2020 Cyber Foundations II

Course Code: 000286

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The Research and Curriculum Unit (RCU), located in Starkville, MS, as part of Mississippi State University, was established to foster educational enhancements and innovations. In keeping with the land grant mission of Mississippi State University, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

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Standards

Standards are superscripted in each unit and are referenced in the appendices. Standards in the *Cyber Foundations II Curriculum Framework and Supporting Materials* are based on the following:

21st Century Skills and Information and Communication Technologies Literacy Standards

In defining 21st century learning, the Partnership for 21st Century Skills has embraced five content and skill areas that represent the essential knowledge for the 21st century: global awareness; civic engagement; financial, economic, and business literacy; learning skills that encompass problem-solving, critical-thinking, and self-directional skills; and Information and Communication Technology (ICT) literacy.

National Educational Technology Standards for Students

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2018 Mississippi College- and Career-Readiness Standards for Computer Science

In an effort to closely align instruction for students who are progressing toward postsecondary study and the workforce, the *2018 Mississippi College- and Career-Readiness Standards (MS CCRS) for Computer Science* includes grade- and course-specific standards for K-12 computer science. Mississippi has adapted these standards from the nationally developed *Computer Science Teachers Association K-12 Computer Science Standards, Revised 2017*.

Preface

Secondary career and technical education programs in Mississippi are faced with many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing true learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, ch. 487, §14; Laws, 1991, ch. 423, §1; Laws, 1992, ch. 519, §4 eff. from and after July 1, 1992; Carl D. Perkins Vocational Education Act IV, 2007; and No Child Left Behind Act of 2001).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers:

Curriculum, Assessment, Professional Learning, and other program resources can be found at The Research and Curriculum Unit's website: rcu.msstate.edu

Learning Management System: An online resource

Learning Management System information can be found at the RCU's website, under Professional Learning.

Should you need additional instructions, please call 662.325.2510.

Executive Summary

Program Description

Cyber foundations II is an innovative instructional program that prepares students to effectively use technology in learning, communication, and life and introduces them to the critical-thinking and problem-solving skills used in computing and that impact every career field. Students in cyber foundations II complete studies in interpersonal and self-directional skills, basic technology operation and technology concepts, ethical issues in technology, technology communication tools, lab management and networking, database applications, graphic design applications, and career preparation.

Applied Academic Credit

The latest academic credit information can be found at: mdek12.org/Accred/AAS

Once there, click the "Mississippi Public School Accountability Standards Year" tab. Review the appendices for graduation options and superscript information regarding specific programs receiving academic credit. Check this site often as it is updated frequently.

Grade Level and Class Size Recommendations

It is recommended that students enter this program as a 7th grader or higher and ONLY after completing Cyber Foundations I. Classes may contain mixed grade levels if allowed by district policy. The classroom and lab should be designed to accommodate a maximum of 24 students. Class size should be determined by the number of operational computers in the lab. Each student needs access to their computer to be successful in this course.

Teacher Licensure

The latest teacher licensure information can be found at: mdek12.org/OTL/OEL

Professional Learning

If you have specific questions about the content of any training sessions provided, please contact the Research and Curriculum Unit at 662.325.2510.

Course Outline

Cyber Foundations II – Course Code: 000286

Unit	Unit Name	Hours
1	Orientation, Digital Citizenship and Keyboarding	15
2	Student Organizations	2
3	21st Century Tool Box	3
4	Personal Finance	10
5	Interactive Games and Animations	30
6	The Design Process	30
7	Data, Computers, and Society	25
8	Physical Computing	25
Total		140

Research Synopsis

Introduction

Cyber Foundations II (CF II) is an instructional program that prepares individuals to effectively use technology in learning, communication, and life skills. In CF II, students will build upon the skills they learned in CF I and expand them to applications, such as databases, graphic design, mobile application development and micro-controller programming.

Needs of the Future Workforce

The information and communication technology industry is a rapidly growing and ever-changing field. Students will learn basic skills that will serve as the foundation of their knowledge. The workforce will require them to use these skills and adapt them to various specialties. As seen in Table 1.1, the information and communication technology workforce is equally competitive as it is abundant in opportunities for upward mobility (MDES, 2013).

Table 1.1: Current and Projected Occupation Report

Description	**Jobs, 2010**	**Projected Jobs, 2020**	**Change (Number)**	**Change (Percent)**	**Total Projected Avg. Annual Job Openings**	**Average Hourly Earning**
Computer systems analyst	1,540	1,690	150	9.7%	45	$29.09
Computer programmer	1,430	1,400	-30	-2.1%	35	$33.83
Software developer, applications	600	720	120	20%	20	$45.42
Software developer, systems software	240	280	40	16.7%	5	$41.32
Database administrator	410	500	90	22%	15	$34.27
Network and computer systems administrator	2,150	2,570	420	19.5%	80	434.41
Computer support specialist	2,450	2,730	280	11.4%	90	$20.87
Information security analysist, web developer, and computer network architect	290	330	40	13.8%	10	$32.06
Computer and information systems manager	1,140	1,270	130	11.4%	30	$42.66
Computer operator	600	540	-60	-10%	5	$17.71

Executive secretary and administrative assistant	7,130	7,140	10	0.1%	95	$16.86
First-line supervisor/office manager and administrative support worker	10,250	11,000	750	7.3%	350	$20.35
General and operations manager	17,260	16,710	-550	-3.2%	320	$29.42
Word processor and typist	850	740	-110	-12.9%	5	$12.55
Desktop publisher	80	70	-10	-12.5%	0	$18.55

Source: Mississippi Department of Employment Security; mdes.ms.gov (accessed June 2, 2018).

Perkins IV Requirements

The Cyber Foundations II curriculum meets Perkins IV requirements of high-skill, high-wage, and/or high-demand occupations by introducing students to and preparing students for occupations. It also offers students a program of study including secondary, postsecondary, and Institution of Higher Learning courses that will prepare them for occupations in these fields. Additionally, the cyber foundations curriculum is integrated with the Mississippi College and Career Readiness Standards. Lastly, the cyber foundations curriculum focuses on ongoing and meaningful professional development for teachers, as well as relationships with industry.

Curriculum Content: Summary of Standards

The standards included in the Cyber Foundations II curriculum reflect state and national standards. The curriculum aligns with the *Mathematics and English Language Arts, Framework for 21st Century Learning*, and the standards for the International Society for Technology in Education (ISTE). Aligning the curriculum content to these standards will result in students who are highly skilled, well-rounded, more academically proficient, and more likely to be successful in community colleges, institutions of higher learning, and the workforce.

Academic Infusion

Cyber Foundations II is aligned to the Mississippi College and Career Readiness Standards. The Mississippi College and Career Readiness Standards are aligned with college and work expectations and include rigorous content and application of knowledge through high-order thinking skills. This applied approach to learning academic skills has long been the practice in career and technical education and brings relevance and enhances and reinforces these academic skills. Throughout the curriculum, students will be required to perform calculations and use strategic and critical thinking skills to solve real-world problems.

Transition to Postsecondary Education

The latest articulation information for secondary to postsecondary can be found at the Mississippi Community College Board (MCCB) website, mccb.edu.

Best Practices

Innovative Instructional Technologies

Recognizing that today's students are digital learners, the classroom should be equipped with tools that will teach them in the way they need to learn. The cyber foundations II curriculum includes teaching strategies that incorporate current technology. Each classroom should incorporate one teacher desktop or laptop as well as student computers in a networked environment. It is suggested that each classroom be equipped with an interactive white board and projector, intensifying the interaction between students and teachers during class. Teachers are encouraged to make use of the latest online communication tools, such as wikis, blogs, and podcasts. They are also encouraged to teach using a learning management system, which introduces students to education in an online environment and places the responsibility of learning on the student.

Differentiated Instruction

Students learn in a variety of ways. Some are visual learners, needing only to read information and study it to succeed. Others are auditory learners, thriving best when information is read aloud to them. Still others are tactile learners, needing to participate actively in their learning experiences. Add the student's background, emotional health, and circumstances, and a very unique learner emerges. To combat this, the cyber foundations curriculum is written to include many projects which allow students to choose the type of product they will produce or to perform a certain task. By encouraging various teaching and assessment strategies, students with various learning styles can succeed.

Career and Technical Education Student Organizations

There are student organizations for students that would be relevant to this curriculum. Teachers are required to charter one of these organizations if one is not already available to students. The suggested organization for this course is Technology Students Association (TSA). Contact information for this and other related organizations is listed under "Professional Organizations" in this document.

Conclusion

Based on the previous information, the Cyber Foundations II curriculum will be filled with opportunities to develop workforce skills. Widely used teaching strategies, such as cooperative learning, problem-based learning, and demonstration, will also be included. These will help to prepare students for the hands-on environment they will likely experience upon entering the workforce. The curriculum document will be updated regularly to reflect the needs of the information and communication technology workforce.

Professional Organizations

For students:
Future Business Leaders of America
fbla-pbl.org

Technology Student Association
tsaweb.org

For teachers:
Mississippi Educational Computing Association
ms-meca.org

Mississippi Association of Career and Technical Education
mississippiacte.com

Mississippi Business Education Association
ms-mbea.com

Computer Science Teachers Association
csteachers.org

Using This Document

Suggested Time on Task

This section indicates an estimated number of clock hours of instruction that should be required to teach the competencies and objectives of the unit. A minimum of 140 hours of instruction is required for each Carnegie unit credit. The curriculum framework should account for approximately 75-80% of the time in the course. The remaining percentage of class time will include instruction in non-tested material, review for end of course testing, and special projects.

Competencies and Suggested Objectives

A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies. The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.

Integrated Academic Topics, 21st Century Skills and Information and Communication Technology Literacy Standards, ACT College Readiness Standards, and Technology Standards for Students

This section identifies related academic topics as required in the Subject Area Testing Program (SATP) in Algebra I, Biology I, English II, and U.S. History from 1877, which are integrated into the content of the unit. Research-based teaching strategies also incorporate ACT College Readiness standards. This section also identifies the 21st Century Skills and Information and Communication Technology Literacy skills. In addition, national technology standards for students associated with the competencies and suggested objectives for the unit are also identified.

Unit 1: Orientation, Digital Citizenship, and Keyboarding

Competencies and Suggested Objectives
1. Identify school policies, program policies, and safety procedures related to cyber foundations II. DOK 1 a. Examine the school handbook, the acceptable use policy for technology, and other safety procedures for building level situations. b. Preview the course outline and its relevance in today's workforce. c. Recognize appropriate safety measures related to technology in the computer lab and online safety.
2. Investigate social and ethical issues related to digital citizenship. DOK 3 a. Privacy and security: Identify strategies for managing online information and keeping it secure from online risks. b. Creative credit and copyright: Identify user responsibilities and rights for creative credit, copyright, fair use, plagiarism and piracy. c. Digital footprint: Discuss ways to protect user privacy and respect others' privacy. d. Information Literacy: Evaluate the quality, credibility, and validity of websites and give proper credit. d. Cyberbullying: Explore the behaviors of cyberbullying and how it impacts individuals and communities and discuss the consequences. e. Internet safety: Identify strategies to determine inappropriate contact and positive connections when collaborating online. f. Self-image and identity: Explore digital lives by focusing on students' online and offline identities and the risks of presenting themselves through different personas. g. Relationships and communication: Explore different types of communication and online etiquette for different audiences
3. Collaborate with teachers, peers, and course materials using a learning management system. DOK 4 a. Discover online learning environments and how they operate among teachers and students. b. Demonstrate proper email etiquette. c. Participate in online learning methods, such as discussion boards, student journals, blogs, wikis, and so forth.
4. Demonstrate understanding of basic keyboarding information and perform keyboarding applications. DOK 2 a. Define vocabulary associated keyboarding. b. Demonstrate understanding of keyboarding and workspace ergonomics through proper hand, finger, and body position when using a keyboard (ongoing). c. Perform touch typing by keying words, sentences, and paragraphs (ongoing). d. Demonstrate speed and accuracy with the touch keyboard (ongoing).
5. Investigate career opportunities within the law, public safety, corrections, and security career cluster. DOK 3 a. Research career opportunities for employment in law, public safety, corrections, and security by exploring the law, public safety, corrections, and security career cluster.

b. Examine the requirements, skills, wages, education, and employment opportunities in at least one career pathway from the law, public safety, corrections, and security career cluster.

c. Link computer science and knowledge of ethics with employment opportunities in the law, public safety, corrections, and security career cluster.

NOTE: The content from this unit should be reinforced throughout the program. *Additionally, material in Unit 1, 2, 3 is review from CF I. Consider alternative ways to present this material to build on previous knowledge.*

Important Notes for Keyboarding

Model for and teach students the proper body posture for effective keyboarding. Students should have the following posture:

- Sit straight up in chair with feet flat on the floor
- Arms parallel with the keyboard
- Wrists low but off keyboard
- Fingers curved and upright

Space ONCE after all punctuation marks. Numeric keyboarding and numeric keypad instruction should only take place if time allows.

To calculate NWAM, subtract errors from GWAM (GWAM-errors=NWAM). Continue to have students perform timed writings throughout the school year. Students should strive for 40 NWAM by the end of the school year by keying a 5-minute timed writing.

Unit 2: Student Organizations

Competencies and Suggested Objectives
1. Recognize opportunities to participate in student organizations related to technology and business. DOK 1 a. Identify student organizations available at the school for technology and business students. b. List student competitions available through each organization.
2. Recognize how a business meeting is conducted. DOK 1 a. Illustrate the opening of a business meeting. b. Illustrate the closing of a business meeting.
3. Identify leadership and personal development styles. DOK 1 a. List the characteristics of an effective leader. b. Explore the characteristics of personal development.
NOTE: The content from this unit should be reinforced throughout the program.

