Arkansas Introduction to Computer Science Syllabus

High School (140 Contact Hours)

Course Overview and Goals

In the Arkansas Introduction to Computer Science course students are introduced to foundational computer science topics, encompassing programming concepts, career paths, and computational thinking. Students will explore data analysis, visualization, and emerging technologies in the field of computer science.

Learning Environment

The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Each module of the course is broken down into lessons. Lessons are composed of short video tutorials, interactive learning pages, quizzes, explorations, simulations, and free-response prompts. Each module ends with a comprehensive quiz that assesses students' mastery of that module's material.

More Information

Browse the content of this course at https://codehs.com/course/26529/overview

Prerequisites

The Arkansas Introduction to Computer Science course is designed for complete beginners with no previous background in computer science. The course is highly visual, dynamic, and interactive, making it engaging for those new to computer science.

Technology Requirements

To complete all activities and exercises in this course, students must have access to the 3rd party sites and tools listed here: Arkansas Introduction to Computer Science Course Links

Course Breakdown

Module 1: Basic Python and Console Interaction (3 weeks/15 hours)

In this module, students learn the basics of programming by writing programs that interact with users through the keyboard.

Topics Covered	• Printing • Variables • Types • User Input • Converting Input Types • Arithmetic Expressions • String Operators • Comments
Example Assignments	• Printing ○ Print messages to the console

	• Variables
	  ○ Create variables of different types, and print them to the console.
	• Types
	  ○ Investigate the types of different variables
	  ○ Convert between types
	• Arithmetic Expressions & Converting Input Types
	  ○ Age in One Year - Ask the user how old they are, and tell them how old they will be in one year
	  ○ Rectangle, part 1 - Make variables for length and width and compute area and perimeter
	  ○ Rectangle, part 2 - Ask the user for length and width, and compute area and perimeter

Module 2: Conditionals (2 weeks/10 hours)

In this module, students teach their programs to make decisions based on the information they receive.

Topics Covered	• If Statements • Boolean Values • Logical Operators • Comparison Operators • Floating Point Numbers and “Equality”

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

Module 3: Looping (2 weeks/10 hours)

In this module, students learn how to write more efficient code by using loops as shortcuts.

Topics Covered	• While Loops • For Loops • Break and Continue • Nested Control Structures

Example Assignments	• While Loops
	  ○ Divisibility - Ask the user to enter a numerator and denominator, and re-prompt until the denominator is non-zero
	• For Loops
	  ○ Average test score - Compute the average of several test scores
	• Break and Continue
	  ○ 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 ● Nested Control Structures ○ Rolling Dice - Print out all combinations that can be made when 2 dice are rolled

Module 4: Functions and Exceptions (1.5 weeks/8 hours)

In this module, students learn how to decompose problems into smaller pieces that work together to solve a problem.

Topics Covered	● Functions ● Namespaces ● Parameters ● Return Values ● Exceptions
Example Assignments	● Functions ○ Raining cats and dogs - Write functions to print text art of a cat and a dog ○ Temperature converter - write functions to convert from Fahrenheit to Celsius and vice versa ● Exceptions ○ Temperature converter, part 2 - Add exception handling to your temperature conversion program ● Putting it all together ○ Enter a positive number - Make a function to repeatedly ask the user to enter a number until they enter a positive number

Module 5: Creating and Altering Data Structures (1.5 weeks/8 hours)

In this module, students learn how tuples and lists are formed and the various methods that can alter them.

Topics Covered	● Tuples ● Lists ● For Loops and Lists ● List Methods
Example Assignments	● Tuples ○ Cookout Orders - Given a tuple of food orders, add up the number of burgers and hot dogs and print the total sums. ● Lists ○ Listed Greeting - Ask a user to enter their name, age, and favorite sport, then split their response into list elements and use index values to greet them by name and respond that you enjoy that sport as well! ○ Exclamat!on Po!nts - Ask the user for a string and then print the same string with every lowercase i replaced with an exclamation point. ○ Librarian - Ask the user for the last names of the authors of the five books they are returning. Print a list of those names in sorted order.

Module 6: File I/O (1.5 weeks/8 hours)

In this module, students learn to read, write, and process information from text files.

Topics Covered	• Reading from Files • Writing to Files • Processing File Data

Example Assignments	• Reading from Files
	  ○ Validating Tweet Length - Write a function called that reads the contents of a text file tweet.txt and determines whether the text represents a valid tweet.
	• Write to Files
	  ○ Activity Tracker - Imagine you are building an activity tracker program. Your task is to write a program that logs a list of activities to a file.

