

# North Carolina Introduction to Computer Science

## Syllabus

High School (75 Contact Hours)

### Course Overview and Goals

In the North Carolina Introduction to Computer Science course, students will explore the foundational concepts of computing and how they apply in the real world. They will gain insights into cybersecurity, learn to protect personal data and navigate the digital landscape with responsibility and awareness. Students will also learn the basics of programming and develop computational thinking and problem-solving skills. Additionally, the course will cover the evolution of technology, examining its impact on society and the ethical considerations that accompany it. By understanding how the internet operates and the significance of data management, students will be equipped to harness the power of technology effectively and ethically. This holistic approach ensures that learners are well-prepared to engage with the complexities of the digital age, fostering both technical competence and a commitment to responsible computing practices.

### 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/24835/overview>

### Prerequisites

The North Carolina 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.

### 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/24835/explore/module/34374>

Topics Covered	<ul style="list-style-type: none"><li>Digital Footprint and Responsibility</li></ul>
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	<ul style="list-style-type: none"> <li>● Personal Data Collection and Security</li> <li>● Cyber Ethics and Laws</li> <li>● Cybersecurity Essentials</li> <li>● Common Cyber Attacks and Prevention</li> </ul>
Example Assignments	<ul style="list-style-type: none"> <li>● Digital Footprint and Responsibility <ul style="list-style-type: none"> <li>○ 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.</li> </ul> </li> <li>● Personal Data Collection and Security <ul style="list-style-type: none"> <li>○ 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.</li> </ul> </li> <li>● Cyber Ethics and Laws <ul style="list-style-type: none"> <li>○ 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.</li> </ul> </li> <li>● Cybersecurity Essentials <ul style="list-style-type: none"> <li>○ 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.</li> </ul> </li> </ul>

## Module 2: Programming with Karel (4 weeks/20 hours)

In this module, students will use Karel, a dog that can move, turn left, and place tennis balls, to explore the fundamentals of programming and enhance their computational problem-solving skills. They will discover the importance of programming languages and their applications, learn to write programs to tackle computational challenges, design algorithms, and analyze various potential solutions. Additionally, students will learn the value of collaboration and the challenges it presents when working together to solve programming problems.

Browse the full content of this unit at <https://codehs.com/course/24835/explore/module/34644>

Topics Covered	<ul style="list-style-type: none"> <li>● Commands</li> <li>● Defining vs. Calling Functions</li> <li>● Designing Functions</li> <li>● Variables</li> <li>● Program Entry Points</li> <li>● Control Flow</li> <li>● Looping</li> <li>● Conditionals</li> <li>● Commenting Code</li> <li>● Preconditions and Postconditions</li> </ul>
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	<ul style="list-style-type: none"> <li>● Top Down Design</li> </ul>
Example Assignments	<ul style="list-style-type: none"> <li>● More Basic Karel <ul style="list-style-type: none"> <li>○ <i>Pyramid of Karel</i>: Write a program to have Karel build a pyramid. There should be three balls on the first row, two in the second row, and one in the third row.</li> </ul> </li> <li>● Functions in Karel <ul style="list-style-type: none"> <li>○ <i>Pancakes</i>: Karel is the waiter and needs to deliver a stack of pancakes to the guests on the 2nd, 4th, and 6th columns. Each stack of pancakes should have three pancakes. Create a function called <i>makePancakes()</i> to help Karel solve this problem. The world should end up exactly as shown here.</li> </ul> </li> <li>● Top Down Design and Decomposition in Karel <ul style="list-style-type: none"> <li>○ <i>The Two Towers</i>: In this program, Karel should build two towers of tennis balls. Each tower should be 3 tennis balls high. At the end, Karel should end up on top of the second tower, facing East.</li> </ul> </li> <li>● Control Structures Example <ul style="list-style-type: none"> <li>○ <i>Random Hurdles</i>: Write a program that has Karel run to the other side of the first row, jumping over all of the hurdles. Karel should only jump if there is a hurdle blocking the way. However, the hurdles can be in random locations. The world is fourteen columns long. Students must write a function named <i>jumpHurdle()</i> as part of their solution.</li> </ul> </li> </ul>

### Module 3: Exploring Computing (2 weeks/10 hours)

In this module, students will explore various technologies and their impact on our world. They will learn about the history of computers, various types of software, cloud computing, and key computer components. They will also discuss the ethical and legal considerations in technology that can lead to bias.