Unit 3: 21st Century Toolbox

Competencies and Suggested Objectives
1. Differentiate between various learning styles and personality traits found within the classroom and workplace. DOK 3 a. Complete the learning styles inventory. b. Identify personality traits and complete a personality self-test. c. Discuss strategies people can use to work effectively with one another regardless of their differences.
2. Demonstrate effective time management skills, study skills and note-taking strategies. DOK 2 a. Develop short-term and long-term personal goals. b. Demonstrate use of technology to master note-taking. c. Demonstrate use of technology to master study skills and time management skills.
3. Compare careers in each of the 16 national career clusters. DOK 2 a. Use career-planning software to become familiar with the 16 national career clusters and the opportunities for employment with each.
4. Perform interest-profiling and career-exploration exercises. DOK 3 a. Complete a career-interest survey and log results. b. Explore career options in career cluster(s) of your choice.
5. Complete a career-plan builder. DOK 1 a. Explore careers identified in the interest profiler. b. Explore future education plans and lifestyle choices. c. Complete an eighth-grade course-builder plan.
6. Review each student's Individual Success Plan *(ISP)***. DOK 2 a. Link the ISP to the 16 national career clusters and to secondary and postsecondary education. b. Apply the basic components of the ISP to build a plan of study. c. Identify, select, and print courses that meet graduation requirements and reflect the ISP. ***Individual Success Plan (ISP) is the former Individual Career and Academic Plan (iCAP)*
7. Demonstrate effective public speaking skills. DOK 2 a. Demonstrate effective communication in groups. b. Demonstrate presentation skills.
8. Demonstrate knowledge of 21st Century skills. DOK 2 a. Collaboration and teamwork b. Creativity and imagination c. Critical thinking d. Problem-solving
NOTE: The content from this unit should be reinforced throughout the program.

Unit 4: Personal Finance

Competencies and Suggested Objectives
1. Organize and use a budget to manage cash flow, plan for spending. a. Recognize the responsibilities associated with financial decisions. b. Use reliable resources when making financial decisions. c. Make criterion-based financial decisions by systematically considering alternatives and consequences d. Create and calculate a sample project budget. e. Apply consumer skills to spending and saving decisions.
2. Perform spreadsheet applications. DOK 2 a. Explore spreadsheet software purpose and functions. b. Identify terminology and key features including navigation related to spreadsheets. c. Use basic spreadsheet formulas, functions, format and edit commands (sort, filter, edit, format, insert, delete, etc.). d. Create and manipulate a spreadsheet in meaningful situations.
3. Develop and interpret spreadsheet tables, charts, and figures to support written and oral communication. DOK 2 a. Create spreadsheet tables, charts, and figures to support (data) written and oral communication. b. Interpret spreadsheet tables, charts, and figures used to support (data) written and oral communication.

Unit 5: Interactive Games and Animations

Competencies and Suggested Objectives
1. Investigate programming for entertainment. DOK 3 a. Identify how Computer Science is used in a field of entertainment.
2. Investigate the use of shapes in gaming and animation. DOK 3 a. Reason about locations on a coordinate grid. b. Communicate how to draw an image, accounting for shape position, color, and order. c. Plot different colored shapes and be able to sequence code to correctly overlay shapes. d. Debug code written by others. e. Use and reason about drawing commands with multiple parameters.
3. Recall and use the problem-solving process. DOK 1 a. Communicate and collaborate with classmates in order to solve a problem. b. Iteratively improve a solution to a problem. c. Identify different strategies used to solve a problem, d. Identify the four steps of the problem-solving process.
4. Investigate the use of variables in gaming and animation. DOK 3 a. Identify a variable as a way to label and reference a value in a program. b. Use variables in a program to store a piece of information that is used multiple times. c. Reason about and fix common errors encountered when programming with variables. d. Read and follow the steps of a short program written in pseudocode that manipulates variable values.
5. Demonstrate the use of sprites in gaming and animation. DOK 2 a. Assign a sprite to a variable. b. Use dot notation to update a sprite's properties. c. Create a static scene combining sprites, shapes, and text. d. Describe the connection between updating a sprite's location properties and sprite movement on the screen.
6. Apply the use of draw loop in gaming and animation. DOK 3 a. Explain what an animation is and how it creates the illusion of smooth motion. b. Explain how the draw loop allows for the creation of animations. c. Use the draw loop in combination with the random Number () command, shapes, and sprites to make simple animations.
7. Demonstrate the use of movement in gaming and animation. DOK 2 a. Use the counter pattern to increment or decrement sprite properties. b. Identify which sprite properties need to be changed, and in what way, to achieve a s specific movement. c. Use the velocity and rotation Speed blocks to create and change sprite movements. d. Describe the advantages of simplifying code by using higher level blocks. e. Use sprite velocity with the counter pattern to create different types of sprite movement.
8. Examine the use of Booleans and conditionals in gaming and animation. DOK 2 a. Organize objects based on simple and compound Boolean statements. b. Predict the output of simple Boolean statements. c. Use conditionals to react to changes in variables and sprite properties. d. Use conditionals to react to keyboard input.

e. Move sprites in response to keyboard input. f. Use an else-statement as the fallback case to an if-statement.
9. Create games and animations using the game design process. DOK 4 a. Identify core programming constructs necessary to build different components of a game. b. Create and use multi-frame animations in a program. c. Create a plan for building a piece of software by describing its major components. d. Implement a plan for creating a piece of software.
10. Investigate career opportunities in the STEM (game designer, mathematics, or entrepreneur) career cluster. DOK 3 a. Research career opportunities for employment in STEM (game designer, mathematics, or entrepreneur) career cluster by exploring the STEM (game designer, mathematics, or entrepreneur) career cluster. b. Examine the requirements, skills, wages, education, and employment opportunities in at least one career pathway from the STEM (game designer, mathematics, or entrepreneur) career cluster. c. Discuss how computer science impacts the STEM (game designer, mathematics, or entrepreneur) career cluster.
NOTE: For the career exploration objective, the cluster chosen is just a suggestion. You may choose to explore any other career cluster.

Unit 6: The Design Process

Competencies and Suggested Objectives
1. Identify and examine user needs to understand the purposes of design. DOK 2 a. Express opinions respectfully and effectively. b. Critically evaluate an object for how well its design meets a given set of needs. c. Identify empathy for the user as an important component of the design process. d. Distinguish between creator needs and user needs.
2. Develop paper prototypes to test ideas and assumptions. DOK 3 a. Use a paper prototype to test out an app before programming it. b. Identify the user needs a prototype was designed to address. c. Categorize and prioritize user feedback for an app. d. Create a paper prototype for the screens of an app. e. Design the functionality of an app to address the specific needs of a user. f. Identify improvements to an app based on user testing. g. Design the user interface of an app.
3. Compare and contrast different types of apps. DOK 2 a. Identify ways in which apps can affect social change. b. Identify the user needs addressed by an app.
4. Develop digital prototype of an app. DOK 3 a. Construct transformations of graphic designs. b. Construct graphic animations. c. Generate the graphics and animations.
5. Revise and formulate improvements. DOK 4 a. Develop a detailed plan for testing prototype. b. Collect and analyze test data. c. Revise and formulate improvements based on testing.
6. Investigate career opportunities in the STEM (software development or engineering) career cluster. DOK 2 a. Research career opportunities for employment in the STEM (software development or engineering) career cluster. b. Examine the requirements, skills, wages, education, and employment opportunities in at least one career pathway from the STEM (software development or engineering) career cluster. c. Discuss how computer science impacts the STEM (software development or engineering) career cluster.
NOTE: For the career exploration objective, the cluster chosen is just a suggestion. You may choose to explore any other career cluster.

Unit 7: Data, Computers, and Society

Competencies and Suggested Objectives
1. Examine data collection and representation using the problem-solving process. DOK 2 a. Recognize data as information collected from the world to help make a recommendation or solve a problem. b. Provide examples of how representing data in different ways can affect its ability to solve different problems. c. Choose the best way to represent some information based on how it will be used. d. Describe the necessary features of a system for representing information. e. Create, use, and provide feedback on a system for representing information. f. Iteratively improve upon a system for representing information by testing and responding to feedback.
2. Identify and design ASCII and binary systems. DOK 4 a. Define terms associated with ASCII and binary systems. b. Use the ASCII system to encode and decode text information in binary. c. Create and manipulate binary patterns to represent black-and-white images. d. Describe common features of systems used to represent information in binary. e. Use a binary system to represent numbers. Extend a representation system based on patterns.
3. Design and analyze digital security systems using encoding. DOK 4 a. Apply a method of encryption to ensure the secure transmission of data. b. Use both physical and digital security measures to secure data. c. Use multiple binary systems to decode information. d. Determine the most appropriate encoding system for a given piece of information.
4. Analyze and apply appropriate encoding systems. DOK 3 a. Choose and justify the use of different binary representation systems depending on the information being represented. b. Encode and decode information represented in binary numbers and ASCII text. c. Create a generalized representation system for many instances of a complex type of information.
5. Apply concepts to solve problems using data. DOK 3 a. Use the problem-solving process to answer questions using data. b. Identify and collect relevant data to help solve a problem. c. Use data to draw conclusions.
6. Investigate how data is collected. DOK 3 a. Give examples of how data is collected from sensors and by tracking user behavior. b. Determine data that would be helpful in solving a problem, and how that data could be collected. c. Distinguish between data that users intentionally and unintentionally produce.
7. Analyze and revise data to make it useful. DOK 4 a. Identify and remove irrelevant data from a data sheet. b. Create a bar chart based on a set of data. c. Explain why a set of data must be cleaned before a computer can use it.

8. Critique data to make and support decisions using that data. DOK 3 a. Use tables and visualizations summarizing data to support a decision. b. Present and critique interpretations of tables and visualizations. c. Identify additional data that could be collected to improve a decision. d. Organize data to support a claim. e. Find patterns and relationships in data.
9. Construct a plan to automate data decisions. DOK 4 a. Design an algorithm for making decisions using data as inputs. b. Explain the benefits and drawbacks of using computers for automated decision-making. c. Interpret collected data to identify patterns.
10. Apply concepts of data collection and interpretation of data to make a recommendation. DOK 3 a. Apply the data problem-solving process to a personally relevant topic. b. Determine appropriate sources of data needed to solve a problem.
11. Investigate career opportunities in the STEM (cyber security or genetics) career cluster. DOK 3 a. Research career opportunities for employment in the STEM (cyber security or genetics) career cluster. b. Examine the requirements, skills, wages, education, and employment opportunities in at least one career pathway from the STEM (cyber security or genetics) career cluster. c. Discuss how computer science impacts the STEM (cyber security or genetics) career cluster.
NOTE: For the career exploration objective, the cluster chosen is just a suggestion. You may choose to explore any other career cluster.

Unit 8: Physical Computing

Competencies and Suggested Objectives
1. Investigate innovations in computing and computing devices. DOK 3 a. Identify computing innovations within a given field. b. For a given device, articulate the likely inputs and outputs. c. Suggest improvements to help a device better solve a specific problem.
2. Investigate user interface properties. DOK 2 a. Set the properties of user interface elements using code. b. Respond to user input using an event handler. c. Write programs that change multiple elements on a single screen instead of changing screens.
3. Analyze microcontrollers. DOK 4 a. Connect and troubleshoot external devices. b. Turn on and off a LED with code. c. Use code to control a physical device. d. Compare and contrast multiple ways to take input. e. Describe the elements of an event handler. f. Model different methods of taking user input. g. Attach an event handler to a hardware input. h. Choose the appropriate event for a given scenario.
4. Investigate career opportunities in the STEM (data science or mathematics) career cluster. DOK 3 a. Research career opportunities for employment in the STEM (data science or mathematics) career cluster. b. Examine the requirements, skills, wages, education, and employment opportunities in at least one career pathway from the STEM (data science or mathematics) career cluster. c. Discuss how computer science impacts the STEM (data science or mathematics) career cluster.
NOTE: For the career exploration objective, the cluster chosen is just a suggestion. You may choose to explore any other career cluster.

Student Competency Profile

Student Name: _____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. It can be duplicated for each student, and it can serve as a cumulative record of competencies achieved in the course.

In the blank before each competency, place the date on which the student mastered the competency.

