

DISTRICT RESOURCE GUIDE



MISSISSIPPI STATE
UNIVERSITY™

CENTER FOR CYBER EDUCATION

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District Resource Guide

Background and Introduction

There is a severe shortage of qualified computer science professionals in the US. According to Code.org and calculations from the Bureau of Labor Statistics Employment Projections (Table 1.2) there are over 500,000 open computing jobs and that number is expected to continue growing.

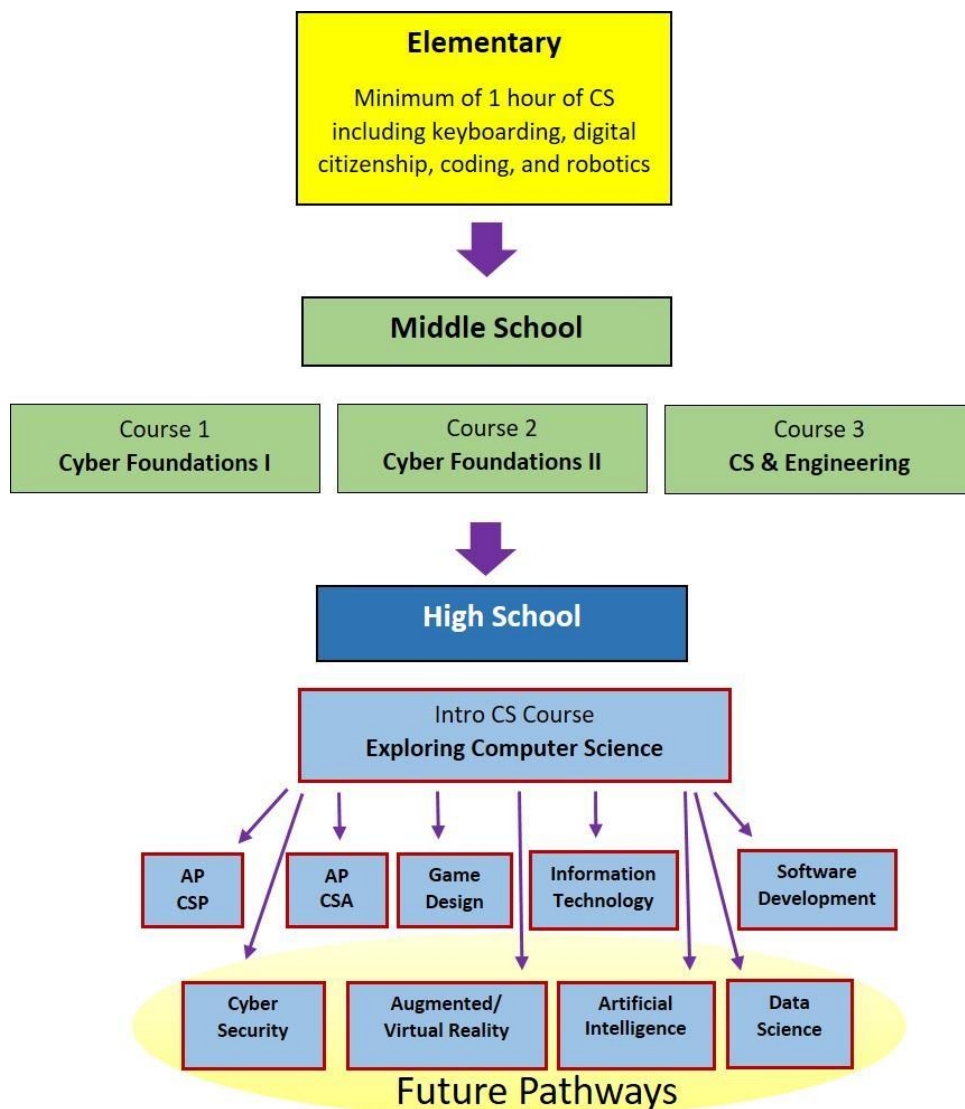


In 2015 the Mississippi Department of Education (MDE) sponsored research into the state of computer science education in the United States. Over the course of eight months, this research revealed an enormous shortage in computer scientists across the country and an almost nonexistent K-12 computer science education pathway. A Google/Gallup report showed that while 9 out of 10 parents believed it was important for their child to learn about computer science in school, only 1 in 4 schools across the nation offered any computer science courses. As of June 2016, only five states had computer science standards. In Mississippi, less than 10 schools offered any formal computer science instruction.

