

Georgia's Introduction to Hardware Technology Syllabus

High School - One Year (120 - 140 hours)

Course Overview and Goals

This course is the foundational course for Information Support & Services, Networking, and Cybersecurity pathways. This course is designed for high school students to understand, communicate, and adapt to a digital world as it impacts their personal lives, society, and the business world. Exposure to foundational knowledge in hardware, IT support, networks, and cybersecurity are all taught in a computer lab with hands-on activities and project-focused tasks. Students will not only understand the concepts but apply their knowledge to situations and defend their actions/decisions/choices through the knowledge and skills acquired in this course.

Learning Environment

The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Students will investigate and discuss cyber-related topics, conduct hands-on labs, and engage in in-person collaborative exercises with classmates. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students.

Programming Environment

Students modify and run programs in the browser using the CodeHS online editor. Students will participate in a variety of activities that include networking and computing topics..

Prerequisites

This course is designed for complete beginners with no previous background in computer science, information technology, or cybersecurity. The prerequisite for this course is advisor approval.

More Information

Browse the content of this course at <https://codehs.com/course/16719/>

Course Breakdown

Module 1: Digital Citizenship and Cyber Hygiene (2-3 weeks/10-15 hours)

Students learn topics on Internet etiquette and how to stay safe on the world wide web. Students will look at the potential effects of their digital footprints, how to protect information from online risks, and the importance of creative credit.

Objectives / Topics Covered	<ul style="list-style-type: none">● Digital Footprint and Reputation● Privacy and Security● Creative Credit and Copyright● Hacking Ethics
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	<ul style="list-style-type: none"> ● Common Security Problems ● Always Connected
Example Assignments	<ul style="list-style-type: none"> ● Digital Footprint and Reputation <ul style="list-style-type: none"> ○ What is your digital footprint? ○ Are you going to make any changes in what you post on social media? ● Privacy and Security <ul style="list-style-type: none"> ○ What are data privacy and security? ○ Test out various passwords on a site ○ Explore Google’s privacy policy: What do they know about you? ● Creative Credit and Copyright <ul style="list-style-type: none"> ○ What is copyright? ○ What are the different types of copyright licenses ○ Create citations for sources ○ Explore image search tools ● Hacking Ethics <ul style="list-style-type: none"> ○ Are there different kinds of hackers? (white, black, gray) ○ What are the consequences of illegal hacking? ○ Explore what penetration testing is ○ Sign an ethical hacker agreement

Module 2: Operating Systems and Software (2 weeks/10 hours)

Students will compare and contrast common operating systems (Windows, Linux, OS) and explain the importance of compatibility. Students will also explore software and apps while discussing software licenses and running through the software development life cycle.

Objectives / Topics Covered	<ul style="list-style-type: none"> ● Software vs Hardware ● Operating Systems ● File and Folder Management ● Compatibility ● Software and Applications ● Software Licenses ● Software Development ● Artificial Intelligence and Ethics
Example Assignments	<ul style="list-style-type: none"> ● What’s the difference between software and hardware? ● Understanding and comparing Operating Systems <ul style="list-style-type: none"> ○ Installing an OS ● File and Folder Management <ul style="list-style-type: none"> ○ What Processor are you Running? ○ Organize the files! ● Application simulations ● Software Development <ul style="list-style-type: none"> ○ Development Life Cycle ○ Agile/SCRUM ○ Using flowcharts ● Drawing with AI ● Ethics of AI

Module 3: Hardware (3 weeks/15 hours)

Students will learn about the physical elements of computers, laptops and mobile devices such as motherboards, RAM, routers, and the use of port numbers, ethernet and wireless devices.