Unit 1: Orientation, Digital Citizenship and Keyboarding		
	1.	Identify school policies, program policies, and safety procedures related to Cyber Foundations II.
	2.	Investigate social and ethical issues related to digital citizenship.
	3.	Collaborate with teachers, peers, and course materials using a learning management system.
	4.	Demonstrate understanding of basic keyboarding information and perform keyboarding applications.
	5.	Investigate career opportunities within the Law, Public Safety, Corrections, and Security career cluster.
Unit 2: Student Organizations		
	1.	Recognize opportunities to participate in student organizations related to technology and business.
	2.	Recognize how a business meeting is conducted.
	3.	Identify leadership and personal development styles.
Unit 3: 21st Century Toolbox		
	1.	Differentiate between various learning styles and personality traits found within the classroom and workplace.
	2.	Demonstrate effective time management skills, study skills and note-taking strategies.
	3.	Compare careers in each of the 16 national career clusters.
	4.	Perform interest profiling and career exploration exercises.
	5.	Complete a career plan builder.
	6.	Review each student's Individual Success Plan *(ISP)*.
	7.	Demonstrate effective public speaking skills.
	8.	Demonstrate knowledge of 21st Century skills.
Unit 4: Personal Finance		
	1.	Organize and use a budget to manage cash flow, plan for spending.
	2.	Perform spreadsheet applications
	3.	Develop and interpret spreadsheet tables, charts, and figures to support written

		and oral communication.
Unit 5: Interactive Games and Animations		
	1.	Investigate programming for entertainment.
	2.	Investigate the use of shapes in gaming and animation.
	3.	Recall and use the problem-solving process.
	4.	Investigate the use of variables in gaming and animation.
	5.	Demonstrate the use of sprites in gaming and animation.
	6.	Apply the use of draw loop in gaming and animation.
	7.	Demonstrate the use of movement in gaming and animation.
	8.	Examine the use of Booleans and conditionals in gaming and animation.
	9.	Create games and animations using the game design process.
	10.	Investigate career opportunities in the STEM (game designer, mathematics, or entrepreneur) career cluster.
Unit 6: User Experience Design		
	1.	Identify and examine user needs to understand the purposes of design.
	2.	Develop paper prototypes to test ideas and assumptions.
	3.	Compare and contrast different types of apps.
	4.	Develop digital prototype of an app.
	5.	Revise and formulate improvements.
	6.	Investigate career opportunities in the STEM (software development or engineering) career cluster.
Unit 7: Data, Computers, and Society		
	1.	Examine data collection and representation using the problem-solving process.
	2.	Identify and design ASCII and binary systems.
	3.	Design and analyze digital security systems using encoding
	4.	Analyze and apply appropriate encoding systems.
	5.	Apply concepts to solve problems using data.
	6.	Investigate how data is collected.
	7.	Analyze and revise data to make it useful.
	8.	Critique data to make and support decisions using that data.
	9.	Construct a plan to automate data decisions.
	10.	Apply concepts of data collection and interpretation of data to make a recommendation.
	11.	Investigate career opportunities in the STEM (cyber security or genetics) career cluster.

~~Unit 8: Physical Computing~~		
	~~1.~~	~~Investigate innovations in computing and computing devices.~~
	~~2.~~	~~Investigate user interface properties.~~
	~~3.~~	~~Analyze microcontrollers.~~
	~~4.~~	~~Investigate career opportunities in the STEM (data science or mathematics) career cluster.~~

Appendix A: 21st Century Skills[1]

21st Century Crosswalk for Cyber Foundations II									
	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
21st Century Standards									
CS1		x		x					
CS2			x	x					
CS3		x	x	x					
CS4				x					
CS5		x		x					
CS6				x	x	x	x	x	x
CS7				x	x	x	x	x	x
CS8		x	x	x	x	x	x	x	x
CS9		x		x	x	x	x	x	x
CS10		x		x	x	x	x	x	x
CS11		x		x	x	x	x	x	x
CS12				x	x	x	x	x	x
CS13		x		x	x	x	x	x	x
CS14		x	x	x	x	x	x	x	x
CS15		x		x	x	x	x	x	x
CS16		x	x	x	x				

CSS1 21st Century Themes

CS1 Global Awareness

1. Using 21st century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

CS2 Financial, Economic, Business, and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national, and global levels
3. Understanding the local and global implications of civic decisions

CS4 Health Literacy

1. Obtaining, interpreting, and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance, and stress reduction
3. Using available information to make appropriate health-related decisions
4. Establishing and monitoring personal and family health goals

[1] *21st century skills.* (n.d.). Washington, DC: Partnership for 21st Century Skills.

5. Understanding national and international public health and safety issues

CS5 Environmental Literacy

1. Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water, and ecosystems.
2. Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.).
3. Investigate and analyze environmental issues, and make accurate conclusions about effective solutions.
4. Take individual and collective action toward addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues).

CSS2 Learning and Innovation Skills

CS6 Creativity and Innovation

1. Think Creatively
2. Work Creatively with Others
3. Implement Innovations

CS7 Critical Thinking and Problem Solving

1. Reason Effectively
2. Use Systems Thinking
3. Make Judgments and Decisions
4. Solve Problems

CS8 Communication and Collaboration

1. Communicate Clearly
2. Collaborate with Others

CSS3 Information, Media and Technology Skills

CS9 Information Literacy

1. Access and Evaluate Information
2. Use and Manage Information

CS10 Media Literacy

1. Analyze Media
2. Create Media Products

CS11 ICT Literacy

1. Apply Technology Effectively

CSS4 Life and Career Skills

CS12 Flexibility and Adaptability

1. Adapt to change
2. Be Flexible

CS13 Initiative and Self Direction

1. Manage Goals and Time
2. Work Independently
3. Be Self directed Learners

~~CS14 Social and Cross-Cultural Skills~~

1. ~~Interact Effectively with others~~
2. ~~Work Effectively in Diverse Teams~~

~~CS15 Productivity and Accountability~~

1. ~~Manage Projects~~
2. ~~Produce Results~~

~~CS16 Leadership and Responsibility~~

1. ~~Guide and Lead Others~~
2. ~~Be Responsible to Others~~

Appendix B: Mississippi College and Career Readiness Standards

Mississippi College and Career Readiness Standards Crosswalk for Cyber Foundations II (English/Language Arts 11-12)									
	Units	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
MCCR Standards									
RI.11.1.		x	x	x		x	x	x	x
RI.11.2.									
RI.11.4.		x	x	x		x	x	x	x
RI.11.5.		x							
RI.11.7.		x	x	x		x	x	x	x
W.11.1.		x	x	x		x	x	x	x
W.11.2.		x	x	x		x	x	x	x
W.11.4.		x	x	x		x	x	x	x
W.11.5.									
W.11.6.		x	x	x		x	x	x	x
W.11.8.		x	x	x		x	x	x	x
SL.11.1.		x	x	x		x	x	x	x
SL.11.2.		x	x	x		x	x	x	x
SL.11.4.		x	x	x		x	x	x	x
SL.11.5.		x	x	x		x	x	x	x
SL.11.6.		x	x	x		x	x	x	x
L.11.1.		x	x	x		x	x	x	x
L.11.2.		x	x	x		x	x	x	x
L.11.3.		x	x	x		x	x	x	x
L.11.4.		x	x	x		x	x	x	x
RH.11.1.		x	x	x		x	x	x	x
RH.11.4.		x	x	x		x	x	x	x

Reading Standards for Literature (11-12)

College and Career Readiness Anchor Standards for *Reading Literature*

Key Ideas and Details

RL.11.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RL.11.2. Determine two or more themes or central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to produce a complex account; provide an objective summary of the text.

RL.11.3. Analyze the impact of the author's choices regarding how to develop and relate elements of a story or drama (e.g., where a story is set, how the action is ordered, how the characters are introduced and developed).

Craft and Structure

RL.11.4. Determine the meaning of words and phrases as they are used in the text, including figurative and connotative meanings; analyze the impact of specific word choices on meaning and tone, including words with multiple meanings or language that is particularly fresh, engaging, or beautiful. (Include Shakespeare as well as other authors.)

RL.11.5. Analyze how an author's choices concerning how to structure specific parts of a text (e.g., the choice of where to begin or end a story, the choice to provide a comedic or tragic resolution) contribute to its overall structure and meaning as well as its aesthetic impact.

RL.11.6. Analyze a case in which grasping point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, sarcasm, irony, or understatement).

Integration of Knowledge and Ideas

RL.11.7. Analyze multiple interpretations of a story, drama, or poem (e.g., recorded or live production of a play or recorded novel or poetry), evaluating how each version interprets the source text. (Include at least one play by Shakespeare and one play by an American dramatist.)

RL.11.8. (Not applicable to literature)

RL.11.9. Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics.

Range of Reading and Level of Text Complexity

RL.11.10. By the end of grade 11, read and comprehend literature, including stories, dramas, and poems, in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.
By the end of grade 12, read and comprehend literature, including stories, dramas, and poems, at the high end of the grades 11–CCR text complexity band independently and proficiently.

Reading Standards for Informational Text (11-12)

College and Career Readiness Anchor Standards for *Informational Text*

Key Ideas and Details

RI.11.1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text, including determining where the text leaves matters uncertain.

RI.11.2. Determine two or more central ideas of a text and analyze their development over the course of the text, including how they interact and build on one another to provide a complex analysis; provide an objective summary of the text.

RI.11.3. Analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text.

Craft and Structure

RI.11.4. Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze how an author uses and refines the meaning of a key term or terms over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

RI.11.5. Analyze and evaluate the effectiveness of the structure an author uses in his or her exposition or argument, including whether the structure makes points clear, convincing, and engaging.

RI.11.6. Determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, analyzing how style and content contribute to the power, persuasiveness, or beauty of the text.

Integration of Knowledge and Ideas

RI.11.7. Integrate and evaluate multiple sources of information presented in different media or formats (e.g., visually, quantitatively) as well as in words in order to address a question or solve a problem.

RI.11.8. Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning (e.g., in U.S. Supreme Court majority opinions and dissents) and the premises, purposes, and arguments in works of public advocacy (e.g., The Federalist, presidential addresses).

RI.11.9. Analyze seventeenth-, eighteenth-, and nineteenth-century foundational U.S. documents of historical and literary significance (including The Declaration of Independence, the Preamble to the Constitution, the Bill of Rights, and Lincoln's Second Inaugural Address) for their themes, purposes, and rhetorical features.

Range of Reading and Level of Text Complexity

RI.11.10. By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.
By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band independently and proficiently.

College and Career Readiness Anchor Standards for *Writing*

Text Types and Purposes

W.11.1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.

a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.

b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level, concerns, values, and possible biases.

c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

e. Provide a concluding statement or section that follows from and supports the argument presented.

W.11.2. Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.

a. Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

c. Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

d. Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.

e. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

W.11.3. Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.

a. Engage and orient the reader by setting out a problem, situation, or observation and its significance, establishing one or multiple point(s) of view, and introducing a narrator and/or characters; create a smooth progression of experiences or events.

b. Use narrative techniques, such as dialogue, pacing, description, reflection, and multiple plot lines, to develop experiences, events, and/or characters

c. Use a variety of techniques to sequence events so that they build on one another to create a coherent whole and build toward a particular tone and outcome (e.g., a sense of mystery, suspense, growth, or resolution).

d. Use precise words and phrases, telling details, and sensory language to convey a vivid picture of the experiences, events, setting, and/or characters.
e. Provide a conclusion that follows from and reflects on what is experienced, observed, or resolved over the course of the narrative.

Production and Distribution of Writing

W.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)

W.11.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (Editing for conventions should demonstrate command of Language standards 1–3 up to and including grades 11–12 on page 54.)

W.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

W.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

W.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

W.11.9. Draw evidence from literary or informational texts to support analysis, reflection, and research.

a. Apply grades 11–12 Reading standards to literature (e.g., "Demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics").

b. Apply grades 11–12 Reading standards to literary nonfiction (e.g., "Delineate and evaluate the reasoning in seminal U.S. texts, including the application of constitutional principles and use of legal reasoning [e.g., in U.S. Supreme Court Case majority opinions and dissents] and the premises, purposes, and arguments in works of public advocacy [e.g., The Federalist, presidential addresses]").

Range of Writing

W.11.10. Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.

College and Career Readiness Anchor Standards for *Speaking and Listening*

Comprehension and Collaboration

SL.11.1. Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

a. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.

b. Work with peers to promote civil, democratic discussions and decision-making, set clear goals and deadlines, and establish individual roles as needed.

c. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.

d. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.

SL.11.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.

SL.11.3. Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, assessing the stance, premises, links among ideas, word choice, points of emphasis, and tone used.

Presentation of Knowledge and Ideas

SL.11.4. Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.

SL.11.5. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

SL.11.6. Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate. (See grades 11–12 Language standards 1 and 3 on page 54 for specific expectations.)

College and Career Readiness Anchor Standards for *Language*

Conventions of Standard English

L.11.1. Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

a. Apply the understanding that usage is a matter of convention, can change over time, and is sometimes contested.

b. Resolve issues of complex or contested usage, consulting references (e.g., Merriam-Webster's Dictionary of English Usage, Garner's Modern American Usage) as needed.

L.11.2. Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

a. Observe hyphenation conventions.

b. Spell correctly.

Knowledge of Language

L.11.3. Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.

a. Vary syntax for effect, consulting references (e.g., Tufte's Artful Sentences) for guidance as needed; apply an understanding of syntax to the study of complex texts when reading.

Vocabulary Acquisition and Use

L.11.4. Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grades 11–12 reading and content, choosing flexibly from a range of strategies.

a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

b. Identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., conceive, conception, conceivable).

c. Consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage.

d. Verify the preliminary determination of the meaning of a word or phrase (e.g., by checking the inferred meaning in context or in a dictionary).

L.11.5. Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

a. Interpret figures of speech (e.g., hyperbole, paradox) in context and analyze their role in the text.
b. Analyze nuances in the meaning of words with similar denotations.

L.11.6. Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Reading Standards for Literacy in History/Social Studies (11-12)

Key Ideas and Details

RH.11.1 Cite specific textual evidence to support analysis of primary and secondary sources, connecting insights gained from specific details to an understanding of the text as a whole.

RH.11.2. Determine the central ideas or information of a primary or secondary source; provide an accurate summary that makes clear the relationships among the key details and ideas

RH.11.3. Evaluate various explanations for actions or events and determine which explanation best accords with textual evidence, acknowledging where the text leaves matters uncertain

Craft and Structure

RH.11.4. Determine the meaning of words and phrases as they are used in a text, including analyzing how an author uses and refines the meaning of a key term over the course of a text (e.g., how Madison defines faction in Federalist No. 10).

RH.11.5. Analyze in detail how a complex primary source is structured, including how key sentences, paragraphs, and larger portions of the text contribute to the whole.

RH.11.6. Evaluate authors' differing points of view on the same historical event or issue by assessing the authors' claims, reasoning, and evidence.

Integration of Knowledge and Ideas

RH.11.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, as well as in words) in order to address a question or solve a problem.