In response to this information, a steering committee composed of K-12 administrators, technology directors and teachers, postsecondary instructors, and industry leaders was formed to design an action plan to incorporate computer science education in Mississippi's K-12 schools. The committee developed a recommendation to conduct a three-year pilot program during which time the state would explore curricula, teacher licensure, and standards development. The Mississippi College- and Career-Readiness Standards (MS CCRS) for Computer Science, based on national standards developed by the Computer Science Teachers Association (CSTA), were adopted in 2018.

In Mississippi, there are currently 2,194 open computing jobs with an average salary of \$72,039.

Mississippi has made significant strides since the initial research in 2015 to broaden participation in computer science through the Computer Science for Mississippi (CS4MS) initiative. In 2018 Mississippi State University (MSU) created the Center for Cyber Education (CCE) to focus on K-12 computer science education in the state. In partnership with MDE and guidance from industry along with K-12 teachers and administrators, the CCE has led the development of a 10-Year Strategic Plan for Computer Science Education, created computer science courses/content at every grade level, worked to see computer science count as a graduation credit, trained more than 3,000 teachers to teach computer science, and seen legislature pass a law and dedicate funding specifically for computer science education.





The Mississippi Computer Science and Cyber Education Equality Act (House Bill 633)

In March 2021, The Mississippi Computer Science and Cyber Education Equality Act ([House Bill 633](#)) was passed requiring all districts to offer computer science content and courses by the 2024-2025 school year. The bill allows for a phased-in approach as listed below:

2022-2023: All middle schools offer at least 1 course in computer science

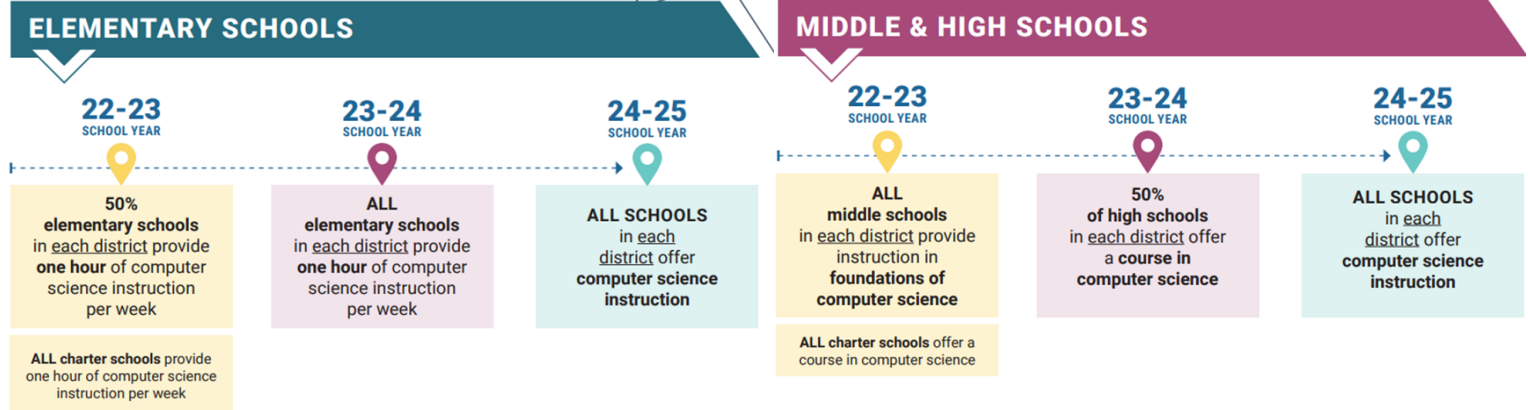
50% of elementary schools offer a minimum of one (1) hour of instruction in computer science each week at each grade level.

