectives / Topics Covered | • Effects of Using Biased AI<br>• Hallucinations and Security Risks<br>• Deepfakes and Misinformation<br>• Project: AI on Trial<br>• You, Your Data, and AI<br>• Environmental Impacts of AI<br>• AI Governance and the Future of AI<br>• Project: Designing a Responsible AI Future |
| Example Assignments | • Effects of Using Biased AI<br>  ○ Students explore how using biased AI affects people in negative ways<br>• Hallucinations and Security Risks: Image Prompt Injection<br>  ○ Students explore the security risks involved with using LLMs and they simulate a prompt injection using an image<br>• Deepfakes and Misinformation<br>  ○ Students learn how deepfakes are created and how they can spot and defend themselves from the dangers they pose<br>• Project: AI on Trial<br>  ○ Students explore the legal challenges that generative AI faces and they prepare for and engage in a debate around this topic<br>• You, Your Data, and AI<br>  ○ Students weigh the tradeoffs of creating a digital footprint and using AI<br>• Environmental Impacts of AI<br>  ○ Students create a one-pager of the pros and cons of an AI-related environmental topic<br>• AI Governance and the Future of AI<br>  ○ Students explore existing AI policies before developing their own |
| AI Tools/Permissions | • ChatGPT/Gemini<br>• Lakera |

## Module 14: Coding with AI Tools (9-10 hours)

Students will create a game then solve a real world problem with the help of AI.

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| Objectives / Topics Covered | • Introduction to AI-Assisted Coding<br>• Project: AI-Assisted Coding |
| Example Assignments | • Introduction to AI-Assisted Coding<br>  ○ Students create their own Connections Game with the help of AI<br>• Project: AI-Assisted Coding<br>  ○ Students solve a real-world problem with AI assistance |
| AI Tools/Permissions | • ChatGPT/Gemini |

## Module 15: Careers and AI (7-8 hours)

Students will explore the changing landscape of work in the age of AI.

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| Objectives / Topics Covered | • AI Across Industries and Careers<br>• Exploring AI-Specific Career Paths<br>• Looking Ahead at Careers & Applications<br>• Project: Future of Work |
| Example Assignments | • AI Across Industries and Careers<br>  ○ Students explore how industries transform with technological advances<br>• Exploring AI-Specific Career Paths<br>  ○ Students take a Career Quiz, then explore AI-specific jobs<br>• Looking Ahead at Careers & Applications<br>  ○ Students consider how learning to use AI can help in many types of jobs |
| AI Tools/Permissions | • ChatGPT/Gemini |

## Other Coding Options

| Supplemental Modules | Instructions |
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| • Turtle Graphics: Programming<br>• Turtle Graphics: Challenges with Tracy | These two modules can be pulled into the course to replace modules 3-9.<br>The two modules will take the same amount of time, which is approximately 9 weeks or 45 hours. |
| • JavaScript: Basics<br>• JavaScript: The Canvas and Graphics<br>• JavaScript: Graphics Challenges<br>• JavaScript: Control Structures<br>• JavaScript: Control Structures Challenges | These five modules can be pulled into the course to replace modules 3-9.<br><br>The five modules will take the same amount of time, which is approximately 9 weeks or 45 hours. |

## Supplemental: Alternative Assignments

The alternative assignments provide a variety of low-tech, accessible, or different ways for students to engage with each module's content. Choose to supplement or replace activities as needed.

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| Objectives / Topics Covered | • Intro to AI<br>• Machine Learning<br>• Training AI Models<br>• Risks of AI<br>• Coding with AI Tools<br>• Careers and AI |
| Example Assignments | • Machine Learning: Sort It Out! Be the AI<br>  ○ Students act like an AI model and learn from labeled "training data" then make predictions on new, unlabeled "mystery data"<br>• Risks of AI: AI Ethics Board<br>  ○ Students read situations where an AI may have made an unfair decision, then decide if the AI was fair or unfair, and explain how to improve it |