Rumson-Fair Haven Regional High School

Course: *Introduction to Computer Science*
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Board Approval: October, 2024

Section I: Course Description

Introduction to Computer Science is an introductory course designed for all students of any ability level. Students will learn to problem solve, create a website, how to manage data and fundamental programming. Throughout the course, students will consider privacy, digital citizenship, and the role of technology in society. This course requires project creation and refinement. The course is currently taught through the Code.org platform with opportunities for students to participate in events such as the Hour of Code and Girls Who Code initiative. This is a 20-week, semester course.

Section II: NJSLS: New Jersey Student Learning Standards/Learning Objectives:

1. **2020 New Jersey Student Learning Standards – *Computer Science and Design Thinking*:**
   - "The 'Intent and Spirit of the Computer Science and Design Thinking Standards' is to focus on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers."
2. **2023 New Jersey Student Learning Standards - *English Language Arts:***
   - A New Jersey education in English Language Arts builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. …Students will develop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language read rich, challenging texts that build their knowledge of the world, grow their confidence and identities as readers, and develop critical thinking skills and vocabulary necessary for long-term success[; e]ngage in regular, meaningful, writing authentic tasks, exploring valued topics, writing for impact and expression, and sharing their work with others (including authentic audiences) leverage complex texts and digital media to develop comprehension, active listening, and discussion skills ground daily writing and discussion in evidence, fostering an ability to read critically, build arguments, cite evidence, and communicate ideas to contribute meaningfully as productive citizens evaluate the reliability, credibility, and perspective of authors and speakers across all forms of media express ideas and knowledge through a variety of modalities and media, and serve as effective communicators who purposefully read, write, and speak across multiple disciplines [and l]earn to persist in reading complex texts, establishing lifelong habits to read voluntarily for pleasure, for further education, for information on public policy, and for advancement in the workplace.
3. ***Standard 9.4 (Life Literacies and Key Skills)* of the *2020 NJSLS*:**
   - "This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy."
     ***Climate Change:** The state of New Jersey has mandated instruction in, "Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs."
4. ****Amistad Law: N.J.S.A. 18A 52:16A-88:***
   - The inclusion of lessons and resources/texts dealing with the African slave trade, slavery in America, the vestiges of slavery in this country, and the contributions of African Americans to our society will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students."
5. ****Holocaust Law: N.J.S.A. 18A 35-28:***
   - The inclusion of lessons and resources/texts that enable pupils to identify and analyze applicable theories concerning human nature and behavior; to understand that genocide is a consequence of prejudice and discrimination; and to understand that issues of moral dilemma and conscience have a profound impact on life will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens."
6. ****LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35:***

- A transformative approach to the inclusion of lessons and resources/texts on the contributions and issues concerning the LGBTQ+ population and people with disabilities will be implemented across all core subjects in accordance with state law: "A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35."

7. ***Asian American and Pacific Islanders Legislation: N.J.S.A 4021/A6100:***
   - The inclusion of lessons and resources/texts on the history and contributions of Asian Americans and Pacific Islanders will enable New Jersey's schools to provide a curriculum that reflects the diversity of our state. In accordance with state law: "A board of education shall include instruction on the history and contributions of Asian Americans and Pacific Islanders in an appropriate place in the curriculum of students in grades kindergarten through as part of the school district's implementation of the New Jersey Student Learning Standards in Social Studies."
8. Acquisition/development/refinement of the higher-order critical thinking skills aligned with the *Revised Bloom's Taxonomy of Cognitive Objectives*

Section III: Curriculum Modifications

The *Introduction to Computer Science* curriculum is subject to case-by-case modifications to support/advance the needs of all students, including special education students, English language learners, gifted students, and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district's English Language Learners (ELL) coordinator, feedback from members of the Intervention & Referral Services Team (*I&RS*) for at-risk students, and 504 Plans.

Coursework and assessments will be modified on an individual basis for students when necessary. Modifications may include but are not limited to those outlined on the Modifications/Accommodations for Technology and Design Courses chart.

Section IV: Preparation for Standardized Testing

Instruction in *Introduction to Computer Science* is aligned with the requirements of state and national standardized assessments, including the *NJGPA, NJSLA*, the *ACT*, the *PSAT,* and the *SAT*.