2023-2024: All elementary schools offer a minimum of one (1) hour of instruction in computer science each week at each grade level.

50% of high schools offer a course in computer science

2024-2025: All schools will offer instruction in computer science.

OVERVIEW: Computer Science and Cyber Education Equality Act



See the following resources on the MDE website for more information:

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



CCE: What We Do

The mission of the Center for Cyber Education (CCE) is to **ensure ALL students in Mississippi have access to quality cyber education instruction from elementary through high school and into the workforce.** This mission is accomplished through partnering with the Mississippi Department of Education to lead the ongoing development and updating of computer science curriculum, providing professional development in CS content to Mississippi teachers, offering cybersecurity certification training to high school students, hosting computer science and cybersecurity camps and outreach activities for K-12 students, developing industry partnerships to build stronger pipelines into the computing workforce, and promoting diversity in CS education and occupations. The CCE seeks to grow the computing and cybersecurity workforce of the state through cradle-to-grave educational opportunities in both traditional and non-traditional learning environments. The CCE also works to grow and strengthen the cyber workforce by providing cybersecurity awareness and certification training for individuals and small businesses. Our work includes:

- Leading K-12 computer science standards development and maintenance
- Providing computer science professional development for K-12 teachers
- Development and maintenance of K-12 computer science curricula
- Hosting computer science camps and outreach events for K-12 students
- Developing industry partnerships to build stronger pipelines into the workforce
- Promoting diversity in computer science education and occupations
- Conducting awareness and certification training to grow and strengthen the cybersecurity workforce



Our dedicated staff is ready to assist you in building a district-wide computer science program that will serve your students from elementary to high school. Please feel free to give us a call to arrange a convenient time for our teams to meet. We value the opportunity to connect and collaborate with you to create an impactful program that will empower learners in this rapidly advancing field. Please email us today to request a site visit:

www.tinyurl.com/ccehelpdesk



Elementary Computer Science

The current legislation requires all elementary schools within a district (grades K-5/6) to offer at least 1 hour of instruction to all students each week by the 2023-2024 school year. Ideally, that instruction will be integrated into the primary classroom by a licensed teacher.

However, some schools have opted to provide instruction in a rotational computer activity class with a non-certified instructor under the guidance of a licensed teacher. Both models are in compliance with the legislation (see the amendment in [Senate Bill 2586](#)). Since most rotational classes are less than 1 hour, schools may need to find other areas such as the primary classroom, library, etc. to ensure the weekly time requirement is met.

As of May 2023, computer science instruction has been added to the Mississippi Public School Accountability Standards in the Process Standards, section 27.4: *“In any elementary configuration of grades K-6, the curriculum must include 60 minutes of computer science instruction per week. Miss. Code Ann. §37-13-201.”*

No special teacher licensure is required at this time for elementary computer science.

However, In the SB2586 amendment non-certified instructors are required to go through MDE-approved training. The course codes in the table below can be used when computer science instruction is offered in a rotational activity class. Otherwise, lesson plans should be used to document when computer science instruction occurs and how much time is spent on a weekly basis.

Elementary Computer Science Course Codes and Endorsements				
Course Name	Course Code	Carnegie Unit Credits	Endorsements	Description
Computer Science (PK-3)	110103	0	Valid Teacher License	An introduction to the fundamental concepts of computer science, including computing systems, networks and the internet, data and analysis, algorithms and programming, and impacts of computing.
Computer Science (Grades 4-6)	110104	0	Valid Teacher License	Explores the fundamental concepts of computer science, including computing systems, networks and the internet, data and analysis, algorithms and programming, and impacts of computing.