Objectives / Topics Covered	<ul style="list-style-type: none">● Internal Components of a Computer● Peripheral Devices● Network Devices● Storage and Network Options● Laptops, Tablets, and Mobile Devices● Internet of Things
Example Assignments / Labs	<ul style="list-style-type: none">● Different Types of CPU● RAM vs. Hard Drive● Lab: Computer Disassembly● Wireless Internet Connections<ul style="list-style-type: none">○ Speed Test● Security of Cloud Storage● Ethernet Standards● Lab: Mobile Device Connectivity● Smart Devices in Your Life

Module 4: Project - Troubleshooting (2 weeks/10 hours)

Students will explore the troubleshooting methodology and utilize it to solve sample IT support issues.

Objectives / Topics Covered	<ul style="list-style-type: none">● Troubleshooting Methodology<ul style="list-style-type: none">○ Identify the problem○ Research past solutions○ Establish a theory○ Test the theory○ Establish a plan of action○ Implement the solution○ Verify functionality○ Document findings
Example Assignments / Labs	<ul style="list-style-type: none">● 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.<ul style="list-style-type: none">○ Poor Signal Strength○ Interference

Module 5: Networking (3-4 weeks/15-20 hours)

This module explores 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 the use of networking protocols.

Objectives / Topics Covered	<ul style="list-style-type: none">● Introduction and Impact of the Internet● Internet Hardware● Internet Addresses
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	<ul style="list-style-type: none"> ● Domain Name System (DNS) ● Routing ● Packets and Protocols ● Protocols and Standards ● Viewing a Webpage ● Advanced Networking
<p>Example Assignments / Labs</p>	<ul style="list-style-type: none"> ● Introduction to the internet <ul style="list-style-type: none"> ○ What is the Internet? How does it work? What has been its impact on society? ○ Explore the different levels of the internet. ● Internet hardware <ul style="list-style-type: none"> ○ Bandwidth, bitrate, latency ○ Why are protocols so important? ○ Explore how data is able to be transmitted across the ocean by using underwater cables ○ Explore the role of simple and complex networks and routers ● Internet Addresses <ul style="list-style-type: none"> ○ Internet Protocol (IP) ○ How do IP addresses work? ○ Explore the differences between IPv4 and IPv6. Why are we running out of addresses? ○ Trace a website request from the server, through the network, and to your computer ● Domain Name System (DNS) <ul style="list-style-type: none"> ○ How does DNS help with sending digital information and IP addresses? ○ Explore the process of how requesting a web resource works ● Routing <ul style="list-style-type: none"> ○ How is routing used to send messages/data? ○ Why is redundancy a good thing for the Internet? (fault-tolerant) ● Packets and Protocols <ul style="list-style-type: none"> ○ How data is transmitted? ○ Create your own protocol ○ What are the standard protocols for the Internet and how do they work? (TCP/IP, HTTP) ● Protocols and Standards <ul style="list-style-type: none"> ○ What are the protocols used in sending and receiving emails? ○ What is the difference between TCP and UDP? ○ What are the different wireless standards? ○ What frequency band(s) can be used with the 801.11ax standard? ○ What is a MU-MIMO device and how does it help the range of the signal? ● What is Net Neutrality? ● Network Management ● Advanced Networking <ul style="list-style-type: none"> ○ The OSI Model ○ Encapsulation ○ Virtualization

Module 6: IT Professionals (3 weeks/15 hours)

In this project, students will explore career pathways and build skills that will be needed within these fields such as communication.

Objectives / Topics Covered	<ul style="list-style-type: none">● IT Helpdesk● Working with Customers● Contributing to a Knowledge Base● Creating an Instructional Video● Using a Database● Compliance Laws● Asset Management● Emerging Technology in IT● Environmental Controls● Personal Safety
Example Assignments	<ul style="list-style-type: none">● Understanding jobs at the IT helpdesk● What are CRM systems?● 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● Keeping a Database: Create a SQL table using unstructured data.● Creating an ITAM pitch● Exploring Cloud Computing● Exploring the external and personal safety concerns with technology● National and State Compliance Regulations

Module 7: Project: IT Proposal (1-2 weeks/5-10 hours)

In this project, students will develop a professional pitch for the creation of an IT department. They will find a real company and make a presentation that persuades the leadership team as to why they should have dedicated IT staff.

