



COMPUTER SCIENCE EDUCATION

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CENTER FOR CYBER EDUCATION



Why Is It Important?

Students need the skills to be:

- Informed Citizens
- Prepared Employees

500,000 current openings!

Fewer than 60,000 CS graduates!



These jobs are in **every** industry and **every** state, and they're projected to **grow at twice the rate** of all other jobs.





Why Is It Important?

Computer science is fundamental for every student's success

Six different studies show: children who study computer science...

perform better in
other subjects



excel at
problem-solving



are 17% more likely
to **attend college**





Why Is It Important?





THE MISSISSIPPI COMPUTER SCIENCE AND CYBER EDUCATION EQUALITY ACT

KEY TIMING POINTS

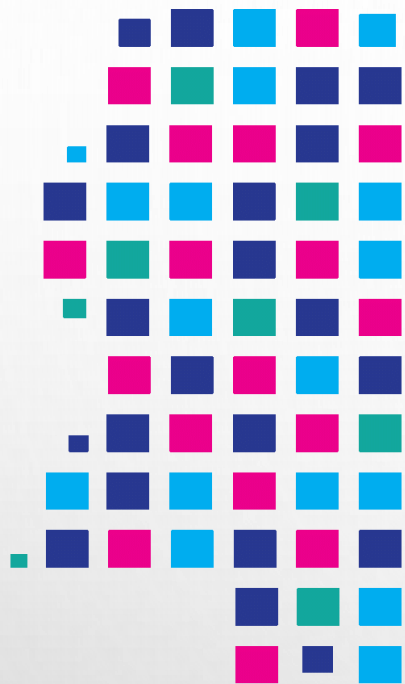


- Beginning in the 2022-2023
ALL middle schools offer a course in computer science
50% elementary schools offer a minimum of one (1) hour of instruction in CS each week
- Beginning in the 2023-2024
50% of high schools offer a course in computer science
ALL elementary schools offer a minimum of one (1) hour of instruction in CS each week
- **Beginning in the 2024-2025** school year, each local school district shall provide that **all schools** in its school system offer instruction in computer science.

<https://legiscan.com/MS/text/HB633/2021>



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{ CS4MS }

<https://cs4ms.org/news/>

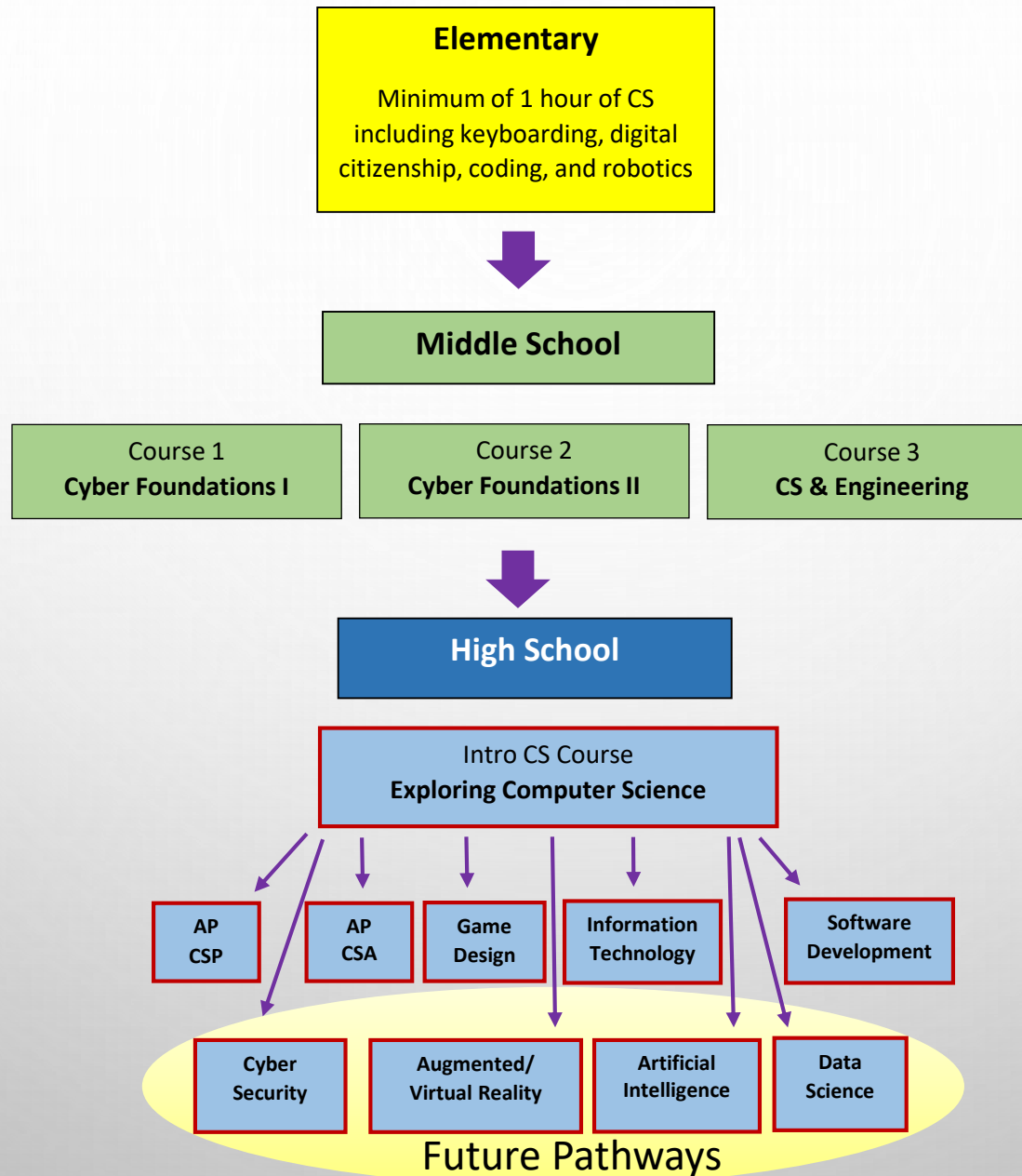
A 10-YEAR STRATEGIC PLAN FOR COMPUTER SCIENCE EDUCATION IN MISSISSIPPI



<https://www.mdek12.org/CTE/MS-Computer-Science-and-Cyber-Education-Equality-Act>



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Computer Science Courses





What counts toward graduation?