Elementary Training and Resources

- **Summer Institute:** Each summer the CCE and MDE host a Computer Science Institute for elementary teachers – both certified and non-certified. This professional development introduces participants to the fundamentals of coding, robotics, and computational thinking. The K-12 computer science standards are reviewed, and participants have the opportunity to get hands-on experience with various coding and robotics platforms.
- **District/Regional Training:** Any district can contact the CCE to schedule a professional development program for their district or to host a regional opportunity to include surrounding districts. Contact the CCE at www.tinyurl.com/ccehelpdesk to schedule.
- **Elementary Integration Guides:** In an effort to make the integration of computer science content as convenient as possible for elementary teachers, the CCE formed a team of elementary teachers and administrators to develop an integration guide for each grade level, kindergarten through 6th grade. This guide provides plans for forty, sixty-minute, lessons covering six topics: coding, robotics, digital literacy, digital citizenship, keyboarding, and unplugged (no computer needed) activities.

Each guide contains a breakdown of content by integrated subjects, content by computer science topics, and a calendar/pacing guide. Teachers may choose to start at the beginning and teach each lesson once a week in chronological order or choose to teach the lesson that integrates with another core subject topic at a more relevant time. In addition to a lesson overview and links to required resources, each lesson plan maps to a Mississippi Computer Science Standard and a core subject area standard.

The guides are on the CS4MS website: <https://cs4ms.org/elementary-integration/>

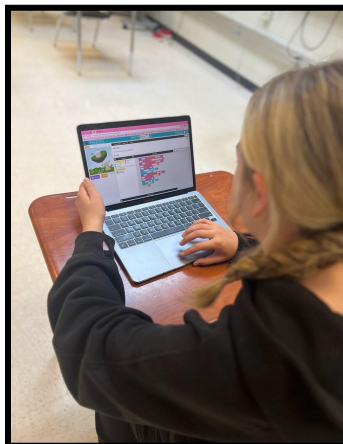




Middle School Computer Science

Middle schools are required by legislation to offer at least one course in computer science. The following computer science courses may be offered at middle school and count towards the graduation credit for technology and computer science (*see page 90 of [Mississippi Accountability Standards](#)).

Middle School Computer Science Course Codes and Endorsements				
Course Name	Course Code	Carnegie Unit Credits	Endorsements	Description
Cyber Foundations I	000284	1 *Can count toward graduation credit	933	Career & Technical Education (CTE) course which counts toward graduation credit for "technology and computer science." The curriculum framework can be found here: CF I Curriculum
Cyber Foundations II	000286	1 *Can count toward graduation credit	933	Career & Technical Education (CTE) course which counts toward graduation credit for "technology and computer science." The curriculum framework can be found here: CF II Curriculum
Computer Science & Engineering (CSE)	000287	1 *Can count toward graduation credit	983	Career & Technical Education (CTE) course which counts toward graduation credit for "technology and computer science." The curriculum framework can be found here: CSE Curriculum



Middle School Endorsement and Resources

The CCE provides licensure training for the Cyber Foundations 933 endorsement and the Computer Science and Engineering/STEM 983 endorsement. An outline for each professional development program is provided below.

CYBER FOUNDATIONS (933)

(Required to teach Cyber Foundations I and II)

- Complete the Methods of Cyber Foundations course
Registration is available on the [GoSignMeUp](#) website.
This course has 6 modules:
 - Module 1: 3-week, self-paced online course covering technology applications.
 - Module 2: 5-day (face-to-face) training (M-F) during the summer.
 - Modules 3-6: 4 Saturday (face-to-face) trainings (all day) throughout the school year
- Pass the IC3 Exam. Registration is available on the [GoSignMeUp](#) website.
- Complete the 2 C.O.O.L. 4 Teachers. Registration is available on the [GoSignMeUp](#) website.

