Oklahoma Computer Science I Syllabus

High School (125 Contact Hours)

Course Overview and Goals

In this Oklahoma Computer Science I course, students will gain a comprehensive understanding of the digital world they navigate every day. They'll be exposed to the inner workings of computer hardware and software, explore the intricacies of how networks connect, and dive into the world of encryption and cryptography. They will also learn the importance of safeguarding our increasingly digital world from unauthorized access, ensuring the privacy and integrity of data. By understanding these fundamental building blocks, students will be able to identify and defend against potential cybersecurity threats. This comprehensive approach will ensure that students are well-prepared to navigate the ever-evolving cybersecurity landscape.

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/24119/overview

Prerequisites

The Oklahoma Computer Science I 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.

Course Breakdown

Module 1: 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.

Browse the full content of this unit at https://codehs.com/course/24119/explore/module/33155

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 2: Cryptography (2 weeks/10 hours)

In this module, students will dive into the history of cryptography systems, the motivation behind using encryption systems, and modern cryptography systems. This includes explaining the core concepts of Public Key Infrastructure and hash functions. Students will also explore the importance of digital certificates, and authentication methods.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33156

Topics Covered	- Cryptography: Then, Now and Future - Symmetric Encryption - Asymmetric Encryption - Public Key Encryption - Authentication Methods - Digital Certificates
Example Assignments	- Symmetric Encryption *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? - Asymmetric Encryption *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.

	● Authentication Methods
	○ *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: Project: Create an Escape Room (1 week/5 hours)

In this project, students will create an escape room using what they have learned about ciphers and cryptography.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33157

Topics Covered	● Ciphers ● Cryptographic puzzles ● Testing

Example Assignments	● Step 1: Define Your Theme and Storyline
	    ○ Choose a theme for your escape room (spy mission, historical mystery, fantasy adventure, etc).
	● Step 2: Create Cryptographic Puzzles
	    ○ Select at least three different types of cryptographic puzzles. A cryptographic puzzle uses a cipher and a key to hide a message.
	    ○ Create the actual cryptographic puzzles. Ensure that the difficulty level is set appropriately (not too hard or too easy).
	    ○ Align the puzzles to the theme and storyline of the escape room.
	● Step 3: Create a Room Layout
	    ○ Design a physical or a digital escape room using the cryptographic puzzles.
	    ○ Incorporate clues, hints, and any necessary props.
	● Step 4: Test The Escape Room
	    ○ Conduct a full run-through of the escape room with a group of testers to identify any potential issues.
	    ○ Gather feedback on the overall experience and adjust elements as necessary.
	● Step 5: Finalize Details
	    ○ Make any final adjustments based on feedback and testing results.
	    ○ Ensure all elements, including clues, props, and cryptographic puzzles, are ready for participants.

Module 4: System Administration (4 weeks/20 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.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33158

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 5: IT Concepts (4 weeks/20 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 use of networking protocols.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33159

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 6: IT Infrastructure (4 weeks/20 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.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33160

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 7: Project: IT Professional (2 weeks/10 hours)

In this project, students will explore cybersecurity career pathways and build skills that will be needed within these fields such as communication. In this project, students will explore the troubleshooting methodology and utilize it to solve sample IT support issues.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33161

Topics Covered	- Troubleshooting Methodology - Identify the problem - Research past solutions - Establish a theory - Test the theory - Establish a plan of action - Implement the solution - Verify functionality - Document findings - Cybersecurity Career Pathways - Customer Service and Communication - Contributing to a Knowledge Base - Creating an Instructional Video
Example Assignments	*Troubleshooting:* In this project, students will learn more about each step of the troubleshooting methodology and use these steps to repair and improve faulty network systems. - Poor Signal Strength - Interference *Act it out!:* Pair up with a partner and create a short script of a customer support scenario based on a common mobile device issue. *Write a KB Article:* Create an internal knowledge base article that will be shared with other technicians. *Star in a Video!:* Create a 2-5 minute video tutorial based on a common mobile device issue

Module 8: Data Security (4 weeks/20 hours)

In this module, students will learn about the benefits and dangers of collecting and storing large sets of data. They will learn how to prevent attacks such as SQLi and XSS using programming controls. Students will also learn about risk management and how to identify, assess, prioritize, and minimize risks.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33162

Topics Covered	- Data as a Resource - Databases - Security in Coding - Environmental Controls - Risk Management
Example Assignments	- Databases *SQL Query Exploration:* In this activity, students will explore a database using the SQL query language. - SQLi

	- **Can you gain access?:** The database in this item lists 100 of the most commonly used passwords. Attempt to gain access to a single record by guessing the password. Remember, this is a database of 100 of the most commonly used passwords. Can you guess at least 3 of them? How many can you guess?
	● XSS
	    ○ **XSS Tutorial:** In this activity, students will perform simulated Cross Site Scripting (XSS) attacks on vulnerable websites using unprotected input fields.
	● Security in Coding
	    ○ **Capture the Flag:** Within this lesson, students will have the opportunity to find "flags" by locating specific information using the View Page Source feature as well as other features that they will learn about.
	● Risk Management
	    ○ **CyberGuard High School:** You have just started a new job as the network administrator for CyberGuard High School. Throughout the next few activities, you will go through the Risk Management process to develop a Risk Management plan for CyberGuard High.

Module 9: Project: The Game of Risk (1 week/5 hours)

In this project, students will design and create a board game or a card game that will help players to identify randomized security vulnerabilities and their appropriate defenses.

Browse the full content of this module at https://codehs.com/course/24119/explore/module/33163

Topics Covered	● Risk Management ● Prototypes ● Testing
Example Assignments	● Create a Game: Students will design and create a board game that will help players to identify randomized security vulnerabilities and their appropriate defenses. They will create a prototype and test the game to receive feedback to consider before building their final game.