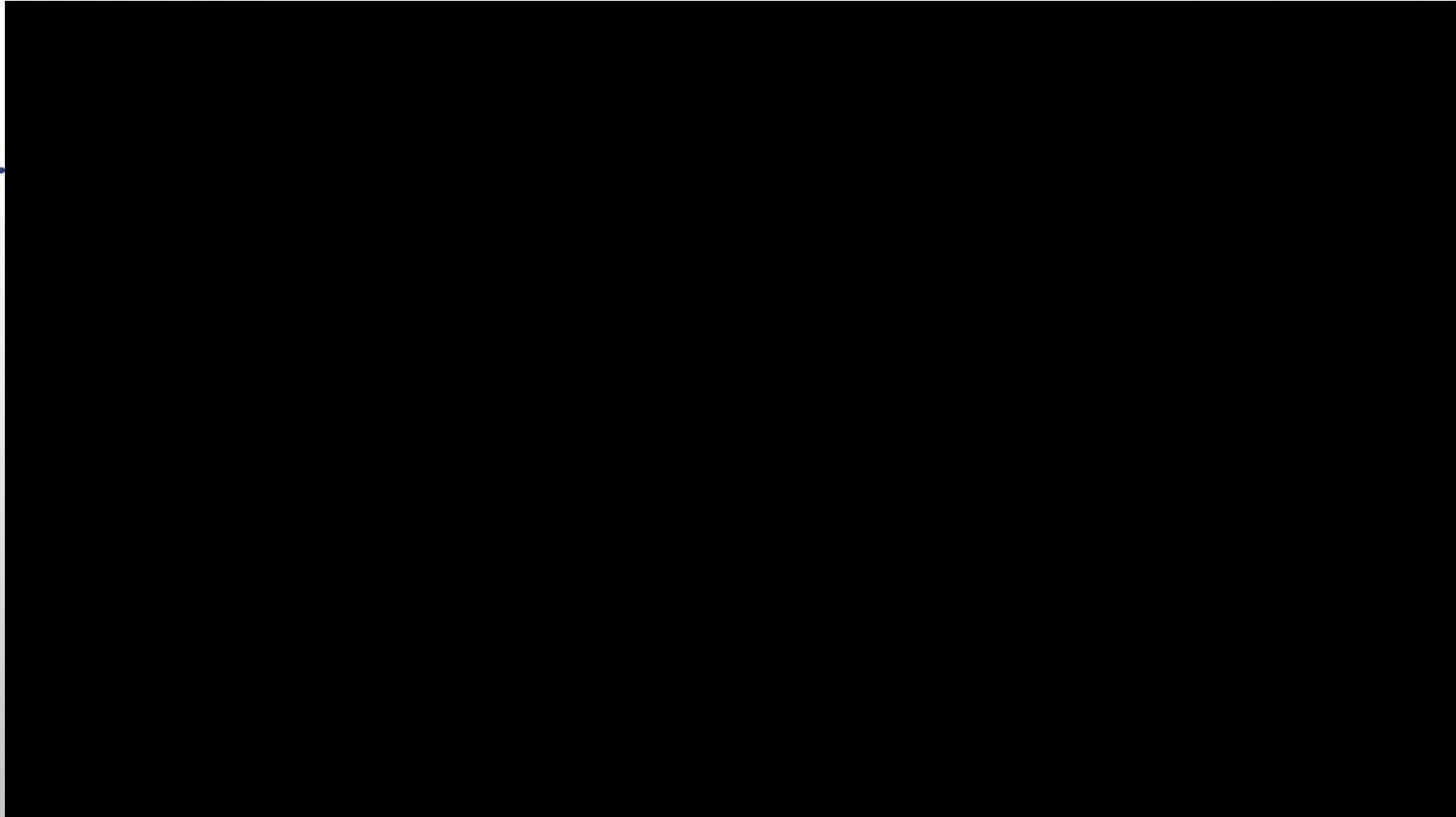
The following courses all count toward a Carnegie Unit required for graduation PLUS meet the requirements of the CS legislation:

- Cyber Foundations I
- Cyber Foundations II
- Computer Science and Engineering
- Exploring Computer Science
- AP Computer Science Principles
- AP Computer Science A
- Software Development Pathway Courses
- Simulation, Animation, and Design Courses

Can count as a math or science credit!

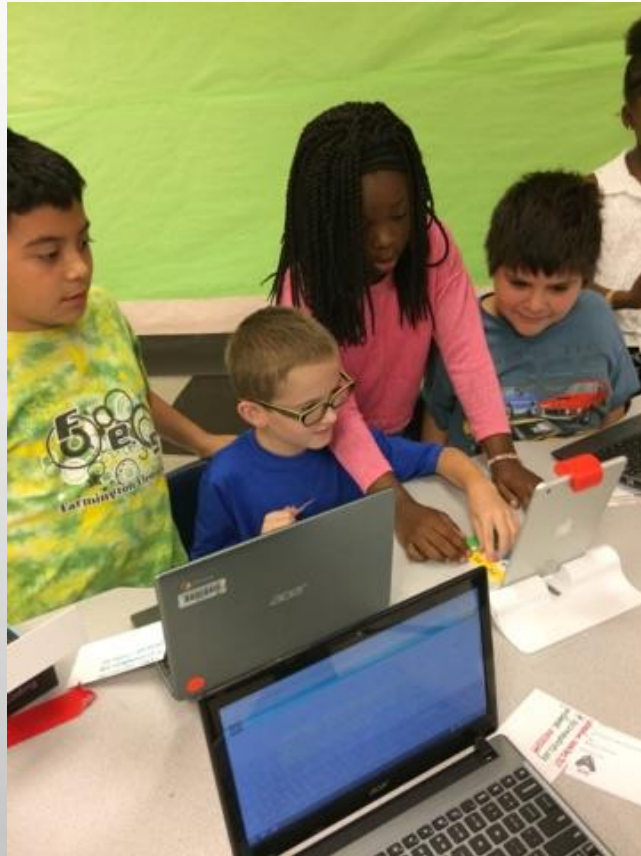


MESSAGE FROM THE GOVERNOR





ELEMENTARY SCHOOL COMPUTER SCIENCE





THE MISSISSIPPI COMPUTER SCIENCE AND CYBER EDUCATION EQUALITY ACT

According to Miss. Code § 37-13-205 (passed in 2021), elementary computer science instruction...