COMPUTER SCIENCE AND ENGINEERING/STEM (983)

- Complete the Methods of Computer Science and Engineering course.
Registration is available on the [GoSignMeUp](#) website.
This course consists of:
 - a 1-week, 5-day (face-to-face) training (M-F) during the summer.
- Pass the IC3 Exam. Registration is available on the [GoSignMeUp](#) website.
- Complete the 2 C.O.O.L. 4 Teachers. Registration is available on the [GoSignMeUp](#) website.





High School Computer Science

House bill 633 requires all high schools in a district to offer at least one course in computer science by the 2024-2025 school year. The table below lists a few of the computer science courses which may be offered at high school and count towards the graduation credit for technology and computer science (*see page 90 of [Mississippi Accountability Standards](#)). Additionally, the **AP Computer Science Principles course may count as a math or science credit.**

High School Computer Science Course Codes and Endorsements				
Course Name	Course Code	Carnegie Unit Credits	Endorsements	Description
Exploring Computer Science (ECS)	000283	1 *Can count toward graduation credit	935	Career & Technical Education (CTE) course which counts toward graduation credit for "technology and computer science." The curriculum framework can be found here: ECS Curriculum
Advanced Placement Computer Science Principles	110145	1 *Can count toward graduation credit	Valid license	An academic course which counts toward graduation credit for technology and computer science OR math OR science. The curriculum framework can be found here: College Board - APCSP
Advanced Placement Computer Science A	110141	1 *Can count toward graduation credit	154, 181, 185, 189	An academic course which counts toward graduation credit for technology and computer science. The curriculum framework can be found here: College Board - APCSA

There are other courses available through Project Lead the Way and as dual-credit options with community colleges. Mississippi has three computer science related pathways in the Career and Technical Education program: Software Development, Information Technology, and Simulation and Animation Design (Game Design). These are programs that generally take a student 2 years to complete a series of 2-4 courses. More information can be found here: [CTE Curriculum](#).

High School Endorsement and Resources

The CCE provides licensure training for the Exploring Computer Science (ECS) 935 endorsement as well as professional development for Advanced Placement Computer Science Principles (AP CSP) and Advanced Placement Computer Science A (AP CSA).

EXPLORING COMPUTER SCIENCE (935)

- Complete the Methods of Exploring Computer Science
Registration is available on the [GoSignMeUp](#) website.
This course has 5 modules:
 - Module 1: 5-day (face-to-face) training (M-F) during the summer.
 - Modules 2-5: 4 Saturday (face-to-face) trainings (all day) throughout the school year
- Pass the IC3 Exam. Registration is available on the [GoSignMeUp](#) website.
- Complete the 2 C.O.O.L. 4 Teachers course. Registration is available on the [GoSignMeUp](#) website.

AP COMPUTER Science Principles

While an additional AP Computer Science Principles endorsement is not required by MDE, ***it is strongly encouraged that a teacher attend the training for this course to learn the content and understand the structure of the AP exam.***

- Complete the Methods of Computer Science Principles course.
Registration is available on the [GoSignMeUp](#) website.
This course consists of:
 - a 1-week, 5-day (face-to-face) training (M-F) during the summer.
 - Modules 2-5: 4 Saturday (face-to-face) trainings (all day) throughout the school year

AP COMPUTER Science A

While an additional AP Computer Science A endorsement is not required by MDE, a teacher must have one of the following endorsements: 154, 181, 185, or 189. ***It is strongly encouraged that a teacher attend the training for this course to learn the content and understand the structure of the AP exam.***

- Complete the Methods of Computer Science A course.
Registration is available on the [GoSignMeUp](#) website.
This course consists of:
 - a 1-week, 5-day (face-to-face) training (M-F) during the summer.
 - Modules 2-5: 4 Saturday (face-to-face) trainings (all day) throughout the school year



Computer Science Resources

The resources listed below are ones that the CCE has found very effective and useful over the past few years. Some may require creation of accounts, but all resources referenced are free. All resources may be used on any internet-capable device including Chromebooks and tablets.