RH.11.8. Evaluate an author's premises, claims, and evidence by corroborating or challenging them with other information.

RH.11.9. Integrate information from diverse sources, both primary and secondary, into a coherent understanding of an idea or event, noting discrepancies among sources.

Range of Reading and Level of Text Complexity

RH.11.10. By the end of grade 12, read and comprehend history/social studies texts in the grades 11–CCR text complexity band independently and proficiently.

Reading Standards for Literacy in Science and Technical Subjects (11-12)

Key Ideas and Details

RST.11.1. Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

RST.11.2. Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.

RST.11.3. Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Craft and Structure

RST.11.4. Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

RST.11.5. Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.

RST.11.6. Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.

Integration of Knowledge and Ideas

RST.11.7. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11.8. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.11.9. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Range of Reading and Level of Text Complexity

RST.11.10. By the end of grade 12, read and comprehend science/technical texts in the grades 11–CCR text complexity band independently and proficiently.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects (11-12)

Text Types and Purposes

WHST.11.1. Write arguments focused on discipline-specific content.

a. Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences the claim(s), counterclaims, reasons, and evidence.

b. Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form that anticipates the audience's knowledge level, concerns, values, and possible biases.

c. Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

d. Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.

e. Provide a concluding statement or section that follows from or supports the argument presented.

WHST.11.2. Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.

c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.

d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.

e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).

WHST.11.3. (Not applicable as a separate requirement)

Production and Distribution of Writing

WHST.11.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11.6. Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Research to Build and Present Knowledge

WHST.11.7. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the

inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

WHST.11.8. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.11.9. Draw evidence from informational texts to support analysis, reflection, and research.

Range of Writing

WHST.11.10. Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

Appendix C: National Educational Technology Standards for Students (NETS-S)

NETS Crosswalk for Cyber Foundations II

	Course	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
NETS Standards									
T1		x	x	x	x	x	x	x	x
T2		x	x	x	x	x	x	x	x
T3		x	x	x	x	x	x	x	x
T4		x	x	x	x	x	x	x	x
T5		x	x	x	x	x	x	x	x
T6		x	x	x	x	x	x	x	x

T1 Creativity and Innovation
T2 Communication and Collaboration
T3 Research and Information Fluency
T4 Critical Thinking, Problem Solving, and Decision Making
T5 Digital Citizenship
T6 Technology Operations and Concepts

T1 Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology. Students do the following:

a. Apply existing knowledge to generate new ideas, products, or processes.
b. Create original works as a means of personal or group expression.
c. Use models and simulations to explore complex systems and issues.
d. Identify trends and forecast possibilities.

T2 Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students do the following:

a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media.
b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
c. Develop cultural understanding and global awareness by engaging with learners of other cultures.
d. Contribute to project teams to produce original works or solve problems.

T3 Research and Information Fluency

Students apply digital tools to gather, evaluate, and use information. Students do the following:

a. Plan strategies to guide inquiry.

b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media.
c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks.
d. Process data and report results.

T4 Critical Thinking, Problem Solving, and Decision Making

Students use critical-thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources. Students do the following:

a. Identify and define authentic problems and significant questions for investigation.
b. Plan and manage activities to develop a solution or complete a project.
c. Collect and analyze data to identify solutions and/or make informed decisions.
d. Use multiple processes and diverse perspectives to explore alternative solutions.

T5 Digital Citizenship

Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior. Students do the following:

a. Advocate and practice safe, legal, and responsible use of information and technology.
b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity.
c. Demonstrate personal responsibility for lifelong learning.
d. Exhibit leadership for digital citizenship.

T6 Technology Operations and Concepts

Students demonstrate a sound understanding of technology concepts, systems, and operations. Students do the following:

a. Understand and use technology systems.
b. Select and use applications effectively and productively.
c. Troubleshoot systems and applications.
d. Transfer current knowledge to learning of new technologies.

Appendix D: 2018 Mississippi College- and Career-Readiness Standards for Computer Science

Computer Science (CS) Crosswalk for Cyber Foundations II								
	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
CS Standards								
AP				X	X		X	X
CS					X			X
DA					X	X	X	
IC				X	X		X	X
NI						X		

Level 2: GRADES 6-8 - Computing Systems

Computing Systems (CS.2)

Conceptual understanding: People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form. An understanding of hardware and software is useful when troubleshooting a computing system that does not work as intended.

CS.2.1 Recommend improvements to the design of computing devices based on an analysis of how users interact with the devices. [DEVICES] (P3.3)

The study of human-computer interaction (HCI) can improve the design of devices, including both hardware and software.

CS.2.1a ***Students should make recommendations for existing devices (e.g., a laptop, phone, or tablet) or design their own components or interface (e.g., create their own controllers).*** *Teachers can guide students to consider usability through several lenses, including accessibility, ergonomics, and learnability. For example, assistive devices provide capabilities such as scanning written information and converting it to speech.*

CS.2.2 Design projects that combine hardware and software components to collect and exchange data. [HARDWARE & SOFTWARE] (P5.1)

Collecting and exchanging data involves input, output, storage, and processing. When possible, students should select the hardware and software components for their project designs by considering factors such as functionality, cost, size, speed, accessibility, and aesthetics.

CS.2.2a ***Students will design projects that use both hardware and software to collect and exchange data.*** *For example, components for a mobile app could include accelerometer, GPS, and speech recognition. The choice of a device that connects wirelessly through a Bluetooth connection*

versus a physical USB connection involves a tradeoff between mobility and the need for an additional power source for the wireless device.

CS.2.3 Systematically identify and fix problems with computing devices and their components. [TROUBLESHOOTING] (P6.2)

Since a computing device may interact with interconnected devices within a system, problems may not be due to the specific computing device itself but to devices connected to it.

CS.2.3a ***Students will use a structured process to troubleshoot problems with computing systems and ensure that potential solutions are not overlooked.*** *Examples of troubleshooting strategies include following a troubleshooting flow diagram, making changes to software to see if hardware will work, checking connections and settings, and swapping in working components.*

Level 2: GRADES 6-8 - Networks and the Internet

Networks and the Internet (NI.2)

Conceptual Understanding: Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world by providing fast, secure communication and facilitating innovation.

NI.2.1 Model the role of protocols in transmitting data across networks and the Internet. [NETWORK COMMUNICATION & ORGANIZATION] (P4.4)

Protocols are rules that define how messages between computers are sent. They determine how quickly and securely information is transmitted across networks and the Internet, as well as how to handle errors in transmission.

NI.2.1a ***Students should model how data is sent using protocols to choose the fastest path, to deal with missing information, and to deliver sensitive data securely.*** *For example, students could devise a plan for resending lost information or for interpreting a picture that has missing pieces. The priority at this grade level is understanding the purpose of protocols and how they enable secure and errorless communication. Knowledge of the details of how specific protocols work is not expected.*

NI.2.2 Explain how physical and digital security measures protect electronic information. [CYBERSECURITY] (P7.2)

Information that is stored online is vulnerable to unwanted access. Examples of physical security measures to protect data include keeping passwords hidden, locking doors, making backup copies on external storage devices, and erasing a storage device before it is reused. Examples of digital security measures include secure router admin passwords, firewalls that limit access to private networks, and the use of a protocol, such as HTTPS, to ensure secure data transmission.

NI.2.2a ***Students will explain how physical and digital security measures protect electronic information.***

NI.2.3 Apply multiple methods of encryption to model the secure transmission of information. [CYBERSECURITY] (P4.4)

Encryption can be as simple as letter substitution or as complicated as modern methods used to secure networks and the Internet.

NI.2.3a ***Students should encode and decode messages using a variety of encryption methods, and they should understand the different levels of complexity used to hide or secure information.*** *For example, students could secure messages using methods like Caesar cyphers or steganography (i.e., hiding messages inside a picture or other data). They can also model more complicated methods, such as public key encryption, through unplugged activities.*

Level 2: GRADES 6-8 - Data and Analysis

Data and Analysis (DA.2)

Conceptual Understanding: Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

DA.2.1 Represent data using multiple encoding schemes. [STORAGE] (P4.0)

Data representations occur at multiple levels of abstraction, from the physical storage of bits to the arrangement of information into organized formats (e.g., tables).

DA.2.1a ***Students should represent the same data in multiple ways.*** *For example, students could represent the same color using binary, RGB values, hex codes (low-level representations), as well as forms understandable by people, including words, symbols, and digital displays of the color (high-level representations).*

DA.2.2 Collect data using computational tools and transform the data to make it more useful and reliable. [COLLECTION, VISUALIZATION, & TRANSFORMATION] (P6.3)

As students continue to build on their ability to organize and present data visually to support a claim, they will need to understand when and how to transform data for this purpose.

DA.2.2a ***Students should transform data to remove errors, highlight or expose relationships, and/or make it easier for computers to process.*** *The cleaning of data is an important transformation for ensuring consistent format and reducing noise and errors (e.g., removing irrelevant responses in a survey). An example of a transformation that highlights a relationship is representing males and females as percentages of a whole instead of as individual counts.*

DA.2.3 Refine computational models based on the data they have generated. [INFERENCE & MODELS] (P5.3, P4.4)

A model may be a programmed simulation of events or a representation of how various data is related.

DA.2.3a **Students will refine computational models by considering which data points are relevant, how data points relate to each other, and if the data is accurate.** *For example, students may make a prediction about how far a ball will travel based on a table of data related to the height and angle of a track. The students could then test and refine their model by comparing predicted versus actual results and considering whether other factors are relevant (e.g., size and mass of the ball). Additionally, students could refine game mechanics based on test outcomes in order to make the game more balanced or fair.*

Level 2: GRADES 6-8 - Algorithms and Programming

Algorithms and Programming (AP.2)

Conceptual understanding: An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems. The development process to create meaningful and efficient programs involves choosing which information to use and how to process and store it, breaking apart large problems into smaller ones, recombining existing solutions, and analyzing different solutions.

AP.2.1 Use flowcharts and/or pseudocode to address complex problems as algorithms. [ALGORITHMS] (P4.4, P4.1)

Complex problems are problems that would be difficult for students to solve computationally.

AP.2.1a **Students will use pseudocode and/or flowcharts to organize and sequence an algorithm that addresses a complex problem, even though they may not actually program the solutions.** *For example, students might express an algorithm that produces a recommendation for purchasing sneakers based on inputs such as size, colors, brand, comfort, and cost. Testing the algorithm with a wide range of inputs and users allows students to refine their recommendation algorithm and to identify other inputs they may have initially excluded.*

AP.2.2 Create clearly named variables that represent different data types and perform operations on their values. [VARIABLES] (P5.1, P5.2)

A variable is like a container with a name, in which the contents may change, but the name (identifier) does not.

AP.2.2a **When planning and developing programs, students should decide when and how to declare and name new variables.** *Examples of operations include adding points to the score, combining user input with words to make a sentence, changing the size of a picture, or adding a name to a list of people.*

AP.2.2b **Students should use naming conventions to improve program readability.**

AP.2.3 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. [CONTROL] (P5.1, P5.2)

Control structures can be combined in many ways. Nested loops are loops placed within loops. Compound conditionals combine two or more conditions in a logical relationship (e.g., using AND, OR, and NOT), and nesting conditionals within one another allows the result of one conditional to lead to another.

AP.2.3a ***Students will design and develop programs that combine control structures.*** *For example, when programming an interactive story, students could use a compound conditional within a loop to unlock a door only if a character has a key AND is touching the door.*

AP.2.4 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. [MODULARITY] (P3.2)

Decomposition facilitates aspects of program development by allowing students to focus on one piece at a time (e.g., getting input from the user, processing the data, and displaying the result to the user). Decomposition also enables different students to work on different parts at the same time.

AP.2.4a ***Students should break down problems into subproblems, which can be further broken down to smaller parts.*** *For example, animations can be decomposed into multiple scenes, which can be developed independently.*

AP.2.5 Create procedures with parameters to organize code and make it easier to reuse. [MODULARITY] (P4.1, P4.3)

AP.2.5a ***Students will create procedures and/or functions that are used multiple times within a program to repeat groups of instructions.*** *These procedures can be generalized by defining parameters that create different outputs for a wide range of inputs. For example, a procedure to draw a circle involves many instructions, but all of them can be invoked with one instruction, such as "drawCircle." By adding a radius parameter, the user can easily draw circles of different sizes.*

AP.2.6 Seek and incorporate feedback from team members and users to refine a solution that meets user needs. [PROGRAM DEVELOPMENT] (P2.3, P1.1)

Development teams that employ user-centered design create solutions (e.g., programs and devices) that can have a large societal impact, such as an app that allows people with speech difficulties to translate hard-to-understand pronunciation into understandable language.

AP.2.6a ***Students should begin to seek diverse perspectives throughout the design process to improve their computational artifacts.*** *Considerations of the end user may include usability, accessibility, age-appropriate content, respectful language, user perspective, pronoun use, color contrast, and ease of use.*

AP.2.7 Incorporate existing code, media, and libraries into original programs and give attribution. [PROGRAM DEVELOPMENT] (P4.2, P5.2, P7.3)

Building on the work of others enables students to produce more interesting and powerful creations.

AP.2.7a ***Students should use portions of code, algorithms, and/or digital media in their own programs and websites.*** *At this level, they may also import libraries and connect to web application program interfaces (APIs). For example, when creating a side-scrolling games, students may*

incorporate portions of code that create a realistic jump movement from another person's game, and they may also import Creative Commons-lessened images to use in the background.

AP.2.7b ***Students should give attribution to the original creator's contributions.***

AP.2.8 Systematically test and refine programs using a range of test cases. [PROGRAM DEVELOPMENT] (P6.1)

Test cases are created and analyzed to better meet the needs of users and to evaluate whether programs function as intended. At this level, testing should become a deliberate process that is more iterative, systematic, and proactive than at lower levels.