- can be provided in stand-alone implementations.
- can be embedded in other subjects.
- is offered by **licensed teachers**.

NOTE: For elementary, teachers are not required to have a Computer Science endorsement.

In May 2022, HB 1600 Appropriations, Section 16, states elementary computer science instruction may be taught by **teachers** who are trained by the district in computer science.

CONSIDERATIONS:

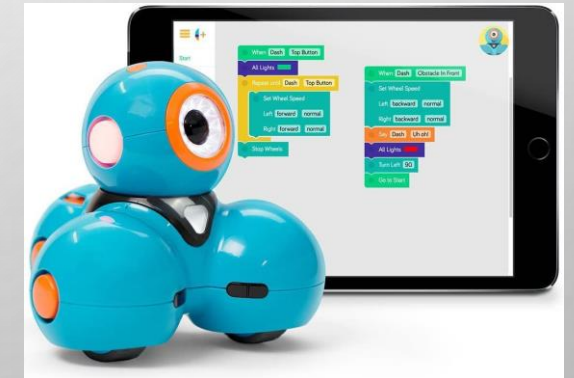
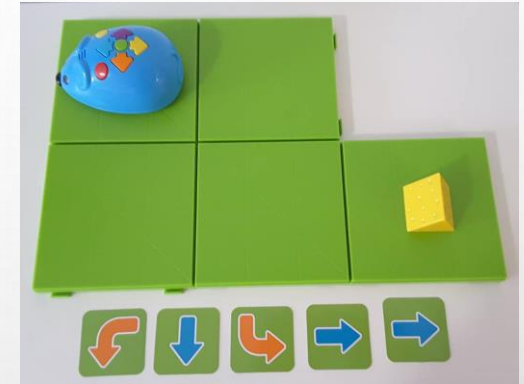
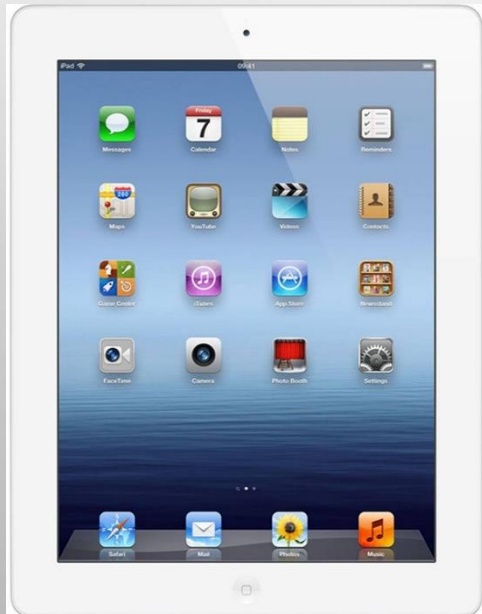
- **Ideally, instruction should be delivered by a licensed teacher; however, as with other activity based instruction in elementary classrooms, trained assistant teachers may provide instruction under the direction of a licensed teacher.**
- The hour of required instruction each week can be broken into smaller chunks of time throughout the week or easily integrated into other lessons, center activities, or content areas, allowing all teachers in the building, including the librarian, to share the responsibility for instruction.

Additional resources and training to support elementary staff will be available in July/August 2022.



ELEMENTARY EQUIPMENT NEEDED

- Equipment Needed:
 - Internet-capable devices including tablets, Chromebooks, laptops, and desktops.
 - Classroom set of robots (1 to every 4 students) is recommended.





Elementary Integration Guide

Topics Covered:

- Digital Literacy
- Keyboarding
- Digital Citizenship
- Coding
- Robotics
- Unplugged

Integration Guides available on CS4MS website:
<https://cs4ms.org/elementary-integration/>

Week 5	
Lesson Overview:	<p><u>Our Digital Citizenship Pledge</u> What makes a strong online community?</p> <p>Students will define what a community is, both in person and online, explain how having norms helps people in a community achieve their goals, and create and pledge to adhere to shared norms for being in an online community.</p> <p>If time allows, the students can practice keyboarding using the links in the previous lesson.</p>
Lesson links/resources:	<p>https://www.common sense.org/education/digital-citizenship/lesson/our-digital-citizenship-pledge</p>
CS Objectives addressed:	<p>NI.1B.1: model how information is broken down into smaller pieces, transmitted as packets through multiple devices over networks and the internet, and reassembled at the destination.</p>
Time needed:	<p>45 minutes for <i>Our Digital Citizenship Pledge</i> lesson 15 minutes for keyboard practice</p>
Materials needed:	<ul style="list-style-type: none"> - Student devices (computer/tablet) - Resources listed in the <i>Our Digital Citizenship Pledge</i> lesson - Keyboarding practice websites from previous lesson
Subject integrated:	Social Studies
Other Standards Addressed:	<p>CI.3.2 Demonstrate knowledge of community and local government.</p>
Vocabulary:	<p><i>community</i>: a group of people who share the same interests or goals <i>digital citizen</i>: someone who uses technology responsibly to learn, create, and participate <i>norm</i>: a way of acting that everyone in a community agrees to <i>pledge</i>: a promise or an oath that one makes</p>
Notes:	<p>The teacher will need to create a free online account with https://www.common sense.org/education/.</p>