Section V: Curriculum Pacing Guide

Curriculum Pacing Guide	
Course Title: *Introduction to Computer Science*	**Grade Level:** 9-12
Unit I: Problem Solving and Computing	Weeks 1-6
Unit II: Web Development	Weeks 7-13
Unit III: Interactive Animations and Games	Weeks 14-20

Section VI: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed for all students in *Introduction to Computer Science*:

- Google Classroom
- *Common Sense Education* (www.commonsense.org)
- Code.org

- YouTube.com
- HourOfCode.com

Section VII: Grading Formula and Assessment Modes

A percentage weighting model determines marking period grades in *Introduction to Computer Science*. The specific grading categories and weightings of each will be determined before each academic year's start and published in the posted/distributed course syllabi.

Assessments in *Introduction to Computer Science* vary greatly in format, scope/content/skills assessed, and alternative assessments, differentiation in assessments and choice will be incorporated as appropriate. Preliminary assessments of each format will be used as benchmarks and summative assessments will be created/revised collaboratively each year and planned by the *Introduction to Computer Science* instructional team members to inform future learning and measure student growth.

Section VIII: Unit Templates

The following unit templates have been established for the *Introduction to Computer Science* curriculum by the *Introduction to Computer Science* instructional team:

<table>
<tr><th colspan="3">Unit I: Problem Solving and Computing</th></tr>
<tr><td colspan="3">Unit Summary</td></tr>
<tr><td colspan="3">This unit is a highly interactive and collaborative introduction to the field of Computer Science, as framed within the broader pursuit of solving problems. Students will practice using a problem-solving process to address a series of puzzles, challenges, and real-world scenarios. Next, students learn how computers input, output, store, and process information to help humans solve problems. The unit concludes with a project in which students design an application that helps solve a problem of their choosing.</td></tr>
<tr><th colspan="3">Standards/Core Ideas/Performance Expectations/Progress Indicators</th></tr>
<tr><td colspan="3">The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in Introduction to Computer Science:
2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.5, 8.2.12.ED.1, 8.2.12.ETW.2
2023 New Jersey Student Learning Standards English Language Arts
W.IW.9–10.2.A, W.IW.11–12.2.A
2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills
9.3.IT-PRG.1, 9.3.IT-PRG.4, 9.3.IT-PRG.5, 9.3.IT-PRG.6, 9.3.IT-PRG.9</td></tr>
<tr><th colspan="2">Unit Essential Questions</th><th>Unit Enduring Understandings</th></tr>
<tr><td colspan="2">What strategies and processes can students use to become more effective problem solvers?
How do computers help people to solve problems?
How do people and computers approach problems differently?
What does a computer need from people to solve problems effectively?</td><td>Some strategies are to identify the defining characteristics of a computer and explain how it is used to solve information problems. Decomposition and breaking down a problem into several smaller problems allows a person to solve complex problems.
Computers will work out the mathematical computations and if programmed properly can solve complex problems by breaking them down into smaller problems and functions.
People and computers approach problems differently because there are different ways that code, functions, and methods could be written to solve problems.
Computers need to be defined properly with defined variables and functions to solve repetitive and complex problems. There are different control structures to allow this to happen.</td></tr>
<tr><th colspan="3">Evidence of Learning</th></tr>
<tr><td>Formative & Alternative Assessments:
Do-Nows
Journaling
Peer Feedback
Classroom Discussions
Unplugged and Plugged Activities-Problem Solving: Lessons 1-13
Homework</td><td>Benchmark & Summative Assessments:
Quizzes
End of Unit Project
Post-Project Test
Unit 1 Test</td><td>Resources Needed:
Code.org Studio
Computer
Internet Access</td></tr>
</table>

• Individual student check-ins with teacher		

Unit II: Web Development		
Unit Summary		
In this unit, students are put in the shoes of a web developer and empowered to design and create a web page to meet a user's needs. As students develop the pages and begin to see themselves as web developers and designers, they are encouraged to think critically about the impact of sharing information online and how to be more critical consumers of content. They are also introduced to problem-solving related to programming while learning valuable skills such as debugging, using resources, and teamwork. At the conclusion of chapter one, students will design and create a web page for a user. After chapter two, students will have worked with a team to create a multi-page website they can publish and share.		
Standards/Core Ideas/Performance Expectations/Progress Indicators		

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Introduction to Computer Science:*
• *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  ○ 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.5, 8.2.12.ED.1, 8.2.12.ETW.2
• *2023 New Jersey Student Learning Standards English Language Arts*
  ○ W.IW.9–10.2.A, W.IW.11–12.2.A
• *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills*
  ○ 9.3.IT-PRG.1, 9.3.IT-PRG.4, 9.3.IT-PRG.5, 9.3.IT-PRG.6, 9.3.IT-PRG.9		