AP.2.8a ***Students will test programs by considering potential errors, such as what will happen if a user enters invalid input (e.g., negative numbers and zero instead of positive numbers).***

AP.2.9 Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. [PROGRAM DEVELOPMENT] (P2.2)

Collaboration is a common and crucial practice in programming development. Often, many individuals and groups work on the interdependent parts of a project together.

AP.2.9a ***Students will work collaboratively in groups.***

AP.2.9b ***Students should assume predefined roles within their teams and manage the project workflow using structured timelines.*** *With teacher guidance, they will begin to create collective goals, expectations, and equitable workloads. For example, students may divide the design stage of a game into planning the storyboard, flowchart, and different parts of the game mechanics. They can then distribute tasks and roles among members of the team and assign deadlines.*

AP.2.9c ***Students should give attribution to the original creators to acknowledge their contributions.***

AP.2.10 Document programs in order to make them easier to follow, test, and debug. [PROGRAM DEVELOPMENT] (P7.2)

Documentation allows creators and others to more easily use and understand a program.

AP.2.10a ***Students should provide documentation for end users that explains their artifacts and how they function.*** *For example, students could provide a project overview and clear user instructions.*

AP.2.10b ***Students should incorporate comments in their product (comments in the code).***

AP.2.10c ***Students should communicate their process using design documents, flowcharts, and presentations.***

Level 2: GRADES 6-8 - Impacts of Computing

Impacts of Computing (IC.2)

Conceptual understanding: Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and in turn, computing

~~influences new cultural practices. An informed and responsible person should understand the social implications of the digital world, including equity and access to computing.~~

~~IC.2.1 Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options. [CULTURE] (P7.2)~~

~~*Advancements in computer technology are neither wholly positive nor negative; however, the ways that people use computing technologies have tradeoffs.*~~

~~*IC.2.1a* **Students should consider current events related to broad ideas, including privacy, communication, and automation.** *For example, driverless cars can increase convenience and reduce accidents, but they are also susceptible to hacking. The emerging industry will not only reduce the number of taxi and shared-ride drivers but also create more software engineering and cybersecurity jobs.*~~

~~IC.2.2 Discuss issues of bias and accessibility in the design of existing technologies. [CULTURE] (P1.2)~~

~~*IC.2.2a* **Students should test and discuss the usability of various technology tools (e.g., apps, games, and devices) with the teacher's guidance.** *For example, facial recognition software that works better for lighter skin tones was likely developed with a homogeneous testing group and could be improved by sampling a more diverse population. When discussing accessibility, students may notice that allowing a user to change font sizes and colors will not only make an interface usable for people with low vision but also benefits users in various situations, such as in bright daylight or a dark room.*~~

~~IC.2.3 Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact. [SOCIAL INTERACTIONS] (P2.4, P5.2)~~

~~*Crowdsourcing is gathering services, ideas, or content from a large group of people, especially from the online community. It can be done at the local level (e.g., classroom or school) or global level (e.g., age-appropriate online communities, like Scratch and Minecraft).*~~

~~*IC.2.3a* **Students should collaborate with many contributors.** *For example, a group of students could combine animations to create a digital community mosaic. They could also solicit feedback from many people though use of online communities and electronic surveys.*~~

~~IC.2.4 Describe tradeoffs between allowing information to be public and keeping information private and secure. [SAFETY, LAW, & ETHICS] (P7.2)~~

~~*Sharing information online can help establish, maintain, and strengthen connections between people. For example, it allows artists and designers to display their talents and reach a broad audience; however, security attacks often start with personal information that is publicly available online. Social engineering is based on tricking people into revealing sensitive information and can be thwarted by being wary of attacks, such as phishing and spoofing.*~~

~~*IC.2.4a* **Students should discuss and describe the benefits and dangers of allowing information to be public or kept private and secure**~~

2025 Cyber Foundations II

Program CIP: 11.0701 — Computer Science

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The Research and Curriculum Unit (RCU), located in Starkville, as part of Mississippi State University (MSU), was established to foster educational enhancements and innovations. In keeping with the land-grant mission of MSU, the RCU is dedicated to improving the quality of life for Mississippians. The RCU enhances the intellectual and professional development of Mississippi students and educators while applying knowledge and educational research to the lives of the people of the state. The RCU works within the contexts of curriculum development and revision, research, assessment, professional development, and industrial training.

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Standards

Standards and alignment crosswalks are referenced in the appendices. Depending on the curriculum, these crosswalks should identify alignment to the standards mentioned below, as well as possible related academic topics as required in the Subject Area Testing Program in Algebra I, Biology I, English II, and U.S. History from 1877, which could be integrated into the content of the units. Mississippi's CTE Cyber Foundations II is aligned to the following standards:

2018 Mississippi College- and Career-Readiness Standards for Computer Science
In an effort to closely align instruction for students who are progressing toward postsecondary study and the workforce, the *2018 Mississippi College- and Career-Readiness Standards (MS CCRS) for Computer Science* includes grade- and course-specific standards for K-12 computer science. Mississippi has adapted these standards from the nationally developed *Computer Science Teachers Association K-12 Computer Science Standards, Revised 2017*.

International Society for Technology in Education Standards (ISTE)
Reprinted with permission from *ISTE Standards for Students* (2016). All rights reserved. Permission does not constitute an endorsement by ISTE (iste.org).

College- and Career-Readiness Standards
College- and career-readiness standards emphasize critical thinking, teamwork, and problem-solving skills. Students will learn the skills and abilities demanded by the workforce of today and the future. Mississippi adopted Mississippi College- and Career-Readiness Standards (MCCRS) to provide a consistent, clear understanding of what students are expected to learn so teachers and parents know what they need to do to help them.
mdek12.org/oae/college-and-career-readiness-standards

Framework for 21st Century Learning
In defining 21st-century learning, the Partnership for 21st Century Skills has embraced key themes and skill areas that represent the essential knowledge for the 21st century: global awareness; financial, economic, business, and entrepreneurial literacy; civic literacy; health literacy; environmental literacy; learning and innovation skills; information, media, and technology skills; and life and career skills.
battelleforkids.org/networks/p21/frameworks-resources

Preface

Secondary CTE programs in Mississippi face many challenges resulting from sweeping educational reforms at the national and state levels. Schools and teachers are increasingly being held accountable for providing applied learning activities to every student in the classroom. This accountability is measured through increased requirements for mastery and attainment of competency as documented through both formative and summative assessments. This document provides information, tools, and solutions that will aid students, teachers, and schools in creating and implementing applied, interactive, and innovative lessons. Through best practices, alignment with national standards and certifications, community partnerships, and a hands-on, student-centered concept, educators will be able to truly engage students in meaningful and collaborative learning opportunities.

The courses in this document reflect the statutory requirements as found in Section 37-3-49, *Mississippi Code of 1972*, as amended (Section 37-3-46). In addition, this curriculum reflects guidelines imposed by federal and state mandates (Laws, 1988, Ch. 487, §14; Laws, 1991, Ch. 423, §1; Laws, 1992, Ch. 519, §4 eff. from and after July 1, 1992; Strengthening Career and Technical Education for the 21st Century Act, 2019 [Perkins V]; and Every Student Succeeds Act, 2015).

Mississippi Teacher Professional Resources

The following are resources for Mississippi teachers:

Curriculum, Assessment, Professional Learning
: Program resources can be found at the RCU's website, rcu.msstate.edu.

Learning Management System: An Online Resource
: Learning management system information can be found on the RCU's website, under Professional Learning.

Should you need additional instructions, contact the RCU at 662.325.2510 or helpdesk@rcu.msstate.edu.

Executive Summary

Pathway Description
Cyber Foundations II is a foundational computer science course. This program is designed to provide students with essential skills in computer science, digital literacy, and cybersecurity, laying the groundwork for more advanced studies in the IT field. Students will explore topics such as problem-solving, programming, online safety, and the basics of computer hardware and software.

College, Career, and Certifications
This course aligns with college and career readiness standards, preparing students for further education in computer science and related fields. It provides a foundational understanding that is essential for certifications in areas such as IT Fundamentals, CompTIA, and others related to cybersecurity and digital literacy.

Grade Level and Class Size Recommendations
It is recommended that students enter this program as 6th, 7th, or 8th graders. Exceptions to this are district-level decisions based on class size, enrollment numbers, student maturity, and CTE delivery method. This is a classroom-based course. Therefore, a maximum of 25 students is recommended for each class, and only one class with the teacher at a time.

Student Prerequisites
For students to experience success in the program, the following student prerequisites are suggested:

1. C or higher in English (the previous year)
2. C or higher in high school-level math (last course taken or the instructor can specify the level of math instruction needed)
3. Instructor approval and Test of Adult Basic Education (TABE) reading score (eighth grade or higher)

or

1. TABE reading and math score (eighth grade or higher)
2. Instructor approval

or

1. Instructor approval

Assessment
The latest assessment blueprint for the curriculum can be found at rcu.msstate.edu/curriculum.

Applied Academic Credit
The latest academic credit information can be found at mdek12.org/ese/approved-course-for-the-secondary-schools.

Teacher Licensure
The latest teacher licensure information can be found at mdek12.org/oel/apply-for-an-educator-license.

Professional Learning

If you have specific questions about the content of any training sessions provided, please contact the RCU at 662.325.2510 or helpdesk@rcu.msstate.edu.

Course Outline

This curriculum consists of one 1-credit course.

2025 Cyber Foundations II—Course Code: 000286

Unit	Unit Title	Hours
1	Orientation, Digital Citizenship, and Keyboarding	10
2	Student Organizations, Leadership, and Career Exploration	2
3	21st Century Toolbox	3
4	Block-Based Programming	10
5	Text-Based Programming	30
6	Networking	10
7	Cybersecurity	15
8	Artificial Intelligence (AI)	15
9	Data Science	15
10	Physical Computing	20
11	Ethics	10
Total		**140**

Career Pathway Outlook

Overview
The Cyber Foundations II course is designed to equip students with fundamental skills in computer science, digital literacy, and information technology. This course provides a broad introduction to various aspects of computing, including problem-solving, programming, and understanding the impact of technology on society. Students are prepared for further study in computer science and related fields, as well as for potential careers that leverage these essential skills.

Needs of the Future Workforce
The following data highlights key projected job opportunities in Mississippi from the U.S. Census Bureau, the U.S. Bureau of Labor Statistics (BLS), and the Mississippi Department of Employment Security (MDES):

Table 1.1: Current and Projected Occupation Report

Description	2020 Jobs	Projected 2030 Jobs	Change (Number)	Change (Percent)	Average Hourly Earnings (2024)
Computer Programmers	880	960	80	9.1%	$33.53
Computer Systems Analysts	2,120	2,190	70	3.3%	$42.19
IT Support Specialists	2,440	2,590	150	6.1%	$23.36
Network and Computer Systems Administrators	1,440	1,500	60	4.2%	$38.96
Web Developers	200	210	10	5.0%	$31.34

Source: Mississippi Department of Employment Security; mdes.ms.gov (2024).

Perkins V Requirements and Academic Infusion
The Cyber Foundations II curriculum meets Perkins V requirements by introducing students to foundational concepts in computer science and digital literacy. The curriculum includes classroom instruction and hands-on labs, offering students practical experience that prepares them for further study or entry-level positions in various technology-related fields. Additionally, this curriculum is integrated with academic college- and career-readiness standards. Lastly, it focuses on ongoing and meaningful professional development for teachers as well as relationships with industry.

Transition to Postsecondary Education
The latest articulation information for secondary to postsecondary can be found at the Mississippi Community College Board website, mccb.edu.

Best Practices

Innovative Instructional Technologies

Classrooms should be equipped with tools that will teach today's digital learners through applicable and modern practices. The Cyber Foundations II educator's goal should be to include teaching strategies that incorporate current technology. To make use of the latest online communication tools—wikis, blogs, podcasts, and social media platforms, for example—the classroom teacher is encouraged to use a learning management system that introduces students to education in an online environment and places more of the responsibility of learning on the student.

Differentiated Instruction

Students learn in a variety of ways, and numerous factors—students' background, emotional health, and circumstances, for example—create unique learners. By providing various teaching and assessment strategies, students with various learning preferences can have more opportunities to succeed.

CTE Student Organizations

Teachers should investigate opportunities to sponsor a student organization. There are several here in Mississippi that will foster the types of learning expected from the Cyber Foundations II curriculum. TSA and FBLA are examples of student organizations with many outlets for computer science. Student organizations provide participants and members with growth opportunities and competitive events. They also open the doors to the world of computer science careers and scholarship opportunities.

Cooperative Learning

Cooperative learning can help students understand topics when independent learning cannot. Therefore, you will see several opportunities for group work in the Cyber Foundations II curriculum. To function in today's workforce, students need to be able to work collaboratively with others and solve problems without excessive conflict. The Cyber Foundations II curriculum provides opportunities for students to work together and help each other complete complex tasks. There are many field experiences within the Cyber Foundations II curriculum that will allow and encourage collaboration with professionals currently in the cyber field.

Professional Organizations

For students:
Future Business Leaders of America (FBLA)
fbla.org

Technology Student Association (TSA)
tsaweb.org

For teachers:
Association for Career and Technical Education (ACTE)
acteonline.org

Mississippi Educational Computing Association (MECA)
ms-meca.org.org

Using This Document

Competencies and Suggested Objectives
A competency represents a general concept or performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to receive instruction on all competencies. The suggested objectives represent the enabling and supporting knowledge and performances that will indicate mastery of the competency at the course level.

Teacher Resources
All teachers should request to be added to the Canvas Resource Guide for their course. For questions or to be added to the guide, send a Help Desk ticket to the RCU by emailing helpdesk@rcu.msstate.edu.