Elementary Integration Guide

Pacing Guide by
grade level

Week	Title	Topics	CS Standard	Standard	Subject Integrated
1	Identifying Parts of a Computer	Keyboarding	CS.1A.2	SL.3.1	ELA
2	Keyboard	Keyboarding	CS.1A.2	RI.3.7	ELA
3	Your Rings of Responsibility → Account creation needed	Digital Citizenship	1C.1B.4	CI.3.1	Social Studies
4	This is Me	Digital Citizenship	N1.1B.1	SL.3.1	ELA
5	Our Digital Citizenship Pledge	Digital Citizenship	N1.1B.1	CI.3.2	Social Studies
6	Is Seeing Believing?	Digital Literacy	1C.1B.4	SL.3.1	ELA
7	Password Power-Up → Account creation needed	Digital Literacy	N1.1B.2	SL.3.1	ELA
8	Graph Paper Programming	Coding	AP.1B.4	SL.3.1	ELA
9	Introduction to Online Puzzles	Coding	AP.1B.4	W.3.3c	ELA
10	Relay Programming	Coding	AP.1B.4/AP.1B.5/AP.1B.8	3.NBT.1	Math
11	Debugging with Laurel	Coding	AP.1B.4	SL.3.1	ELA
12	Events in Bounce	Coding	AP.1B.5 CS.1B.1 CS.1B.1	SL.3.1 3.MD.4 CR3.3	ELA Math Social Studies
13	Game Day Commentary	Coding	AP.1B.5 CS.1B.1	RF3.4 SL3.4	ELA Math

Mississippi Computer Science Standards:

https://www.mdek12.org/sites/default/files/Offices/MDE/OAE/SEC/2018_MCCRS_CS.pdf



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Elementary Integration Guide

Contents by Integrated Subjects

English

- Week # 1: RI.4.2, RL.4.2
- Week # 2: RI.4.3
- Week # 7: RI.4.5
- Week #17 : RL.4.1, RI.4.1
- Week # 22: RL.4.2/RI.4.2
- Week # 27: RL.4.4
- Week # 33: RI.4.9
- Week # 38: RI.4.5
- Week #33α: ELA, RL.4.1-4.4
- Week #38α: ELA, RI.4.5

Math

- Week #11: 4.MD.5
- Week #21: 4.OA.5
- Week #26: 4.OA.3 & 4.OA.5
- Week #32: 4.G.1
- Week #37: 4.MD.7

Science

- Week #11: Topic-E.4.9.B
- Week #14: Topic-P.4.6A, P.4.6B, P.4.6.C
- Week #19: Topic-P.4.6C.3
- Week #24: Topic-L.4.2
- Week #30: Topic-E.4.9C.5
- Week #35-Topic-E.4.10.1

Social Studies

- Week #4: Topic-G.4.3.2
- Week #5: Topic-CI.4.3
- Week # 8: Topic-CI.4.3
- Week #12: Topic-CI.4.3
- Week #15: Topic-H.4.1
- Week #20: Topic-CR.4.1.1-2
- Week #25: Topic-H.4.4.1
- Week #28: Topic-CI.4.3.1
- Week #31: Topic-CR.4.1.1
- Week #36: Topic-G.4.1.1, G.4.2.3





Code.org Student Platform

The screenshot shows the Code.org Student Platform interface for Lesson 3: Sequencing with Angry Birds. The top navigation bar is teal and contains the Code.org logo (C O D E), the lesson title "Lesson 3: Sequencing with Angry Birds", a progress indicator with a '2' in a circle, and a "MORE" button. On the right side of the navigation bar, there is a user profile "ShellyHollis" and a help icon.

The main content area is divided into two sections. The left section is a game board with a grid of wooden blocks, TNT blocks, and Angry Birds characters. Below the game board are "Run" and "Step" buttons. The right section is a workspace for coding. It features a "Workspace: 1 / 2 blocks" indicator and buttons for "Start Over" and "Show Code". A speech bubble contains instructions: "To get the bird to the pig, snap the E block to the bottom of the when run block, then press 'Run!'". The workspace shows a "when run" block with an "E" block snapped to its bottom.

At the bottom left, there is a link "See a solution" and a "Need help?" section with the text "See these videos and hints".





Robotic Example For Math



This could be done as an “Unplugged” lesson as well.





THINGS TO CONSIDER:

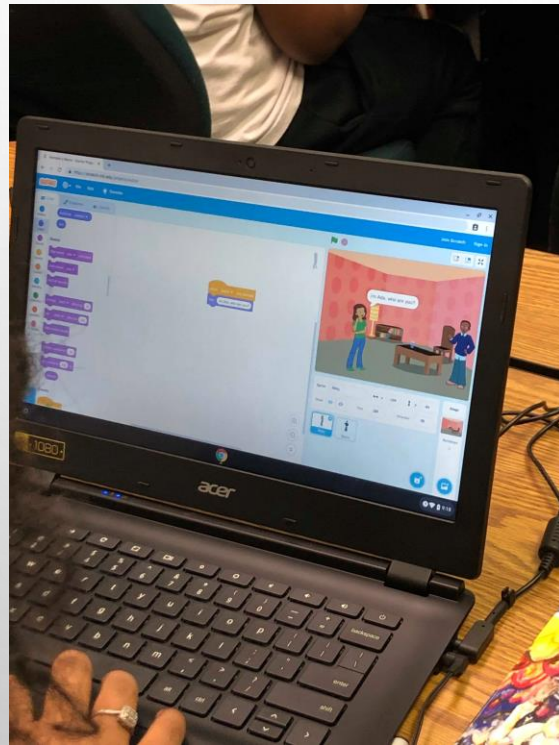


- Can we provide other enrichment equipment such as 3D printer, microcontrollers, robotics, and circuitry kits?
- Train lead/interested teachers at each grade level who will then serve as grade-level trainers on-site.
- Train others such as computer lab manager, librarian, media specialist, SPED teachers, gifted teachers.
- **CHAMPION THE IMPORTANCE OF COMPUTER SCIENCE EDUCATION!**