- Code.org (<https://code.org/>)

The Center for Cyber Education is a regional partner with Code.org. Code.org is the leader in the national K-12 computer science education space. They provide a free K-12 curriculum and learning platform available to all teachers with pre-made lesson plans and a teacher dashboard. Additionally, they offer Hour of Code events for individual classrooms, school, district, and community events.

- Cybersecurity Resources

Common Sense Digital Media: Digital Citizenship

(<https://www.commonsense.org/education/digital-citizenship/curriculum>)

Teach Cyber

(<https://teachcyber.org/resources/>)

Cyber.org

(<https://cyber.org/>)

- Elementary Integration Guides (<https://cs4ms.org/elementary-integration/>)

These guides provide 40 integrated lessons for each grade level: Kindergarten through 6th grade. They are interactive in that teachers can click directly on the links provided and get to all needed resources.

- Google CS First (<https://csfirst.withgoogle.com/s/en/home>)

"CS First is an easy-to-use computer science curriculum designed for students in grades 4-8 (ages 9-14) that is free of charge. Teachers use the video content to teach kids coding basics with Scratch for CS First, a special version of the Scratch coding editor inside the CS First website."

- MDE CANVAS COURSE: RESOURCE GUIDES FOR MIDDLE SCHOOL

This online resource is available for all CTE teachers and contains a wealth of activities, resources, and tips for Cyber Foundations I, Cyber Foundations II, and Computer Science & Engineering courses. These resources have been vetted by other Mississippi middle school computer science teachers and are organized by unit and competency for each curricula. Teachers can request an account and access to the course by emailing:

helpdesk@rcu.msstate.edu.

- MDE CANVAS COURSE: RESOURCE GUIDES FOR COMPUTER SCIENCE

This online resource is available for all CTE teachers and contains a wealth of activities, resources, and tips for Exploring Computer Science. These resources have been vetted by other Mississippi high school computer science teachers and are organized by unit and competency. Teachers can request an account and access to the course by emailing: helpdesk@rcu.msstate.edu.

- Mississippi Computer Science Education Equality Act (MS House Bill 633)

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

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

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

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

- Scratch (<https://scratch.mit.edu/>)

Developed by the Massachusetts Institute of Technology (MIT), "Scratch is the world's largest coding community for children and a coding language with a simple visual interface that allows young people to create digital stories, games, and animations. Scratch is designed, developed, and moderated by the Scratch Foundation, a nonprofit organization. Scratch promotes computational thinking and problem solving skills; creative teaching and learning; self-expression and collaboration; and equity in computing."

- Scratch Jr – For PK-2 (<https://www.scratchjr.org/>)

"ScratchJr is an introductory programming language that enables young children (ages 5-7) to create their own interactive stories and games. Children snap together graphical programming blocks to make characters move, jump, dance, and sing. Children can modify characters in the paint editor, add their own voices and sounds, even insert photos of themselves -- then use the programming blocks to make their characters come to life."

- Standards Deconstruction with Content Area Connections:

[Level 1A: Grades K-2](#)

[Level 1B: Grades 3-5](#)

- Virtual Robotics

[VEX VR](#)



Student Organizations

Please refer to the guidelines listed for student organizations in the audit program standards. If you have additional questions concerning the student organization policies, please contact the MDE Program Supervisor for your course.

- Technology Student Association (TSA) (<https://tsaweb.org/>)

“The Technology Student Association (TSA) is a national career and technical student organization (CTSO) of students engaged in science, technology, engineering, and mathematics (STEM). TSA's intracurricular program includes competitions and leadership activities. As a student organization of 300,000 middle and high school technology and engineering students, TSA provides its members the opportunity to explore a wide variety of STEM career interest areas. All TSA competitions—more than 70 middle and high school events combined—are correlated with national STEM standards to enhance STEM curriculum. Since 1978, more than four million students have participated in TSA.”