Perkins V Quality Indicators and Enrichment Material
Some of the units may include an enrichment section at the end. This material will greatly enhance the learning experiences of students. If the Cyber Foundations II program is using a national certification, work-based learning, or another measure of accountability that aligns with Perkins V as a quality indicator, this material could very well be assessed on that quality indicator. It is the responsibility of the teacher to ensure all competencies for the selected quality indicator are covered throughout the year.

Unit 1: Orientation, Digital Citizenship, and Keyboarding

Competencies and Suggested Objectives
1. Understand school policies, program policies, and safety procedures related to Cyber Foundations II. DOK1 a. Review the school handbook, the technology acceptable use policy, and other safety procedures for building-level situations. b. Examine the course outline and discuss its relevance in today's workforce. c. Demonstrate appropriate safety measures related to technology in the computer lab and online environments. d. Ensure students master the safety test with 100% proficiency.
2. Explore social and ethical issues related to digital citizenship, social media, and artificial intelligence (AI). DOK2 a. Analyze personal media habits and evaluate how much time is spent with different forms of media. b. Debate the pros and cons of social media when used personally, educationally, and professionally. c. Assess user responsibilities to respect others' creative work. d. Develop strategies to determine inappropriate contact and foster positive interactions when collaborating online. e. Reflect on the outcomes of creating different online personalities. f. Investigate cyberbullying behaviors and their impact on individuals and communities. g. Discuss the ethical use of AI in digital interactions and its impact on society. h. Conduct in-depth analysis and discussion on complex social media issues, focusing on ethical and legal implications. i. Examine and debate the ethical considerations and ramifications of AI technologies in digital communications. j. Formulate and promote strategies for fostering positive online interactions and addressing cyberbullying effectively.
3. Facilitate effective collaboration using learning management systems (LMS). DOK3 a. Engage in online learning methodologies, including collaborative projects and peer evaluations. b. Improve professional digital communication skills, ensuring clarity, etiquette, and effectiveness in virtual interactions.
4. Enhance and evaluate keyboarding skills. DOK2 a. Develop touch typing techniques to increase accuracy and speed. b. Demonstrate proper posture and hand placement for effective typing. c. Practice typing regularly to improve proficiency. d. Utilize keyboard shortcuts to enhance productivity. e. Master advanced typing techniques and utilize efficient keyboard shortcuts to improve productivity. f. Implement regular assessments to monitor and enhance typing speed and accuracy.

5. Investigate and correlate career opportunities with digital skills across CTE career pathways. DOK3
   a. Conduct comprehensive research and present detailed analyses on career paths within various Mississippi career clusters.
   b. Explore the integration of digital skills in diverse industries, illustrating the relevance and application of these competencies in real-world CTE career pathways.

Note: Safety is to be taught as an ongoing part of the program. Students are required to complete a written safety test with 100% accuracy before entering the shop for lab simulations and projects. This test should be documented in each student's file.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 2: Student Organizations, Leadership, and Career Exploration

Competencies and Suggested Objectives
1. Understand the structure and function of student organizations. DOK3 a. Analyze the various roles and responsibilities of student organizations. b. Discuss the benefits of participation in student organizations for personal and professional development.
2. Develop and apply leadership skills within student organizations. DOK3 a. Demonstrate effective leadership strategies in student organization activities. b. Implement and manage projects or events within student organizations, showcasing leadership and teamwork.
3. Connect participation in student organizations to career pathways. DOK3 a. Investigate how skills developed through student organizations relate to career pathways in Mississippi's CTE clusters. b. Present case studies or examples of professionals who have benefited from their involvement in student organizations.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 3: 21st Century Toolbox

Competencies and Suggested Objectives
1. Master advanced digital tools for organization and productivity. DOK3 a. Utilize advanced features of digital calendars, note-taking apps, and project management tools to enhance organization and productivity. b. Demonstrate the ability to integrate multiple digital tools to streamline workflows and manage tasks efficiently.
2. Develop proficiency in digital collaboration tools. DOK3 a. Explore and apply advanced functionalities of collaboration tools such as cloud-based platforms, shared documents, and communication apps. b. Engage in collaborative projects using digital tools, showcasing effective teamwork and communication.
3. Enhance digital communication skills. DOK3 a. Practice advanced techniques in digital communication, including email etiquette, professional messaging, and virtual meeting protocols. b. Create and present digital content using various media formats to communicate ideas clearly and effectively.
4. Demonstrate knowledge of 21st-century skills, including ethical AI and data use. DOK3 a. Collaborate effectively with peers on projects and assignments, showcasing teamwork and communication skills. b. Demonstrate creativity and imagination in problem-solving scenarios. c. Utilize critical thinking to analyze and solve complex problems. d. Apply problem-solving techniques to various scenarios, emphasizing ethical considerations in AI and data use.
5. Explore career pathways through career exploration activities. DOK2 a. Research and identify career pathways within various Mississippi career clusters, understanding the required 21st-century skills. b. Discuss the application of these skills to different career paths, emphasizing how they enhance career readiness
6. Update and refine an Individual Success Plan (ISP) to align with career interests and educational goals. DOK2 a. Identify the basic components of the ISP, linking it to the 14 national career clusters and to secondary and postsecondary education. b. Select and print courses that meet graduation requirements and reflect the ISP, ensuring alignment with career goals.

Note: This unit will be ongoing throughout the year. Time allotted for this unit will be distributed over the entire year.

Unit 4: Block-Based Coding

Competencies and Suggested Objectives
1. Reinforce and apply block-based programming concepts. DOK3 a. Review and strengthen understanding of basic and intermediate block-based programming concepts. b. Apply these concepts to develop increasingly complex algorithms and interactive applications.
2. Review, revisit, and remediate key programming concepts. DOK2 a. Conduct thorough reviews of previously covered material to identify and address any gaps in understanding. b. Revisit challenging concepts and provide targeted remediation to ensure mastery.
3. Prepare for transition to text-based programming. DOK2 a. Introduce foundational concepts essential for success in text-based programming. b. Create a seamless transition by demonstrating how block-based concepts translate to text-based coding environments.

Unit 5: Text-Based Programming

Competencies and Suggested Objectives
1. Understand and apply fundamental concepts of text-based programming. DOK3 a. Master the basic concepts and syntax of text-based programming languages. b. Develop and structure code to solve problems effectively.
2. Develop and utilize advanced programming structures. DOK3 a. Create and manipulate variables to store and manage data. b. Implement flow control mechanisms such as conditionals to direct program logic. c. Use loops for repetition and iteration in programs. d. Develop and utilize functions to modularize and simplify code.
3. Enhance debugging and troubleshooting skills. DOK2 a. Identify, diagnose, and fix errors in code. b. Employ debugging techniques to ensure program accuracy and efficiency.
4. Investigate and integrate ethical programming practices. DOK3 a. Explore and discuss ethical considerations in programming. b. Analyze real-world examples of ethical and unethical programming practices and their societal impacts.

Unit 6: Networking

Competencies and Suggested Objectives
1. Define and differentiate types of networks. DOK3 a. Understand and describe the characteristics of various types of networks, including Local Area Network (LAN), Wide Area Network (WAN), and others. b. Explain real-world applications of different network types.
2. Analyze and draw common network topologies. DOK3 a. Identify and illustrate basic network topologies. b. Evaluate the pros and cons of each topology in different scenarios.
3. Identify and explain the functions of key network devices. DOK2 a. Describe the purpose and function of essential network devices such as routers, switches, and hubs. b. Understand the roles of these devices in a network setup.
4. Understand and implement internet protocol (IP) addressing and domain name system (DNS) roles. DOK3 a. Explain the concept of IP addresses and how they are used in networks. b. Describe DNS roles and their importance in network communication.
5. Apply network security measures. DOK3 a. Set up and configure firewalls and antivirus software. b. Practice safe browsing habits and understand the importance of cybersecurity.
6. Organize and troubleshoot networks. DOK4 a. Gain hands-on experience in setting up a network. b. Develop skills in troubleshooting common network issues.
7. Differentiate between the Internet and the World Wide Web (WWW). DOK2 a. Explain the differences between the Internet and the World Wide Web. b. Understand data transfer processes within these systems.

Unit 7: Cybersecurity

Competencies and Suggested Objectives
1. Understand and describe the fundamentals of cybersecurity. DOK2 a. Define cybersecurity and its importance in the digital world. b. Discuss the role of cybersecurity in protecting digital information.
2. Identify and analyze various cyber threats. DOK3 a. Describe different types of cyber threats, such as malware, phishing, and ransomware. b. Analyze real-world examples of cyberattacks and their impacts.
3. Implement safe online practices. DOK3 a. Develop strategies for safe browsing and secure online behavior. b. Explain the importance of antivirus software and firewalls in protecting devices.
4. Understand data privacy and protection measures. DOK2 a. Discuss data privacy principles and the importance of protecting personal information. b. Implement basic data protection techniques.
5. Explore the basics of encryption. DOK2 a. Define encryption and its role in securing digital communications. b. Explain basic encryption methods and their applications.
6. Investigate ethical hacking principles. DOK3 a. Define ethical hacking and its purpose. b. Explore the differences between ethical and unethical hacking practices.
7. Conduct career exploration in cybersecurity. DOK4 a. Research various career paths in cybersecurity. b. Analyze the skills and qualifications required for different roles in the cybersecurity field. c. Explore the relevance of cybersecurity across different industries and CTE career pathways in Mississippi.

Unit 8: Artificial Intelligence (AI)

Competencies and Suggested Objectives
1. Understand and describe the fundamentals of artificial intelligence. DOK2 a. Define AI and explain its importance in modern technology. b. Discuss various types of AI (narrow AI, general AI, superintelligent AI) and their applications.
2. Explore machine learning and its applications. DOK3 a. Explain the basic principles of machine learning, including supervised and unsupervised learning. b. Investigate real-world applications of machine learning in fields such as healthcare, finance, and entertainment.
3. Analyze AI in daily life and ethical considerations. DOK4 a. Identify and discuss how AI is integrated into everyday life through virtual assistants, recommendation systems, and more. b. Critically examine AI's ethical considerations and societal impacts, including bias, privacy, and job displacement.
4. Investigate future trends in AI. DOK3 a. Research emerging trends and advancements in AI technology, such as autonomous vehicles, AI in medicine, and AI in creative arts. b. Analyze the potential future impact of AI on various industries and how it may transform career paths.
5. Complete an AI project. DOK4 a. Design and implement a comprehensive AI project that integrates concepts from the unit. b. Present the project, highlighting the AI concepts applied, the challenges faced, and the outcomes achieved.

Unit 9: Data Science

Competencies and Suggested Objectives
1. Understand and describe the basics of data science. DOK2 a. Define data science and explain its significance in today's data-driven world. b. Identify real-world data science applications across healthcare, finance, and marketing industries.
2. Collect and manage data effectively. DOK3 a. Explain different data collection methods, including surveys, web scraping, and sensors. b. Organize and manage data using tools such as spreadsheets, databases, or cloud-based platforms.
3. Analyze data types and structures DOK3 a. Differentiate between various data types (e.g., categorical, numerical) and structures (e.g., tables, arrays). b. Explore how data is structured and stored in databases, including relational databases.
4. Visualize data using advanced tools. DOK4 a. Create data visualizations, such as charts, graphs, and dashboards, to represent information clearly and effectively. b. Utilize software tools like Excel, Google Sheets, Tableau, or Python libraries (Matplotlib, Seaborn) to generate visualizations.
5. Apply statistical concepts in data analysis. DOK3 a. Explain basic statistical concepts (mean, median, mode, standard deviation) and their relevance to data science. b. Conduct statistical analysis to derive meaningful insights from datasets.
6. Clean and prepare data for analysis. DOK4 a. Demonstrate techniques for cleaning and preparing data, including handling missing values, removing duplicates, and correcting errors. b. Address common data issues such as outliers and inconsistencies.
7. Conduct basic data analysis and interpret results. DOK4 a. Perform basic data analysis using statistical and computational methods. b. Interpret and communicate the results of data analysis through written reports, presentations, or visualizations.
8. Examine ethical considerations in data science. DOK3 a. Discuss ethical issues related to data privacy, security, and usage. b. Reflect on real-world examples of ethical and unethical practices in data science, including data breaches and bias in algorithms.

Unit 10: Physical Computing

Competencies and Suggested Objectives
1. Understand and apply the basics of physical computing. DOK2 a. Introduce the fundamentals of physical computing and its applications. b. Identify and explain the functions of various physical computing devices, including microcontrollers and sensors.
2. Utilize and program physical computing devices. DOK3 a. Explore device usage, including microcontrollers (e.g., Arduino, Micro), sensors, and VEX VR. b. Develop algorithms to program physical devices to perform specific tasks, such as monitoring environmental conditions or controlling actuators.
3. Implement and debug robotics projects. DOK4 a. Program and control robots to perform complex tasks using platforms like VEX Robotics or LEGO Mindstorms. b. Diagnose and troubleshoot issues in physical computing and robotics projects, refining code and hardware as needed.
4. Enhance functions with physical computing devices. DOK4 a. Improve and expand the functionality of physical computing devices through advanced programming and hardware integration. b. Apply practical skills to solve real-world problems, such as designing a smart home system or automated greenhouse.
5. Examine ethical considerations in physical computing. DOK3 a. Discuss the ethical implications of physical computing and robotics, such as privacy concerns and the impact on employment. b. Reflect on real-world examples of ethical and unethical practices in the field.
6. Explore virtual reality (VR) applications. DOK3 a. Understand the basics of virtual reality and its various use cases in fields like education, healthcare, and entertainment. b. Engage in online VR applications and explore their potential through interactive experiences.
7. Investigate career opportunities related to physical computing. DOK4 a. Research and present on careers that involve physical computing, robotics, and VR. b. Connect physical computing skills to real-world applications in various industries, such as automation, manufacturing, and game development

Unit 11: Ethics

Competencies and Suggested Objectives
1. Comprehend and apply ethical principles in computer science. DOK3 a. Understand the importance of ethics in technology and its expansive role within the computer science umbrella. b. Discuss and analyze various ethical theories and principles as they apply to computer science, including deontology, utilitarianism, and virtue ethics.
2. Conduct in-depth ethical analyses. DOK4 a. Examine real-world ethical dilemmas in technology through case studies, such as data privacy, AI bias, and cybersecurity breaches. b. Reflect on the ethical implications of emerging technologies and digital practices, considering both short-term and long-term societal impacts.
3. Develop and implement ethical standards. DOK4 a. Create an ethical code of conduct for computer science professionals that addresses issues like data protection, user consent, and transparency. b. Propose solutions to ethical challenges encountered in different technology sectors, such as social media, artificial intelligence, and cybersecurity.
4. Engage in comprehensive research and scenario analysis. DOK4 a. Conduct research on multiple ethical scenarios in various fields of technology, such as autonomous vehicles, facial recognition, and social media algorithms.