Unit Essential Questions	**Unit Enduring Understandings**	
• Why do people create web pages? • How can text communicate content, structure, and style on a web page? • How should students safely and appropriately make use of the content published on the Internet? • How can websites be used to address problems in the world? • What strategies can teams use to work better together? • How do students know what information can be trusted online?	• People create web pages to display information about a company, person, sports team, college, and many other topics. People also create web pages to sell projects on the Internet. • The way text is displayed can affect the web page greatly. It is important to make the text organized, clear, and readable. • Students should not post personal information on the internet. If the content is copyrighted then credit needs to be given to the publisher. Attribution: You must credit the creator in order to use, copy, or share the content. Non-Commercial: You can't make a profit from the content. No Derivative Works: You can't change the content. • *Websites can share helpful information with people across the globe relating to important issues, such as the climate, government, banking, engineering, education, medical research, etc. • Web Development teams can assign different tasks to different team members. One member can be the content creator and researcher, another can be the coder, and another can be the manager managing the schedule of the project, making sure everyone stays on task. Pair programming can be used as well. Pair programming is a software development technique in which two programmers work together at one workstation. One, the driver, writes code while the other, the observer or navigator, reviews each line of code as it is typed in. The two programmers switch roles frequently. • To trust information on the internet, one must carefully look at the source of the information. Is it a reputable company? Check the domain name as well. Generally, .edu and .gov websites are credible but beware of sites that use these suffixes in an attempt to mislead. Nonprofit websites may also contain reliable information, but time should be taken to consider the organization's purpose and agenda to determine if it could be biased. Search for additional information to back up what you learned. Use certain sources only to jump-start additional research.	
Evidence of Learning		
Formative & Alternative Assessments: • Do-Nows • Journaling • Peer Feedback	**Benchmark & Summative Assessments:** • Quizzes • Chapter 1 Project: Adding Style to a Web Page	**Resources Needed:** • Code.org Studio • Computer • Internet Access

• Classroom Discussions • Unplugged and Plugged Activities-Web Development: Lessons 1-21 • Homework • Individual student check-ins with teacher	• Chapter 2 Project - Website for a Purpose • Post-Project Test	

Unit III: Interactive Animations and Games		
Unit Summary		
In this unit, students create programmatic images, animations, interactive art, and games. Starting off with simple, primitive shapes and building up to more sophisticated sprite-based games, students become familiar with the programming concepts and the design process computer scientists use daily. They then learn how these simpler constructs can be combined to create more complex programs. In the final project, students develop a personalized, interactive program.		
Standards/Core Ideas/Performance Expectations/Progress Indicators		
The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Introduction to Computer Science:* • *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking* ○ 8.1.12.AP.1, 8.1.12.AP.2, 8.1.12.AP.3, 8.1.12.AP.5, 8.2.12.ED.1, 8.2.12.ETW.2 • *2023 New Jersey Student Learning Standards English Language Arts* ○ W.IW.9–10.2.A, W.IW.11–12.2.A • *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies, and Key Skills* ○ 9.3.IT-PRG.1, 9.3.IT-PRG.4, 9.3.IT-PRG.5, 9.3.IT-PRG.6, 9.3.IT-PRG.9		
Unit Essential Questions	**Unit Enduring Understandings**	
• What is a computer program? • What are the core features of most programming languages? • How does programming enable creativity and individual expression? • What practices and strategies will help students write programs?	• Computer programming or coding is the composition of sequences of instructions, called programs, that computers can follow to perform tasks. • Most programming languages contain a grammar for instructing a computer to read or write memory, and to go to different areas of the program. Many programming languages also contain features for grouping code together, commenting, and other common features. • When students learn to code, they learn to see problems from different perspectives and develop multiple approaches to solutions. This process of brainstorming, experimenting, and refining helps to hone their creative thinking skills. Moreover, coding offers a unique platform for creative expression. • When writing a program, students must break down complex problems into smaller tasks to solve the larger program. This method of problem-solving is called decomposition.	
Evidence of Learning		
Formative & Alternative Assessments: • Do-Nows • Journaling • Peer Feedback • Classroom Discussions • Unplugged and Plugged Activities-Animation & Games: Lessons 1-28 • Homework • Individual student check-ins with teacher	**Benchmark & Summative Assessments:** • Quizzes • Mini-Project-Robot Faces • Mini-Project-Captioned Scenes • Mini-Project- Animation • Mini-Project - Side Scroller • Project - Design a Game • Post-Project Test	**Resources Needed:** • Code.org Studio • Computer • Internet Access

Section IX: Unit Reflection

The *Introduction to Computer Science* instructional team must confer upon the completion of each instructional unit in the *Introduction to Computer Science* curriculum and rate the degrees to which the instructional units meet performance criteria established by the New Jersey Department of Education using the Unit Reflection Form. Completed unit reflection forms

must be submitted to the Department Supervisor for approval upon completion of curriculum implementation with a complementing list of suggested modifications to the *Introduction to Computer Science* curriculum.