Objectives / Topics Covered	<ul style="list-style-type: none">● IT Department Proposal
Example Assignments	<ul style="list-style-type: none">● Finding a company that would benefit from IT staff● Drafting the IT pitch● Delivering the IT pitch

Module 8: Cybersecurity (2-3 weeks/10-15 hours)

Students will explore different types of network attacks and how to build up security walls to defend against them.

Objectives / Topics Covered	<ul style="list-style-type: none">● What is Cybersecurity?● Impact of Cybersecurity● Network Attacks
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	<ul style="list-style-type: none"> ● Malware Types and Prevention ● Cross-Site Scripting ● Internal Threats
<p>Example Assignments / Labs</p>	<ul style="list-style-type: none"> ● What is Cybersecurity? <ul style="list-style-type: none"> ○ Why is cybersecurity important? ○ How do we prevent cyber attacks? ○ Summarize and discuss recent cyber attacks ○ Explore a threat map to see where cyber attacks are coming from and which countries are being targeted ● Impact of Cybersecurity <ul style="list-style-type: none"> ○ Why do we care about cybersecurity? ○ What are current cybersecurity careers? ○ What information do cybercriminals steal? <ul style="list-style-type: none"> ■ What do cybercriminals do with stolen information? ● Network Attacks <ul style="list-style-type: none"> ○ What is the difference between a threat, a vulnerability and an exploit? ○ What are the open ports designated for? ○ What do you notice about the commonly attacked ports and the open ports? ● Malware Types and Prevention <ul style="list-style-type: none"> ○ What is the difference between anti-malware and antivirus software? ○ What is a virus, worm, trojan, rootkit? ○ What type of built-in malware protection does your operating system provide? ○ View all of the running processes on your computer. ● Common Network Attacks <ul style="list-style-type: none"> ○ What is DoS and DDoS? ○ What is spoofing and why can it be dangerous? ○ What makes social engineering such an effective technique for hackers? ○ Does the IoT make us more or less vulnerable to DDoS attacks? ● Additional Attacks <ul style="list-style-type: none"> ○ What is a rainbow table? ○ What is a zero-day attack? ○ What is a botnet and how are they used? ○ Explore the United States Computer Emergency Readiness Team (US-CERT) web page and draw conclusions about the current environment of cyber threats. ● Internal Threats <ul style="list-style-type: none"> ○ What is the main function of UEFI? ○ What can you do to prevent someone from booting an alternative operating system? ○ What is data loss prevention? ○ Explore your computer's BIOS/UEFI! ○ Which data breaches can be prevented by DLP tools?

Module 9: Project: Digital Forensics (1-2 weeks/5-10 hours)

Students learn about digital forensics and take on three cases where they investigate a situation and come up with a conclusion of their own.

Objectives / Topics Covered	<ul style="list-style-type: none"> ● Digital Forensics ● Forensic Case 1: Logs ● Forensic Case 1: File Metadata ● Forensic Case 1: Exif Data
Example Assignments	<ul style="list-style-type: none"> ● What is digital forensics? ● Exploring network logs ● Exploring file metadata ● Exploring exif data ● Understanding the evidence and making a conclusion!

Module 10: Computer Science Careers (1 week/5 hours)

In this short module, students take some time to explore and discover different computer science careers. They will also examine inclusive coding and how to avoid bias in computer programming.

Objectives / Topics Covered	<ul style="list-style-type: none"> ● Computer Science Careers ● Computer Science used in non-CS Careers ● Inclusive Coding ● Create an Online Portfolio ● Student Organizations
Example Assignments	<ul style="list-style-type: none"> ● Career Research ● Computer Science concepts that are used in non-computer science positions ● How can a computer program's bias become dangerous? ● Why is it important to have a more diverse group of people in the computer science field? ● Exploring online portfolio options ● Understanding and developing a resume ● What are student organizations? <ul style="list-style-type: none"> ○ How can they help you learn about careers and competitive opportunities?