MIDDLE SCHOOL COMPUTER SCIENCE





Cyber Foundations I (MSIS: 000284)

➤ Content

- Digital Citizenship
- Keyboarding
- Technology Applications (Word Processing, Spreadsheets, Presentations, Graphic Design)
- Computer Science (Problem Solving, Web Development, Intro to Block-based Coding)
- Career Exploration is incorporated each week
- **REPLACED ICT I AND TECHNOLOGY FOUNDATIONS SY 2020-2021**



Cyber Foundations II (MSIS: 000286)

➤ Students should have Cyber Foundations I **BEFORE** taking Cyber Foundations II

➤ Content

- Digital Citizenship and Keyboarding Review
- Financial Literacy
- Block-based Coding, Data, Web Application Development, and Physical Computing
- Career Exploration is incorporated each week
- **REPLACED ICT II SY 2021-2022**

933 Computer Science Endorsement is required to teach this course.

**** ENDORSEMENT TRAINING COVERS BOTH CYBER FOUNDATIONS I AND III! ****



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FACILITIES & EQUIPMENT

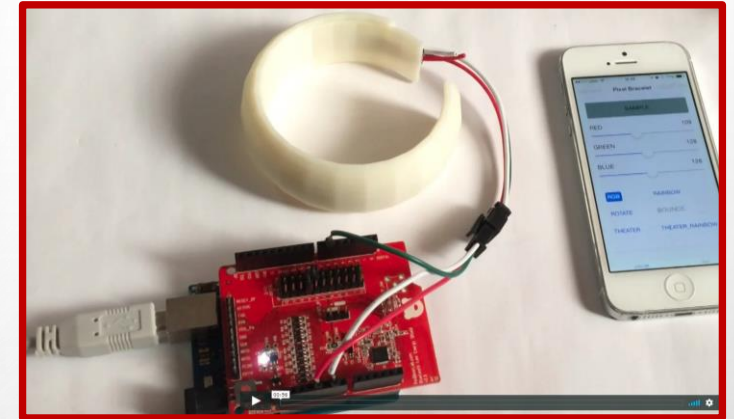
- Computer lab with internet-capable desktops, laptops, or chromebooks – 1 per student.
- Tablets NOT recommended due to keyboarding component.
- Cyber Foundations II classrooms should also have microcontrollers (1 for every 2 students recommended) to allow for a hands-on experience (at present ~\$400 for classroom set). However, there are programs that offer simulations, if schools can't afford the microcontrollers.





Computer Science & Engineering Curriculum

- MSIS: 000287
- Year-long Course (recommended 8th and above)
- CS and Engineering interwoven in project-based class
 - Unit 1: Orientation, Safety, & Student Orgs
 - Unit 2: Project Design
 - Unit 3: Newton's Law
 - Unit 4: Introduction to Modeling and 3D Printing
 - Unit 5: Coding
 - Unit 6: Introduction to Electronics
 - Unit 7: Introduction to Robotics
- **REPLACING STEM Apps SY 2022-2023**