Unit Reflection Form: *Introduction to Computer Science*			
Lesson Activities:	**Strongly**	**Moderately**	**Weakly**
Foster student use of technology as a tool to develop critical thinking, creativity, and innovation skills;			
Are challenging and require higher-order thinking and problem-solving skills;			
Allow for student choice;			
Provide scaffolding for acquiring targeted knowledge/skills;			
Integrate modern, global perspectives, especially those regarding diversity, genocide, global issues, and historical ones regarding racial relations;			
Integrate 21st century skills;			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills;			
Are varied to address different student learning styles and preferences;			
Are differentiated based on student needs;			
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process;			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives;			
Provide opportunities for student reflection and self-assessment;			
Provide data to inform and adjust instruction to better meet the varying needs of learners.			

Appendix
Writing Instruction and the RFH Community

Writing instruction should happen across the RFH Community. Writing across the curriculum is a philosophy that advances the belief that writing is a method of learning. Since all departments are committed to helping students learn, writing must be used as a methodology to advance student learning.

Each academic discipline has its own unique conventions, formats and structures. It is the responsibility of each department to agree upon domain-specific writing praxes, model them for students, and require them to utilize them on a consistent basis. Students must understand that acceptable writing in one domain may not be acceptable writing in another area. The development of domain-specific writing skills supports the overall development of the student writer because all writing is grounded in the writing situation: audience, context, purpose, subject, and writer. Representatives from the academic

disciplines must share their domain-specific writing praxes with each other, identify intersections, and determine how to address perceived gaps that limit student learning.

Students must experience writing situations that help them learn how to think creatively and critically and communicate effectively in the academic disciplines. Writing instruction, regardless of the academic discipline, must always reinforce student understanding of the writing situation. When students experience writing situations, they must study examples of domain-specific writing in order to understand how writers communicate in discipline-related contexts. This does not mean information embedded in textbooks. Domain-specific writing is writing that is used to inform and influence readers as it draws them into an established circle of discourse. Students must use these non-fiction texts to develop the close reading skills that will shape their own writing. Focused engagement with domain-specific writing should not be limited to basic reading comprehension and topical understanding. It must also include the analysis of the writing situation that is represented in the text: audience, context, purpose, subject, and writer. The close reading of well-written texts—regardless of the domain—will show students the importance of writing mechanics, diction, and syntax. The development of close reading skills will also help the students grow in terms of their ability to construct and advance independent and original claims that are well-supported by evidence. Domain-specific writing is grounded in positioning of claims and the effective use of evidence.

The final written product is important; nevertheless, the learning that results in this production must not be devalued. The writing process is not limited to the basic steps of planning, drafting, revising, and editing/proofreading. It is a complex sequence of critical and creative thinking and writing that leads to the production of a text that provides evidence of learning and understanding. Students must ultimately develop the ability to self-assess the effectiveness of their writing as a representation of the writing situation. Without the use of models that evidence learning and understanding, students will not develop the ability to self-assess their own work—the true outcome of the writing process.

What types of writing situations should RFH students engage in?

RFH students should engage in writing situations across the curriculum that require them to:

- write to improve mechanical proficiency, diction usage, and syntactical sophistication
- write to narrate, describe, and reflect
- write to summarize and report
- write to classify and define
- write to explain how process leads to an outcome
- write to compare, contrast and evaluate
- write to speculate on cause and effect
- write to propose solutions and solve problems
- write to analyze

These writing situations should be positioned in a coordinated, developmental sequence that extends <u>across</u> the academic disciplines.

Upon Completion of Grade 12, RFH students must be ready to transition to the following writing situations:

- write to analyze
- write to persuade (argument)

The core foci of first-year college writing courses are analysis and argument. These courses orient the students to the demands and expectations of writing for the academic culture of college. At colleges/universities with carefully coordinated writing programs, students must demonstrate proficiency in analysis and argument before they transition to upper level courses that require them to engage in the following writing situation:

- write to investigate (research)