Enhancement Unit: Advanced Computing Concepts

Competencies and Suggested Objectives
1. Advanced Programming Techniques DOK4 a. Develop complex algorithms and implement them using text-based programming languages. b. Explore advanced programming structures such as recursion, data structures, and object-oriented programming.
2. Cybersecurity Challenges DOK4 a. Simulate and defend against advanced cyber threats in a controlled environment. b. Develop and implement comprehensive cybersecurity strategies that address real-world scenarios.
3. Data Science and Analytics DOK4 a. Conduct advanced data analysis using statistical software, focusing on predictive analytics and data visualization techniques. b. Develop machine learning models to analyze large datasets, applying AI techniques to derive insights and make data-driven decisions.
4. Ethical Computing Practices DOK4 a. Investigate the ethical implications of emerging technologies, such as AI, machine learning, and big data. b. Develop and propose ethical guidelines for technology use in various sectors, focusing on privacy, equity, and transparency.
5. Advanced Networking and Internet Concepts DOK4 a. Design and implement scalable network solutions using advanced networking protocols and architectures. b. Analyze and address network security vulnerabilities using industry-standard tools and practices.

Student Competency Profile

Student's Name: _____

This record is intended to serve as a method of noting student achievement of the competencies in each unit. It can be duplicated for each student, and it can serve as a cumulative record of competencies achieved in the course.

In the blank before each competency, place the date on which the student mastered the competency.

Unit 1: Orientation, Digital Citizenship, and Keyboarding		
	1.	Understand school policies, program policies, and safety procedures related to Cyber Foundations II.
	2.	Explore social and ethical issues related to Digital Citizenship, Social Media, and artificial intelligence (AI).
	3.	Facilitate effective collaboration using learning management systems (LMS).
	4.	Develop and maintain keyboarding skills.
	5.	Investigate and correlate career opportunities with digital skills across CTE career pathways.
Unit 2: Student Organizations, Leadership, and Career Exploration		
	1.	Understand the structure and function of student organizations.
	2.	Develop and apply leadership skills within student organizations.
	3.	Connect participation in student organizations to career pathways.
Unit 3: 21st Century Toolbox		
	1.	Master advanced digital tools for organization and productivity.
	2.	Develop proficiency in digital collaboration tools.
	3.	Enhance digital communication skills.
	4.	Demonstrate knowledge of 21st-century skills, including ethical AI and data use.
	5.	Explore career pathways through career exploration activities.
	6.	Update and refine an Individual Success Plan (ISP) to align with career interests and educational goals.
Unit 4: Block-Based Programming		
	1.	Reinforce and apply block-based programming concepts.
	2.	Review, revisit, and remediate key programming concepts.
	3.	Prepare for transition to text-based programming.
Unit 5: Text-Based Programming		
	1.	Understand and apply fundamental concepts of text-based programming.

	2.	Develop and utilize advanced programming structures.
	3.	Enhance debugging and troubleshooting skills.
	4.	Investigate and integrate ethical programming practices.
Unit 6: Networking		
	1.	Define and differentiate types of networks.
	2.	Analyze and draw common network topologies.
	3.	Identify and explain the functions of key network devices.
	4.	Understand and implement internet protocol (IP) addressing and domain name system (DNS) roles.
	5.	Apply network security measures.
	6.	Organize and troubleshoot networks.
	7.	Differentiate between the Internet and the World Wide Web. (WWW)
Unit 7: Cybersecurity		
	1.	Understand and describe the fundamentals of cybersecurity.
	2.	Identify and analyze various cyber threats.
	3.	Implement safe online practices.
	4.	Understand data privacy and protection measures.
	5.	Explore the basics of encryption.
	6.	Investigate ethical hacking principles.
	7.	Conduct career exploration in cybersecurity.
Unit 8: Artificial Intelligence (AI)		
	1.	Understand and describe the fundamentals of artificial intelligence.
	2.	Explore machine learning and its applications.
	3.	Analyze AI in daily life and ethical considerations.
	4.	Investigate future trends in AI.
	5.	Complete an AI project.
Unit 9: Data Science		
	1.	Understand and describe the basics of data science.
	2.	Collect and manage data effectively.
	3.	Analyze data types and structures.
	4.	Visualize data using advanced tools.
	5.	Apply statistical concepts in data analysis.
	6.	Clean and prepare data for analysis.
	7.	Conduct basic data analysis and interpret results.

	8.	Examine ethical considerations in data science.
Unit 10: Physical Computing		
	1.	Understand and apply the basics of physical computing.
	2.	Utilize and program physical computing devices.
	3.	Implement and debug robotics projects.
	4.	Enhance functions with physical computing devices.
	5.	Examine ethical considerations in physical computing.
	6.	Explore virtual reality (VR) applications.
	7.	Investigate career opportunities related to physical computing.
Unit 11: Ethics		
	1.	Comprehend and apply ethical principles in computer science.
	2.	Conduct in-depth ethical analyses.
	3.	Develop and implement ethical standards.
	4.	Engage in comprehensive research and scenario analysis.

Appendix A: Industry Standards

	Units	1	2	3	4	5	6	7	8	9	10	11
Standards												
CS1		X	X								X	
CS2		X										
CS3		X	X								X	
CS4		X										
CS5										X		
CS6		X		X			X					
CS7		X				X			X	X		
CS8		X			X							
CS9		X					X		X	X		
CS10									X	X		
CS11		X		X	X	X	X	X				
CS12			X	X						X		
CS13			X									
CS14			X	X							X	
CS15			X		X						X	X
CS16		X					X	X		X	X	

CSS1-21st Century Themes

CS1 Global Awareness

1. Using 21st-century skills to understand and address global issues
2. Learning from and working collaboratively with individuals representing diverse cultures, religions, and lifestyles in a spirit of mutual respect and open dialogue in personal, work, and community contexts
3. Understanding other nations and cultures, including the use of non-English languages

CS2 Financial, Economic, Business, and Entrepreneurial Literacy

1. Knowing how to make appropriate personal economic choices
2. Understanding the role of the economy in society
3. Using entrepreneurial skills to enhance workplace productivity and career options

CS3 Civic Literacy

1. Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
2. Exercising the rights and obligations of citizenship at local, state, national, and global levels
3. Understanding the local and global implications of civic decisions

CS4 Health Literacy

1. Obtaining, interpreting, and understanding basic health information and services and using such information and services in ways that enhance health
2. Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance, and stress reduction
3. Using available information to make appropriate health-related decisions
4. Establishing and monitoring personal and family health goals
5. Understanding national and international public health and safety issues

CS5 Environmental Literacy

1. Demonstrating knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water, and ecosystems
2. Demonstrating knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.)
3. Investigating and analyzing environmental issues and making accurate conclusions about effective solutions
4. Taking individual and collective action toward addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues)

CSS2-Learning and Innovation Skills

CS6 Creativity and Innovation

1. Think creatively
2. Work creatively with others
3. Implement innovations

CS7 Critical Thinking and Problem Solving

1. Reason effectively
2. Use systems thinking
3. Make judgments and decisions
4. Solve problems

CS8 Communication and Collaboration

1. Communicate clearly
2. Collaborate with others

CSS3-Information, Media, and Technology Skills

CS9 Information Literacy

1. Access and evaluate information
2. Use and manage information

CS10 Media Literacy

1. Analyze media
2. Create media products

CS11 ICT Literacy

1. Apply technology effectively

CSS4-Life and Career Skills

CS12 Flexibility and Adaptability

1. Adapt to change
2. Be flexible

CS13 Initiative and Self-Direction

1. Manage goals and time
2. Work independently
3. Be self-directed learners

CS14 Social and Cross-Cultural Skills

1. Interact effectively with others

2. Work effectively in diverse teams

CS15 Productivity and Accountability

1. Manage projects
2. Produce results

CS16 Leadership and Responsibility

- Guide and lead others
- Be responsible to others

Appendix B: ISTE Standards

	Units	1	2	3	4	5	6	7	8	9	10	11
Standards												
T1		X		X		X			X		X	X
T2			X						X	X		X
T3			X	X	X		X		X		X	
T4					X	X	X				X	
T5					X				X		X	
T6						X		X				X
T7				X		X						X

International Society for Technology in Education (ISTE)

T1 Empowered Learner

Students leverage technology to take an active role in choosing, achieving, and demonstrating competency in their learning goals, as informed by the learning sciences.

a. Articulate and set personal learning goals, develop strategies leveraging technology to achieve them, and reflect on the learning process itself to improve learning outcomes.
b. Build networks and customize their learning environments to support the learning process.
c. Use technology to seek feedback that informs and improves their practice and to demonstrate their learning in various ways.
d. Understand the fundamental concepts of technology operations, demonstrate the ability to choose, use, and troubleshoot current technologies, and can transfer their knowledge to explore emerging technologies.

T2 Digital Citizen

Students recognize the rights, responsibilities, and opportunities of living, learning, and working in an interconnected digital world. . They act and model in safe, legal, and ethical ways.

a. Cultivate and manage their digital identity and reputation and are aware of the permanence of their actions in the digital world.
b. Engage in positive, safe, legal, and ethical behavior when using technology, including social interactions online or networked devices.
c. Demonstrate an understanding of and respect for the rights and obligations of using and sharing intellectual property.
d. Manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.

T3 Knowledge Constructor

Students critically curate a variety of resources using digital tools to construct knowledge, produce creative artifacts, and make meaningful learning experiences for themselves and others.

a. Plan and employ effective research strategies to locate information and other resources for their intellectual or creative pursuits.
b. Evaluate the accuracy, perspective, credibility, and relevance of information, media, data, or other resources.

c. Curate information from digital resources using various tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
d. Build knowledge by actively exploring real-world issues and problems, developing ideas and theories, and pursuing answers and solutions.

T4 Innovative Designer

Students use a variety of technologies within a design process to identify and solve problems by creating new, useful, or imaginative solutions.

a. Know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.
b. Select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.
c. Develop, test, and refine prototypes as part of a cyclical design process.
d. Exhibit a tolerance for ambiguity, perseverance, and the capacity to work with open-ended problems.

T5 Computational Thinker

Students develop and employ strategies for understanding and solving problems in ways that leverage the power of technological methods to develop and test solutions.

a. Formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models, and algorithmic thinking in exploring and finding solutions.
b. Collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.
c. Break problems into component parts, extract key information, and develop descriptive models to understand complex systems or facilitate problem-solving.
d. Understand how automation works and use algorithmic thinking to develop a sequence of steps to create and test automated solutions.

T6 Creative Communicator

Students communicate clearly and express themselves creatively for a variety of purposes using the platforms, tools, styles, formats, and digital media appropriate to their goals.

a. Choose the appropriate platforms and tools for meeting the desired objectives of their creation or communication.
b. Create original works or responsibly repurpose or remix digital resources into new creations.
c. Communicate complex ideas clearly and effectively by creating or using a variety of digital objects such as visualizations, models, or simulations.
d. Publish or present content that customizes the message and medium for their intended audiences.

T7 Global Collaborator

Students use digital tools to broaden their perspectives and enrich their learning by collaborating with others and working effectively in teams locally and globally.

a. Use digital tools to connect with learners from various backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
b. Use collaborative technologies to work with others, including peers, experts, or community members, to examine issues and problems from multiple viewpoints.

c. Contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
d. Explore local and global issues and use collaborative technologies to work with others to investigate solutions.

Appendix C: Mississippi College- and Career-Readiness Standards for Computer Science (MS CCRS)

	Unit	1	2	3	4	5	6	7	8	9	10	11
Standards												
CS.2.1		X	X									
CS.2.2							X			X		
CS.2.3					X							
NI.2.1			X			X						X
NI.2.2					X	X						
NI.2.3				X						X		
DA.2.1		X							X			
DA.2.2				X					X			X
DA.2.3					X						X	
AP.2.1			X							X		
AP.2.2							X					
AP.2.3				X								
AP.2.4			X									
AP.2.5				X				X				
AP.2.6				X					X			
AP.2.7				X								
AP.2.8					X		X					X
AP.2.9			X									
AP.2.10				X			X		X			
IC.2.1					X							X
IC.2.2					X			X				
IC.2.3		X										
IC.2.4					X							X

Mississippi College- and Career-Readiness Standards for Computer Science (MS CCRS)
Level 2: GRADES 6-8 - Computing Systems (CS)

CS.2 Computing Systems

Conceptual understanding: People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form. An understanding of hardware and software is useful when troubleshooting a computing system that does not work as intended.