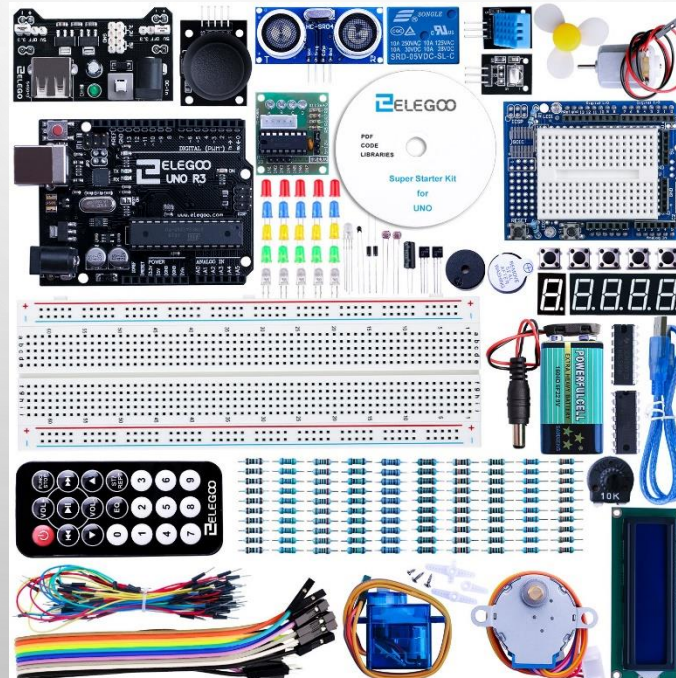
STEM Endorsement (983) required





CSE Facilities & Equipment

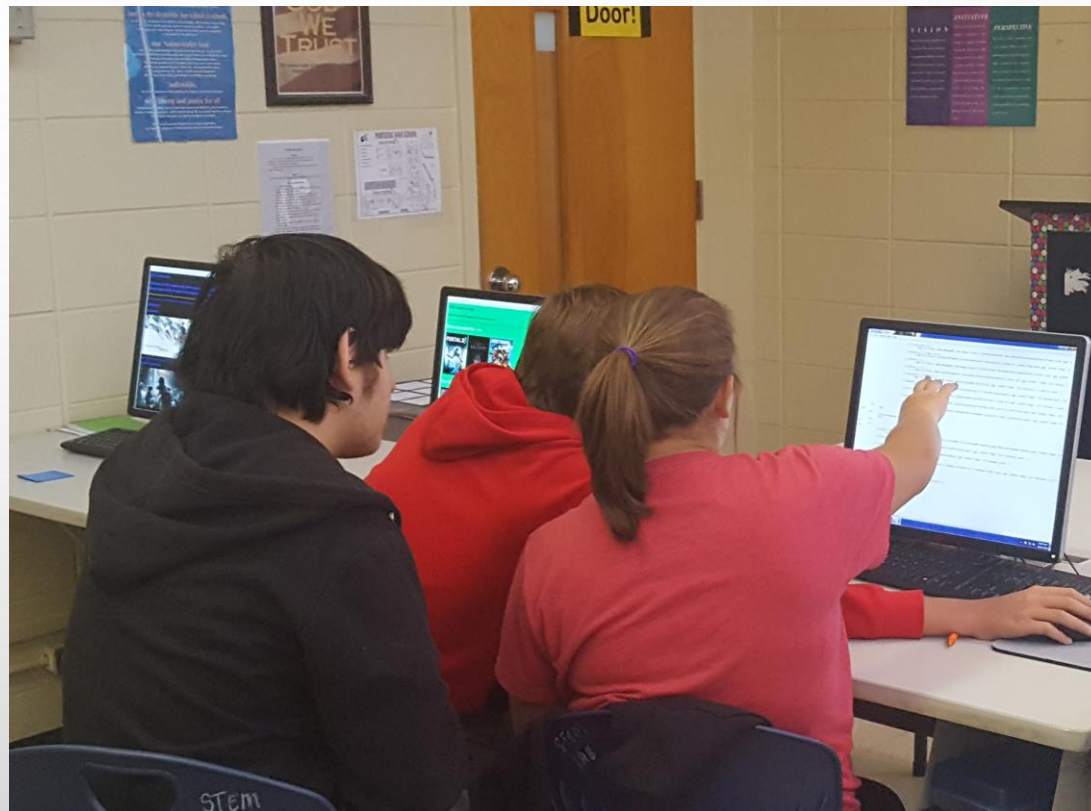
- Computer lab with internet-capable desktops, laptops, or chromebooks – 1 per student.
- Microcontrollers (this can be simulated)
- 3-D printer (this can be simulated)
- Electronics resources (wires, resistors, capacitors, etc.)
- Classroom set of robots (this can be simulated)



3D printers are now very affordable: ~\$200



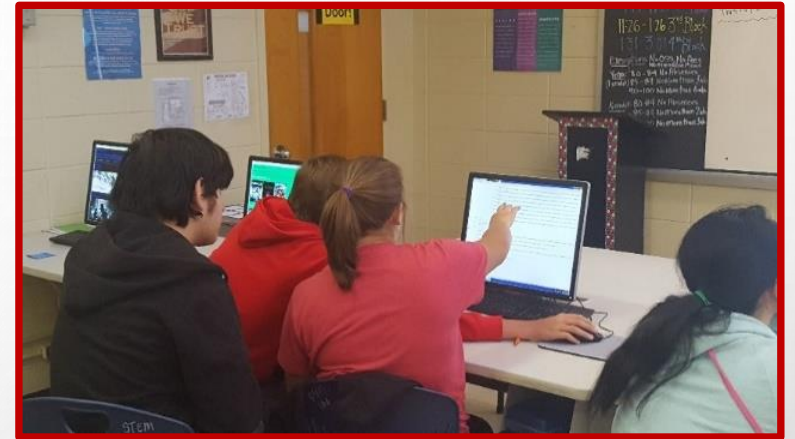
HIGH SCHOOL COMPUTER SCIENCE





Exploring Computer Science Curriculum

- MSIS = 000283
- Year-long Course for 9th -12th grade
- 6 Units – approximately 6 weeks each
 - Unit 1: Human Computer Interaction
 - Unit 2: Problem Solving
 - Unit 3: Web Design
 - Unit 4: Programming
 - Unit 5: Artificial Intelligence
 - Unit 6: Robotics



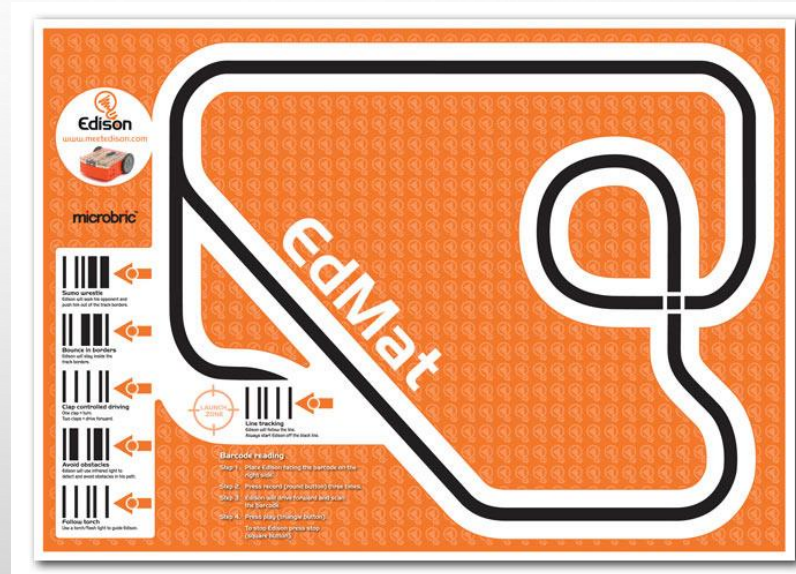
Exploring Computer Science Endorsement
(935) is required to teach this course.





ECS Facilities & Equipment

- Computer lab with internet-capable desktops, laptops, or chromebooks – 1 per student.
- Classroom set of robots (1 for every 2 students recommended) to allow for a hands-on experience (at present ~\$400 for 10).





AP CSP and AP CSA

AP Computer Science A and AP Computer Science Principles

AP Computer Science Principles complements the more programming-oriented AP Computer Science A course. Students can take the courses in any order.

AP COMPUTER SCIENCE A

- Curriculum is focused on object-oriented programming and problem solving.
- Java is the designated programming language.

AP COMPUTER SCIENCE PRINCIPLES

- Curriculum is built around fundamentals of computing, and students engage with the course content by developing computational artifacts and analyzing data, information, or knowledge represented for computational use.
- Teachers choose the programming language(s).