- SkillsUSA (<https://www.skillsusa.org/>)

“Representing nearly 400,000 career and technical education students and teachers, SkillsUSA chapters thrive in middle schools, high schools and college/postsecondary institutions nationwide. Our mission is accomplished through the [SkillsUSA Framework](#) of Personal Skills, Workplace Skills and Technical Skills Grounded in Academics, which is integrated into [the] classroom curriculum.”

- FBLA (<https://www.fbla-pbl.org/>)

“FBLA inspires and prepares students to become community-minded business leaders in a global society through relevant career preparation and leadership experiences.”



Professional Organizations and Conferences for Educators

- CSTA Mississippi (Computer Science Teachers Association)

<https://mississippi.csteachers.org/>

"The Mississippi Chapter of CSTA advocates as your local computer science community. We aim to connect you with other computer science teachers, provide professional development to help you improve your craft, and connect your local voice to the national computer science education community."

- MS ACTE (Mississippi Association of Career and Technical Education)

<http://www.mississippiacte.com/>

"MS ACTE is committed to enhancing the job performance and satisfaction of its members; to increase public awareness and appreciation for career and technical programs, and to assuring growth in local, state, and federal funding for these programs by communicating and working with legislators and government leaders."

- MECA (Mississippi Educational Computing Association)

<https://www.ms-meca.org/>

"MECA (MS Educational Computing Association) provides for the sharing and exchanging of ideas, techniques, materials, and procedures for all persons interested in technology in education including instructional applications, administrative applications, and computer science education."

- ISTE (International Society for Technology in Education)

<https://www.iste.org/>

"ISTE's vision is that education innovators are supported in reimagining and redesigning learning with a focus on using technology to create transformational and equitable experiences for learners. ISTE helps educators use technology to revolutionize learning."

- NICE (National Initiative for Cybersecurity Education)

<https://www.k12cybersecurityconference.org/>

"NICE K12 is known to cybersecurity-related educators and educational stakeholders as THE best place to engage with the thought leaders and pioneers leading the charge in classrooms, schools, districts, and regional and statewide cybersecurity education programs. NICE K12 is THE national hub for providing resources in innovative teaching and learning for K12 educators to inspire their students to be the future cybersecurity workforce."

Optional Classroom Resources

Below are resources that have worked well in various training programs. These are not mandatory for any specific course.

Code & Go Robot Mouse

\$59.99 on Amazon

Great for all elementary-age students as a beginning tool to practice programming concepts and to engage with robots. Needs 3 AAA batteries.



Botley the Coding Robot

\$54.99 on Amazon

Great for all elementary-age students as a beginning tool to practice programming concepts and to engage with robots. Use remote control to program. Needs 5 AAA batteries and a small Phillips screwdriver.



Wonder Workshop Dash Robot

\$149.95 on Amazon

Great for all elementary-age students as a beginning tool to practice programming concepts and to engage with robots. Dash responds to voice commands or any of our five free downloadable apps to sing, draw, and move around. Comes with a charging cable.



VEX 123

\$119 on vexrobotics.com

Recommended for grades K-3

The Vex 123 robot can be manipulated with the forward, backward, left, and right arrows for beginning students. As students' understanding of coding grows, they can use the coder and coding cards to visually see the layout of block coding. Finally, the Vex 123 can be programmed using an online block coding program.



Edison Robot

\$52.99 on Amazon

Better suited for 4th and 5th grade who are ready to practice programming using the block-based Scratch language. Connects to a device through the headphone jack to send code from the computer to the robot or scan barcodes on the Edison Mat. Requires 4 AAA batteries.