2.1 Recommend improvements to the design of computing devices based on an analysis of how users interact with the devices. [DEVICES] (P3.3)

The study of human-computer interaction (HCI) can improve the design of devices, including both hardware and software.

a. Students should make recommendations for existing devices (e.g., a laptop, phone, or tablet) or design their own components or interface (e.g., create their own controllers). Teachers can guide students to consider usability through several lenses, including accessibility, ergonomics, and learnability. For example, assistive devices provide capabilities such as scanning written information and converting it to speech.

2.2 Design projects that combine hardware and software components to collect and exchange data. [HARDWARE & SOFTWARE] (P5.1)

Collecting and exchanging data involves input, output, storage, and processing. When possible, students should select the hardware and software components for their project designs by considering factors such as functionality, cost, size, speed, accessibility, and aesthetics.

a. Students will design projects that use both hardware and software to collect and exchange data. For example, components for a mobile app could include an accelerometer, GPS, and speech recognition. The choice of a device that connects wirelessly through a Bluetooth connection versus a physical USB connection involves a tradeoff between mobility and the need for an additional power source for the wireless device.

2.3 Systematically identify and fix problems with computing devices and their components. [TROUBLESHOOTING] (P6.2)

Since a computing device may interact with interconnected devices within a system, problems may not be due to the specific computing device itself but to devices connected to it.

a. Students will use a structured process to troubleshoot problems with computing systems and ensure that potential solutions are not overlooked. Examples of troubleshooting strategies include following a troubleshooting flow diagram, making changes to the software to see if the hardware will work, checking connections and settings, and swapping in working components.

Level 2: GRADES 6-8 - Networks and the Internet

NI.2 Networks and the Internet

Conceptual Understanding: Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world by providing fast, secure communication, and facilitating innovation.

2.1 Model the role of protocols in transmitting data across networks and the Internet. [NETWORK COMMUNICATION & ORGANIZATION] (P4.4)

Protocols are rules that define how messages between computers are sent. They determine how quickly and securely information is transmitted across networks and the Internet, as well as how to handle errors in transmission.

a. Students should model how data is sent using protocols to choose the fastest path, to deal with missing information, and to deliver sensitive data securely. For example, students could devise a plan for resending lost information or for interpreting a picture that has missing pieces. The priority at this grade level is understanding the purpose of protocols and how they enable secure and errorless communication. Knowledge of the details of how specific protocols work is not expected.

2.2 Explain how physical and digital security measures protect electronic information. [CYBERSECURITY] (P7.2)

Information that is stored online is vulnerable to unwanted access. Examples of physical security measures to protect data include keeping passwords hidden, locking doors, making backup copies on external storage devices, and erasing a storage

device before it is reused. Examples of digital security measures include secure router admin passwords, firewalls that limit access to private networks, and the use of a protocol, such as HTTPS, to ensure secure data transmission.

a. Students will explain how physical and digital security measures protect electronic information.

2.3 Apply multiple methods of encryption to model the secure transmission of information. [CYBERSECURITY] (P4.4)

Encryption can be as simple as letter substitution or as complicated as modern methods used to secure networks and the Internet.

a. Students should encode and decode messages using a variety of encryption methods, and they should understand the different levels of complexity used to hide or secure information. For example, students could secure messages using methods like Caesar cyphers or steganography (i.e., hiding messages inside a picture or other data). They can also model more complicated methods, such as public key encryption, through unplugged activities.

Level 2: GRADES 6-8 - Data and Analysis

DA.2 Data and Analysis

Conceptual Understanding: Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

2.1 Represent data using multiple encoding schemes. [STORAGE] (P4.0)

Data representations occur at multiple levels of abstraction, from the physical storage of bits to the arrangement of information into organized formats (e.g., tables).

a. Students should represent the same data in multiple ways. For example, students could represent the same color using binary, RGB values, hex codes (low-level representations), as well as forms understandable by people, including words, symbols, and digital displays of the color (high-level representations).

2.2 Collect data using computational tools and transform the data to make it more useful and reliable. [COLLECTION, VISUALIZATION, & TRANSFORMATION] (P6.3)

As students continue to build on their ability to organize and present data visually to support a claim, they will need to understand when and how to transform data for this purpose.

a. Students should transform data to remove errors, highlight or expose relationships, and/or make it easier for computers to process. The cleaning of data is an important transformation for ensuring consistent format and reducing noise and errors (e.g., removing irrelevant responses in a survey). An example of a transformation that highlights a relationship is representing males and females as percentages of a whole instead of as individual counts.

2.3 Refine computational models based on the data they have generated. [INFERENCE & MODELS] (P5.3, P4.4)

A model may be a programmed simulation of events or a representation of how various data are related.

a. Students will refine computational models by considering which data points are relevant, how data points relate to each other, and if the data is accurate. For

example, students may make a prediction about how far a ball will travel based on a table of data related to the height and angle of a track. The students could then test and refine their model by comparing predicted versus actual results and considering whether other factors are relevant (e.g., size and mass of the ball). Additionally, students could refine game mechanics based on test outcomes in order to make the game more balanced or fair.

Level 2: GRADES 6-8 - Algorithms and Programming

AP.2 Algorithms and Programming

Conceptual understanding: An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems. The development process to create meaningful and efficient programs involves choosing which information to use and how to process and store it, breaking apart large problems into smaller ones, recombining existing solutions, and analyzing different solutions.

2.1 Use flowcharts and/or pseudocode to address complex problems as algorithms. [ALGORITHMS] (P4.4, P4.1)

Complex problems are problems that would be difficult for students to solve computationally.

a. Students will use pseudocode and/or flowcharts to organize and sequence an algorithm that addresses a complex problem, even though they may not actually program the solutions. For example, students might express an algorithm that produces a recommendation for purchasing sneakers based on inputs such as size, colors, brand, comfort, and cost. Testing the algorithm with a wide range of inputs and users allows students to refine their recommendation algorithm and to identify other inputs they may have initially excluded.

2.2 Create clearly named variables that represent different data types and perform operations on their values. [VARIABLES] (P5.1, P5.2)

A variable is like a container with a name, in which the contents may change, but the name (identifier) does not.

a. When planning and developing programs, students should decide when and how to declare and name new variables. Examples of operations include adding points to the score, combining user input with words to make a sentence, changing the size of a picture, or adding a name to a list of people.
b. Students should use naming conventions to improve program readability.

2.3 Design and iteratively develop programs that combine control structures, including nested loops and compound conditionals. [CONTROL] (P5.1, P5.2)

Control structures can be combined in many ways. Nested loops are loops placed within loops. Compound conditionals combine two or more conditions in a logical relationship (e.g., using AND, OR, and NOT), and nesting conditionals within one another allows the result of one conditional to lead to another.

a. Students will design and develop programs that combine control structures. For example, when programming an interactive story, students could use a compound conditional within a loop to unlock a door only if a character has a key AND is touching the door.

2.4 Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs. [MODULARITY] (P3.2)

Decomposition facilitates aspects of program development by allowing students to focus on one piece at a time (e.g., getting input from the user, processing the data, and displaying the result to the user). Decomposition also enables different students to work on different parts at the same time.

a. Students should break down problems into subproblems, which can be further broken down into smaller parts. For example, animations can be decomposed into multiple scenes, which can be developed independently.

2.5 Create procedures with parameters to organize code and make it easier to reuse. [MODULARITY] (P4.1, P4.3)

a. Students will create procedures and/or functions that are used multiple times within a program to repeat groups of instructions. These procedures can be generalized by defining parameters that create different outputs for a wide range of inputs. For example, a procedure to draw a circle involves many instructions, but all of them can be invoked with one instruction, such as "drawCircle." By adding a radius parameter, the user can easily draw circles of different sizes.

2.6 Seek and incorporate feedback from team members and users to refine a solution that meets user needs. [PROGRAM DEVELOPMENT] (P2.3, P1.1)

Development teams that employ user-centered design create solutions (e.g., programs and devices) that can have a large societal impact, such as an app that allows people with speech difficulties to translate hard-to-understand pronunciation into understandable language.

a. Students should begin to seek diverse perspectives throughout the design process to improve their computational artifacts. Considerations of the end user may include usability, accessibility, age-appropriate content, respectful language, user perspective, pronoun use, color contrast, and ease of use.

2.7 Incorporate existing code, media, and libraries into original programs and give attribution. [PROGRAM DEVELOPMENT] (P4.2, P5.2, P7.3)

Building on the work of others enables students to produce more interesting and powerful creations.

a. Students should use portions of code, algorithms, and/or digital media in their own programs and websites. At this level, they may also import libraries and connect to web application program interfaces (APIs). For example, when creating side-scrolling games, students may incorporate portions of code that create a realistic jump movement from another person's game, and they may also import Creative Commons-lessened images to use in the background.
b. Students should give attribution to the original creator's contributions.

2.8 Systematically test and refine programs using a range of test cases. [PROGRAM DEVELOPMENT] (P6.1)

Test cases are created and analyzed to better meet the needs of users and to evaluate whether programs function as intended. At this level, testing should become a deliberate process that is more iterative, systematic, and proactive than at lower levels.

a. Students will test programs by considering potential errors, such as what will happen if a user enters invalid input (e.g., negative numbers and zero instead of positive numbers).

2.9 Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts. [PROGRAM DEVELOPMENT] (P2.2)

Collaboration is a common and crucial practice in programming development. Often, individuals and groups work together on the interdependent parts of a project.

a. Students will work collaboratively in groups.
b. Students should assume predefined roles within their teams and manage the project workflow using structured timelines. With teacher guidance, they will begin to create collective goals, expectations, and equitable workloads. For example, students may divide the design stage of a game into planning the storyboard, flowchart, and different parts of the game mechanics. They can then distribute tasks and roles among members of the team and assign deadlines.
c. Students should give attribution to the original creators to acknowledge their contributions.

2.10 Document programs in order to make them easier to follow, test, and debug. [PROGRAM DEVELOPMENT] (P7.2)

Documentation allows creators and others to more easily use and understand a program.

a. Students should provide documentation for end users that explains their artifacts and how they function. For example, students could provide a project overview and clear user instructions.
b. Students should incorporate comments in their product (comments in the code).
c. Students should communicate their process using design documents, flowcharts, and presentations.

Level 2: GRADES 6-8 - Impacts of Computing

IC.2 Impacts of Computing

Conceptual understanding: Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and in turn, computing influences new cultural practices. An informed and responsible person should understand the social implications of the digital world, including equity and access to computing.

2.1 Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options. [CULTURE] (P7.2)

Advancements in computer technology are neither wholly positive nor negative; however, the ways that people use computing technologies have tradeoffs.

a. Students should consider current events related to broad ideas, including privacy, communication, and automation. For example, driverless cars can increase convenience and reduce accidents, but they are also susceptible to hacking. The emerging industry will not only reduce the number of taxi and shared-ride drivers but also create more software engineering and cybersecurity jobs.

2.2 Discuss issues of bias and accessibility in the design of existing technologies. [CULTURE] (P1.2)

a. Students should test and discuss the usability of various technology tools (e.g., apps, games, and devices) with the teacher's guidance. For example, facial recognition software that works better for lighter skin tones was likely developed with a homogeneous testing group and could be improved by sampling a more diverse population. When discussing accessibility, students may notice that allowing a user to change font sizes and colors will not only make an interface usable for people with low vision but also benefits users in various situations, such as in bright daylight or a dark room.

2.3 Collaborate with many contributors through strategies such as crowdsourcing or surveys when creating a computational artifact. [SOCIAL INTERACTIONS] (P2.4, P5.2)

Crowdsourcing is gathering services, ideas, or content from a large group of people, especially from the online community. It can be done at the local level (e.g., classroom or school) or global level (e.g., age-appropriate online communities, like Scratch and Minecraft).

a. Students should collaborate with many contributors. For example, a group of students could combine animations to create a digital community mosaic. They could also solicit feedback from many people through the use of online communities and electronic surveys.

2.4 Describe tradeoffs between allowing information to be public and keeping information private and secure. [SAFETY, LAW, & ETHICS] (P7.2)

Sharing information online can help establish, maintain, and strengthen connections between people. For example, it allows artists and designers to display their talents and reach a broad audience; however, security attacks often start with personal information that is publicly available online. Social engineering is based on tricking people into revealing sensitive information, which can be thwarted by being wary of attacks, such as phishing and spoofing.

a. Students should discuss and describe the benefits and dangers of allowing information to be public or kept private and secure.

Appendix D: 21st Century Learning

	Unit	1	2	3	4	5	6	7	8	9	.10	11
Standards												
CS		X	X	X			X				X	X
4C		X	X	X	X	X		X			X	
IMTS		X			X	X	X	X	X	X		
LCS			X	X			X		X			X

21st Century Learning - Framework Elements

CS **Core Subjects and 21st Century Themes**:
Incorporation in Units: Units that emphasize the importance of core academic subjects (like digital literacy in Unit 1) and integrate 21st-century themes such as global awareness, civic literacy, and environmental literacy.

4C **Learning and Innovation Skills (4Cs)**:
Critical thinking, Communication, Collaboration, and Creativity: Units like Unit 3 (21st Century Toolbox) and Unit 5 (Block-Based Programming) heavily focus on these skills, as they require students to collaborate, think critically, and communicate their ideas effectively.

IMTS **Information, Media, and Technology Skills**:
Application in Units: Units focused on digital design, cybersecurity, and data analysis (Units 4, 6, 7, 8, and 9) emphasize the ability to effectively use technology and manage information.

LCS **Life and Career Skills**:
Integration: These skills, such as leadership, initiative, and flexibility, are core to Units 2 (Student Organizations and Leadership) and Unit 8 (App Design).