COMPUTATIONAL THINKING PRACTICES

- Abstraction in Program Development
- Algorithms and Program Development
- Code Analysis
- Computational Solution Design
- Computing Innovations
- Responsible Computing

BIG IDEAS OF AP COMPUTER SCIENCE PRINCIPLES

1. Creative Development
2. Data
3. Algorithms and Programming
4. Computer Systems and Networks
5. Impact of Computing



WHY OFFER AP CSP

It's backed by research.



Six different studies show: students who study computer science perform better in other subjects, excel at problem-solving, and are more likely to attend college.

Students who take AP Computer Science Principles, in particular, are **12% more likely to enroll in college** compared to similarly-situated peers, and students who take AP exams are **more likely to graduate 4-year college**, regardless of their score on the exam. AP computer science students also earn **better AP Calculus scores** than comparable students who don't take AP computer science.

Computer science course taken	Likelihood of enrolling in college
AP Computer Science Principles	12% higher
AP Computer Science A	34% higher
Either AP CS Principles or AP CS A	17% higher

PROVIDE AN AP OPPORTUNITY FOR ALL STUDENTS

- NO PRE-REQUISITES
- DON'T HAVE TO BE TOP MATH OR SCIENCE STUDENTS
- CAN COUNT AS MATH OR SCIENCE CREDIT

ACCOUNTABILITY POINTS

- PARTICIPATION POINTS JUST TO TAKE THE CLASS – DO NOT HAVE TO SIT FOR EXAM.
- PERFORMANCE POINTS FOR THOSE THAT SCORE 3 OR HIGHER

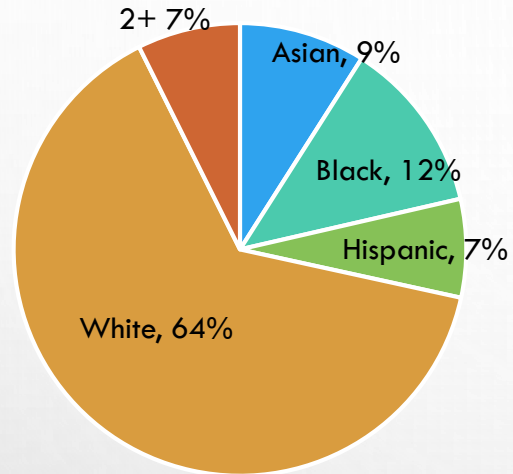




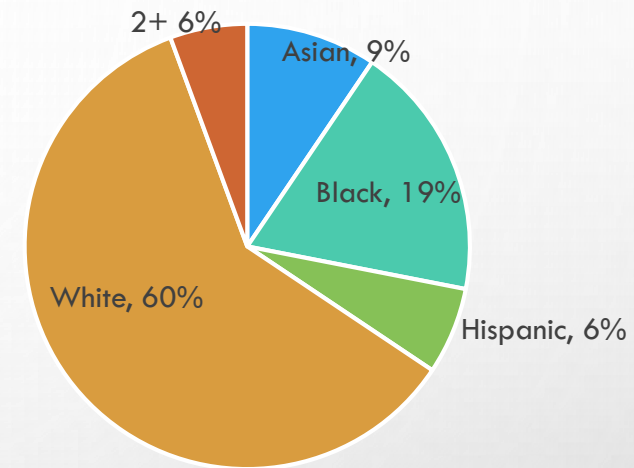
AP Computer Science Principles

STATS

2019 AP CSP Exam Takers



2020 AP CSP Exam Takers



Students scoring 3 or better

2017 = 59% (51 out of 86)
2018 = 48% (87 out of 182)
2019 = 56% (167 out of 300)
2020 = 51% (149 out of 291)

Participation by Girls

2019 = 38% (113 out of 300)
Black = 12%
Score 3+ = 51%
2020 = 38% (112 out of 291)
Black = 13%
Score 3+ = 46%

National Average for
3 or better in 2020 = 36%





SOFTWARE DEVELOPMENT 2-YEAR CTE PATHWAY

C Spire Software Development Pathway			
Sequence	Course Name	Community College #	High School Course Code
Course 1	Web and Programming Concepts	IST 1154 or 1433	902147
Course 2	Client-side Programming	IST 1414	902148
Year 1 Assessment: CIW JavaScript			
Course 3	Python I	IST 1723(4)	902110
Course 4	SQL Programming	IST 1513	902105
Year 2 Assessment: Python Institute: PCEP			



Key Benefits:

- ❖ Dual Credit Program
- ❖ Can complete CC with AAS Degree 1 year after HS
- ❖ Earn 4 or more industry certifications
- ❖ Be qualified for entry level position at \$50K+

75 students participated in first year at 7 different high schools and 6 different CCs





OTHER CS-RELATED COURSES

- Project Lead the Way Computer Essentials
- Project Lead the Way Cybersecurity
- DC – Programming I With C++
- DC – Visual Basic computer Programming I
- DC – Computer Programming I