Module 7: What is Data Science? (2 weeks/10 hours)

In this module, students will learn about the role of a data scientist and the iterative steps in the data science life cycle. This module serves as an introduction to the field of data science.

Topics Covered	• What is Data Science? • The Data Science Life Cycle • Spreadsheet Basics • Data Cleaning • Sorting and Filtering Data • Data Visualizations • Pivot Tables • Mean, Median, Mode

Example Assignments	• What Does a Data Scientist Do?
	  ○ Explore the day-to-day operations of professional data scientists.
	• Exploring Data
	  ○ View different data visualizations to get a feel for the power of data.
	• Basic Operations Exploration
	  ○ Explore rows and columns, ranges, formulas, comparison operators, text and number data types, currency and dates, and logic values.
	• Data Cleaning
	  ○ Address issues in data such as missing values, irrelevant data, formatting issues, and duplicate data.
	• Which Visualization is Best?
	  ○ Explore the variety of visualizations that exist in Google Sheets.
	  ○ Compare different visualizations for the same dataset to determine which visualizations work best for specific data.
	• Sneaker Boutique Sales
	  ○ Help identify items that generate the most revenue for a company by creating pivot tables

Module 8: Data Ethics (1.5 weeks/8 hours)

In this module, students will explore ethical considerations in the field of data science. This module focuses on teaching students about data privacy and how to work with data responsibly.

Topics Covered	• Data Privacy

	• Big Data and Bias • Responsible Data Science

Example Assignments	• Minimizing and Anonymizing data
	  ○ Students learn how data minimization and anonymization help keep private information safe.
	• Big Data and Bias
	  ○ Explore cognitive biases.
	• Data Biographies
	  ○ Students explore what data biographies are and how they can help understand the origins and context of the data they use.
	• Responsible Data Science Life Cycle
	  ○ Students revisit the steps of the data science life cycle and identify what responsible data practices can be put in place in each step.

Module 9: Cybersecurity and You (3 weeks/15 hours)

In this module, students delve into 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.

Topics Covered	• Digital Footprint and Responsibility • Personal Data Collection and Security • Cyber Ethics and Laws • Cybersecurity Essentials • Common Cyber Attacks and Prevention

Example Assignments	• Digital Footprint and Responsibility
	  ○ 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.
	• Personal Data Collection and Security
	  ○ 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.
	• Cyber Ethics and Laws
	  ○ 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.
	• Cybersecurity Essentials
	  ○ 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 10: Emerging Technology (2 weeks/10 hours)

In this module, students will explore key technologies shaping the digital world. Topics include the evolution of cryptography, the roles of human and artificial intelligence, cloud and edge computing, the impact of the internet, and the foundations of blockchain. Together, these lessons highlight how computing innovations continue to transform society.

Topics Covered	• Cryptography • Human & Artificial Intelligence • Cloud Computing • Edge Computing • Impact of the Internet • Blockchain Technology

Example Assignments	• Explore & Reflect: AI Intelligence
	  ○ Chat with an AI (ChatGPT, Gemini, Copilot, etc.), ask it different kinds of questions, then write 4–8 sentences reflecting on how you define intelligence, what seemed smart, how you knew it was a computer, and whether it seemed conscious.
	• Spotify Case Study
	  ○ Explain 3+ advantages Spotify gained from moving to the cloud (faster processing, scaling, no server management, global performance, cost savings, analytics).
	• Cloud vs. Edge Computing
	  ○ Draw two diagrams: one for cloud computing (car → cloud → car) and one for edge computing (car → onboard device). Reflect on why edge is useful here and when cloud might be better.
	• Blockchain Applications
	  ○ Describe how blockchain could improve supply chains, identity verification, or financial services—and note possible risks or challenges.

Module 11: System Administration (2 weeks/10 hours)

In this module, students will compare and contrast common operating systems (Windows, Linux, OS) and explain the importance of application security. They will investigate security options and implement user accounts to enforce authentication and authorization. Students will also demonstrate how to work with basic and advanced command prompts.

Topics Covered	• Operating Systems • Software and Applications • Application Security • Browser Configuration • System Administration • Command Line Interface
Example Assignments	• Software Licenses ○ *Do I Need a Software License?:* You have built a new picture-taking app complete with new original filters for iOS phones and you are excited to start selling it in the app store! Brainstorm and create a software agreement for your new app. • System Administration

	○ *User Accounts:* You have been placed in charge of setting up your family's new computer. There should be four separate user groups - one for you and adult members of the family, one for your two middle school-aged siblings, a child account for your youngest sibling, and a guest account for family visitors. ● Setting Permissions ○ *Shared Folders and Files:* Your principal would like your help setting up the folder structure for the high school. She would like to ensure that the students and teachers only have access to the correct folders. She also would like to make sure that students don't accidentally change, move, or delete files. The different types of files are listed below. What folders will you create to store these files? What permissions will you set for each folder? ● System Commands ○ *Directory Directions:* You are teaching your friend how to use the command line interface. He has listed his steps and would like to know what he should type in the CLI for each one. Can you help him out?