Browse the full content of this unit at <https://codehs.com/course/24835/explore/module/34375>

Topics Covered	<ul style="list-style-type: none"> <li>● History of Computing</li> <li>● Software</li> <li>● Hardware</li> <li>● Operating Systems</li> <li>● Cloud Computing</li> <li>● Ethics and Legal Considerations</li> <li>● The Future of Computing</li> </ul>
Example Assignments	<ul style="list-style-type: none"> <li>● History of Computing <ul style="list-style-type: none"> <li>○ <i>Jigsaw: Computer Interaction Over the Decades</i>: In this activity, students are going to work in small groups to research what it was like to interact with computers over the various decades. For each section, students will want to consider what was typical for most computers. For example, GUI interfaces were first used in the 1970s, but they were not typical until the 1980s.</li> </ul> </li> <li>● Cloud Computing</li> </ul>

	<ul style="list-style-type: none"> <li>○ <i>Case Study: Cloud Computing vs. Physical Computing:</i> Is cloud computing more efficient? Is physical computing the way to go? Students will read through a case study for a middle school that needs to decide between implementing a cloud computing solution or a physical computing solution. What are the pros and cons of each? Which way would you ultimately choose to implement?</li> <li>● Hardware             <ul style="list-style-type: none"> <li>○ <i>Brainstorm: New Computer Components:</i> In this activity, students are going to work with a partner to brainstorm 3 new components for a computer. It can be an entirely new idea or an improvement of an existing component. For each idea, answer the following questions: What is it? Does it replace something, or is it an additional item? If it replaces something, what is it replacing? How will this be helpful in the future?</li> </ul> </li> <li>● The Future of Computing             <ul style="list-style-type: none"> <li>○ <i>Computer Science Career Exploration:</i> Careers in computer science are on the rise. With new emerging technologies, comes new job options and exciting opportunities for professionals in the computer science field. Knowing the basics of computer science can help any professional in all fields of study, not just computer science positions. Choose two different careers to explore further. For each chosen career, read through the profile page. As you research, identify the following and write them down in the editor: What made you choose this career? Summary of daily activities on the job. How is this connected to STEM?</li> </ul> </li> </ul>
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#### Module 4: 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 unit at <https://codehs.com/course/24835/explore/module/34380>

Topics Covered	<ul style="list-style-type: none"> <li>● Encoding Text and Images in Binary</li> <li>● IP Addresses</li> <li>● Routing and Packets</li> <li>● Protocols: TCP, UDP, HTTP/HTTPS</li> <li>● How do Websites Work?</li> <li>● OSI Model</li> <li>● Impact of the Internet</li> </ul>
Example Assignments	<ul style="list-style-type: none"> <li>● Encoding Text in Binary             <ul style="list-style-type: none"> <li>○ <i>Write a Message in Binary:</i> In this activity, students will use ASCII encoding to write the same message in binary. Then, they will trade messages with a partner and use ASCII encoding to figure out their partner's message.</li> </ul> </li> <li>● OSI Model</li> </ul>

	<ul style="list-style-type: none"> <li>○ <i>Troubleshooting with the OSI Model:</i> Students have been hired as a network engineer for Tea-Riffic Blends Co., a small business that sells specialty teas. They 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 your students' know about the OSI layers, they need to identify which layer they should target to solve the issue. Then, explain their reasoning.</li> <li>● Impact of the Internet             <ul style="list-style-type: none"> <li>○ <i>Compass Points: The Internet:</i> In this activity, students use the Compass Points thinking routine to examine their feelings about the Internet and its impact on society.</li> </ul> </li> </ul>
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### Module 5: Exploring Data and Spreadsheets (2 weeks/10 hours)

In this module, students will learn the basics of spreadsheet operations such as sorting, filtering, and applying formulas like average, median, and mode. They also learn how to create visualizations using the data in Google Sheets. They will create data dashboards, learn about data models, and complete the module with a data storytelling project.

Browse the full content of this unit at <https://codehs.com/course/24835/explore/module/34378>

Topics Covered	<ul style="list-style-type: none"> <li>● Data as a Resource</li> <li>● Using Databases</li> <li>● Introduction to Spreadsheets</li> <li>● Sort and Filter</li> <li>● Statistical Measures</li> <li>● Models</li> <li>● Visualizing Data</li> </ul>
Example Assignments	<ul style="list-style-type: none"> <li>● Sort and Filter             <ul style="list-style-type: none"> <li>○ <i>Influential Women:</i> In this exercise, students will learn about remarkable women who have made significant contributions in fields like Science, Literature, and Environmentalism, while having the opportunity to sort and filter data to uncover interesting facts and connections about these inspiring figures.</li> </ul> </li> <li>● Statistical Measures             <ul style="list-style-type: none"> <li>○ <i>Mammal Statistics:</i> In this exercise, students will explore data on common mammals while calculating the mean, median, and mode of various data points to derive meaningful insights.</li> </ul> </li> <li>● Visualizing Data             <ul style="list-style-type: none"> <li>○ <i>Create a Dashboard:</i> In this exercise, students will explore running analytics data and create an engaging running dashboard, a powerful tool that consolidates essential information and data visualizations in one place.</li> </ul> </li> <li>● Project: Tell Your Story             <ul style="list-style-type: none"> <li>○ <i>Draft a Design:</i> For this activity, students will take time to explore</li> </ul> </li> </ul>

	<p>data storytelling designs and draft their own story. They can create their infographic directly in the spreadsheet or sketch their design on paper, in PowerPoint, or using a program of their choice.</p>
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