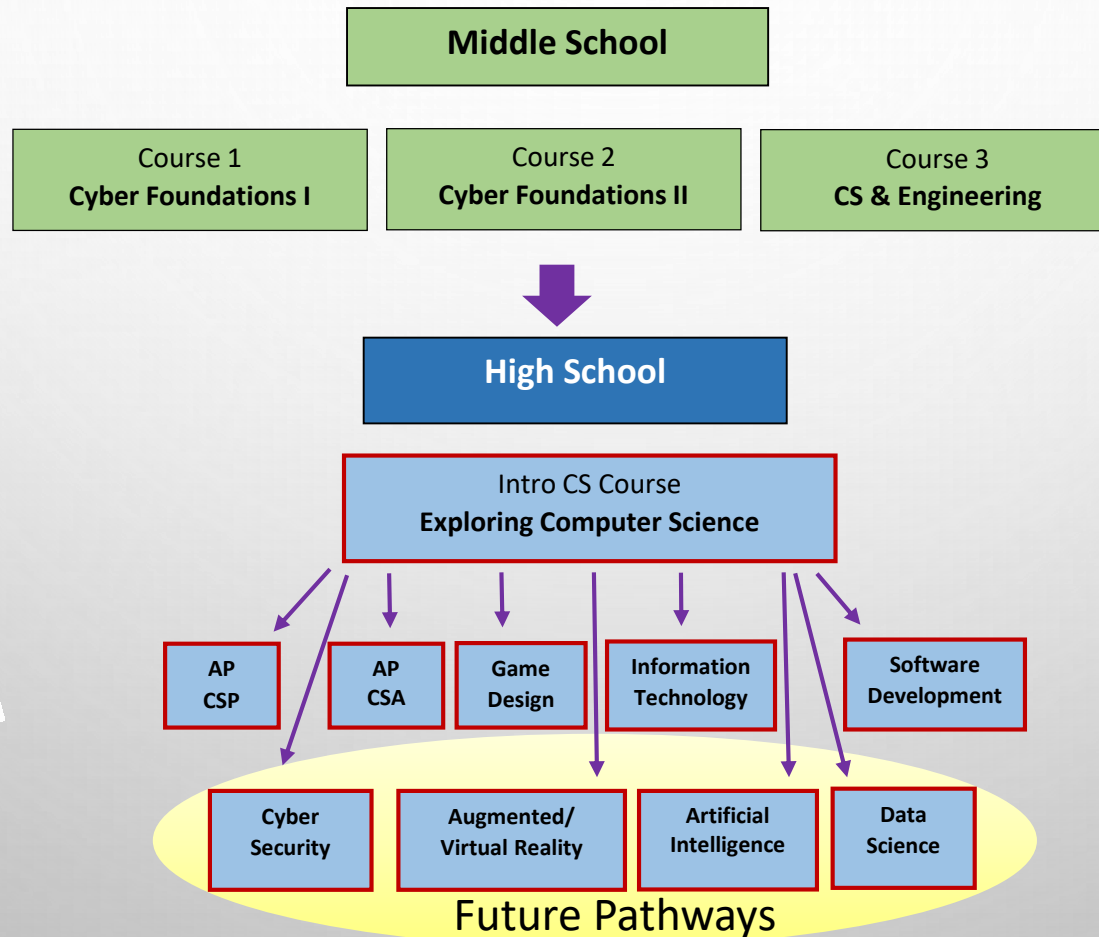
Other CS-Related 2-Year CTE Pathways

- INFORMATION TECHNOLOGY
- SIMULATION, ANIMATION, AND DESIGN





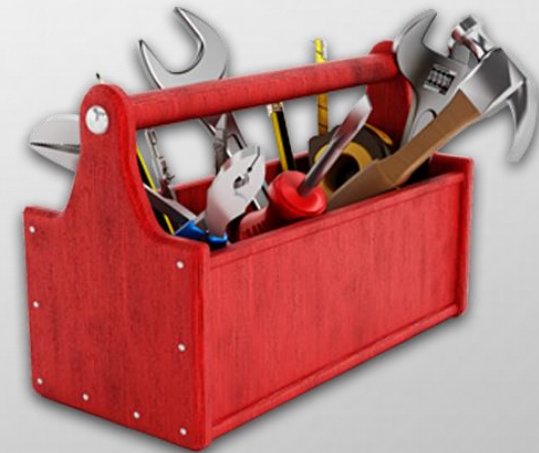
How to RECRUIT?





CURRICULA RESOURCES

- Request access to MDE Canvas Resource Guides:
 - Submit Helpdesk ticket to RCU: helpdesk@rcu.msstate.edu
 - Request to be added as a student to “Resource Guides for Middle School” and “Resource Guides For Computer Science”
 - These Canvas courses have pacing guides, lesson plans, and resources for each unit of CS curriculum.
- OTHER VALUABLE AND FREE RESOURCES:
 - [HTTPS://CODE.ORG/](https://code.org/)
 - [HTTP://WWW.EXPLORINGCS.ORG/](http://www.exploringcs.org/)
 - [HTTPS://SCRATCH.MIT.EDU/](https://scratch.mit.edu/)
 - [HTTPS://EDU.GCFGLOBAL.ORG/EN/](https://edu.gcfglobal.org/en/)
 - [HTTPS://WWW.W3SCHOOLS.COM/](https://www.w3schools.com/)





CTE CS/STEM Programs and Endorsements

PROGRAM	ENDORSEMENT
STEM Apps	983
Cyber Foundations I and II	933
Computer Science and Engineering	983
Exploring Computer Science	935
AP Computer Science Principles	646
AP Computer Science A	612
Simulation, Animation, and Design Pathway	988
Software Development Pathway	TBD



Find curriculum here:

<https://www.rcu.msstate.edu/Curriculum/CurriculumDownload.aspx#565631-computer-science>





QUESTIONS TO CONSIDER:



- How to recruit existing teachers for CS courses?
 - **Don't "volunTELL"** – find teachers who are interested.
- Can we provide other enrichment equipment such as 3D printer, microcontrollers, robotics, and circuitry kits?

MIDDLE SCHOOL:

- Have we converted all ICT and Technology Foundations to Cyber Foundations?
- Replace STEM Apps with CSE or have teacher provide sections of each.

HIGH SCHOOL:

- Could STEM Apps teacher teach a section of ECS?
- Could ECS teacher teach a section of AP CSP?
- Replace STEM Apps with CSE or ECS?
- Do we have any 2-year CTE pathway program slots or low-enrollment programs that could be replaced?
- Use ECS or CSE to provide high school students new to state/district the technology/computer science credit required for graduation





HELP AFTER TODAY

- Contact Shelly Hollis at the CCE for an online meeting with your school or district team (shelly.hollis@cce.msstate.edu).
- Check out the CS4MS website for courses:
cs4ms.org
- Add courses to your master schedule.