Module 12: IT Concepts (3 weeks/15 hours)

In this module, students explore the structure and design of the internet and networks, and how this design affects the reliability of network communication, the security of data, and personal privacy. Students will learn how the Internet connects computers all over the world by using networking protocols.

Topics Covered	● Computers Speak Binary ● Encoding Text and Images in Binary ● IP Addresses ● Routing and Packets ● Protocols: TCP, UDP, HTTP/HTTPS ● How do Websites Work? ● OSI Model ● Impact of the Internet
Example Assignments	● Encoding Text in Binary ○ *Write a Message in Binary:* In this activity, you will use ASCII encoding to write the same message in binary. Then, you will trade messages with a partner and use ASCII encoding to figure out your partner's message. ● OSI Model ○ *Troubleshooting with the OSI Model:* You have been hired as a network engineer for Tea-Riffic Blends Co., a small business that sells specialty teas. You are in charge of setting up their network, configuring it, and solving any issues that arise. The OSI model can help with troubleshooting because it can isolate the layer causing the issue. Read through the following three scenarios. Based on the problem and what you know about the OSI layers, identify which layer you should target to solve the issue. Then, explain your reasoning. ● Impact of the Internet ○ *Compass Points: The Internet:* In this activity, students use the Compass Points thinking routine to examine their feelings about the

	Internet and its impact on society.

Module 13: IT Infrastructure (2 weeks/10 hours)

In this module, students will learn about the physical elements of computers and networking, such as motherboards, RAM, routers, and the use of port numbers, Ethernet, and wireless devices.

Topics Covered	• Internal Components of a Computer • Peripheral Devices • Network Devices • Storage and Network Options • Network Communication • Network Management

Example Assignments	• Network Devices
	  ○ *Network Troubleshooting:* Jamal's computer is able to connect to the Wi-Fi signal, but there is no Internet access. Which device do you think might be causing the problem and why?
	• Network Options
	  ○ *Wireless Network Setup:* In this activity, students will draw a diagram that represents a wireless network setup that will be implemented for a fictitious house, office, or apartment building. The teacher will either assign them a building or they can create one from their own imagination.
	• Network Management
	  ○ *SSH Logs:* Addison works as a server administrator and has been accused of stealing company financial data. He swears he is innocent. A search warrant has been granted for the company's network logs and you have been tasked with learning as much as possible about the attack and the attacker. Can you dig into the logs and help track down the hacker?

Module 14: Professional Skills (3 days/3 hours)

In this module, students will prepare for future academic and career opportunities by exploring student organizations, building strong resumes and interview skills, and creating professional portfolios. These lessons help students develop the tools and experiences needed to showcase their strengths and achieve their goals.

Topics Covered	• Student Organizations • Resume and Interview Prep • Portfolios

Example Assignments	• Write Your Resume!
	  ○ In this activity, you will create a draft of your resume by filling in a template with details about your experiences, activities, education, and skills. You'll think about different parts of your life—such as jobs, volunteering, school, and personal strengths—and decide what to include. Finally, you'll share the link to your completed draft.
	• Interview Skills Practice
	  ○ In this activity, you will prepare for job interviews by choosing a position, practicing answers to common questions, and role-playing with a partner. You'll give and receive feedback to improve your responses, while also learning tips on professionalism, preparation,

	and follow-up. ● Online Repositories ○ An online repository is a collection of projects and documents that can serve as your portfolio. In this activity, explore at least four online portfolio tools (cloud storage services), compare them by listing their name, URL, pros, cons, and a rating (1–10), then answer the reflection questions about your experience, your top choice, and how you might use it.

Supplemental Modules (Differentiation Opportunities)

Module(s)	Instructions for Use
Introduction to Programming with Turtle Graphics Karel in Python	The teacher can choose ONE of these modules to help ease students into Python. However, students will still need to learn console Python and cannot skip over the modules *Python Data Structures* and *Python File I/O*.
The Data Science Life Cycle (Python Programming) Data Storytelling (Python Programming)	These modules teach data science in a Python programming context (instead of Google Sheets) and are more complex and time-consuming. The teacher can choose to include BOTH of these modules instead of *The Data Science Life Cycle* module within the course. Students will still need to learn the material in the *Data Ethics* module.