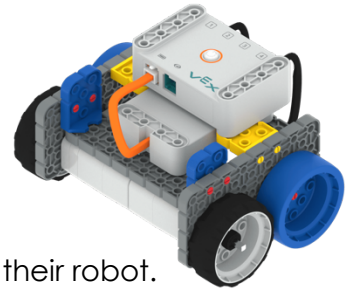


VEX GO

\$199 on vexrobotics.com

Recommended for grades 4-6

The Vex Go robot involves both coding and engineering. The students can build a robot with *easy-to-follow* steps from the Vex Go resources. After engineering the robot, the students can use block and text coding to program their robot.

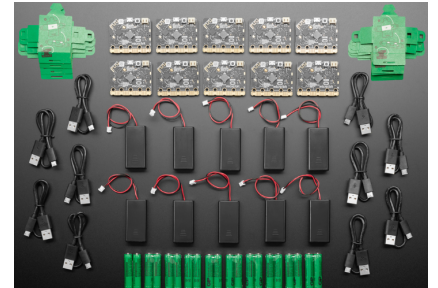


Micro:bit Classroom Kit

\$199.95 on Adafruit

Recommended for Cyber Foundations II, Computer Science and Engineering, and Exploring Computer Science

The micro:bit will fit right into your existing lessons and materials, taking MakeCode blocks, MicroPython code and AI and ML into the classroom.



Code.org Circuit Playground Edu Pack

\$350 on Adafruit

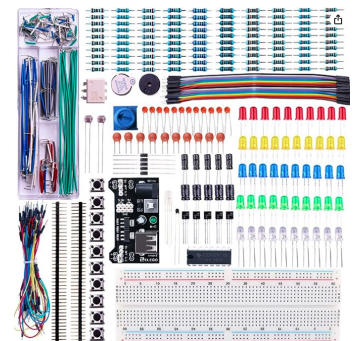
Recommended for Cyber Foundations II, Computer Science and Engineering, and Exploring Computer Science
Circuit Playground Express is a perfect introduction to electronics and programming. It combines a powerful ATSAM21G18 microcontroller with full Code.org CS Discoveries, MakeCode, CircuitPython and Arduino support.



Electronics Kit

\$15.99 on Amazon

Recommended for Computer Science and Engineering
STEM kits provide all the necessary components, sensors, wires, and boards for you to get started with programming, learning electronics, and creating IoT projects.

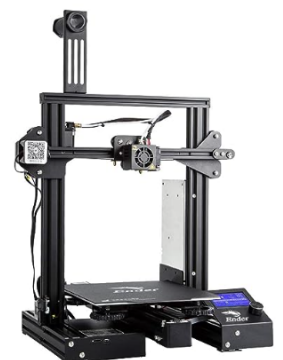


Ender 3 Pro 3D Printer

\$235 on Amazon

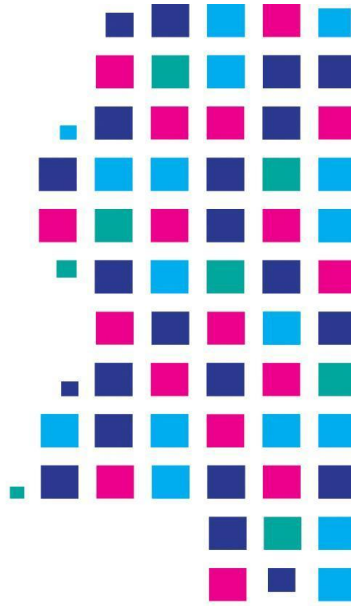
Recommended for Computer Science and Engineering

This easy-to-setup kit comes partially assembled, allowing you to learn about the basic construction of 3D printers as you finish putting it together. A fun STEM educational experience in mechanical engineering and electronics.





MISSISSIPPI STATE UNIVERSITY™
CENTER FOR CYBER EDUCATION



{ **CS4MS** }

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