TO: Members of the State Board of Education

FROM: Carey M. Wright, Ed.D., State Superintendent of Schoo

DATE: December 3, 2024

SUBJECT: Update on Computer Science Education

Executive Summary

The Maryland State Department of Education (MSDE), in collaboration with the Maryland Center for Computing Education (MCCE), is advancing the future of computer science education in Maryland. This presentation provides an overview of MCCE's origins, its strategic partnership with MSDE, and initiatives aimed at expanding high-quality computer science education across the state. Key highlights include the alignment of computer science pathways to regional labor market needs and a proposed roadmap to shift from standalone computer science courses to cohesive, career-connected pathways for students. The partnership prioritizes equitable access, particularly for underserved communities, and seeks to provide educators with high-quality professional learning opportunities.

Background and Process

- The MCCE was established to broaden access to high-quality computer science education throughout the state, driven by House Bill 281.
- Since its inception in 2018, MCCE has worked with the University System of Maryland, MSDE, and other stakeholders to expand computer science opportunities and strengthen educator capacity.
- These efforts have resulted in an increased number of computer science teachers across Maryland.
- In September 2024, MSDE and MCCE signed a new Memorandum of Understanding (MOU) to accelerate the advancement of computer science education.
- The MOU lays out a collaborative approach focused on developing comprehensive computer science pathways, especially for underserved communities.
- It also emphasizes aligning state standards with national benchmarks and delivering robust professional learning opportunities to support educators.
- These initiatives are designed to ensure that Maryland students have access to industry-aligned, career-connected computer science pathways, preparing them for the evolving job market.

Action Requested

No action is required; this information is for discussion only.

Attachments

Computer Science Presentation.pptx

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marylandpublicschools.org

We Are The Maryland Center for Computing Education (MCCE)

- **Requested by** unanimous recommendation of the Maryland Computer Science Education Steering Committee.

- MCCE is housed at **University System of Maryland** and was founded in partnership with the **University of Maryland, Baltimore County**, and the **University of Maryland, College Park.** The long-term vision aims to establish a collaborative Center that fosters connections with USM campuses, independent colleges, school systems, nonprofits, industrial partners, and various government agencies, creating a robust public-private partnership.

- House Bill 281 fully implemented in 2018, which:

  - established MCCE and provided **$5M** to expand access to high-quality computer science education, strengthen the skills of educators, and increase the number of computer science teachers in Maryland.

  - An additional **$1M** has been funded each year since to support this work making Maryland the #1 state for providing access to computer science education.

  - required county boards of education to ensure that **public high schools offer at least one high-quality computer science** course beginning in the **2021-2022 school year**. Maryland is the only state to accomplish this goal.

MCCE Supports Computer Science Educators in Maryland by:

- **expanding access** to high-quality computer science education in grades pre-kindergarten through 12 by **strengthening the skills** of educators and increasing the number of computer science educators in elementary, and secondary education.

- **providing specialized professional development** related to existing and proposed CTE programs of study as well as pathways for teacher certification in Computer Science.

- **supporting districts** with short and long range planning and financial assistance to fund professional development of computer science educators.

- **supporting pre-service programs in education** to include computer science in their programs and train faculty.

- organizing collaborative opportunities to share and grow with peers at **multiple state-wide professional learning experiences.**

- facilitating a **network of computer science resources**, including materials, mentors, and subject-matter experts.

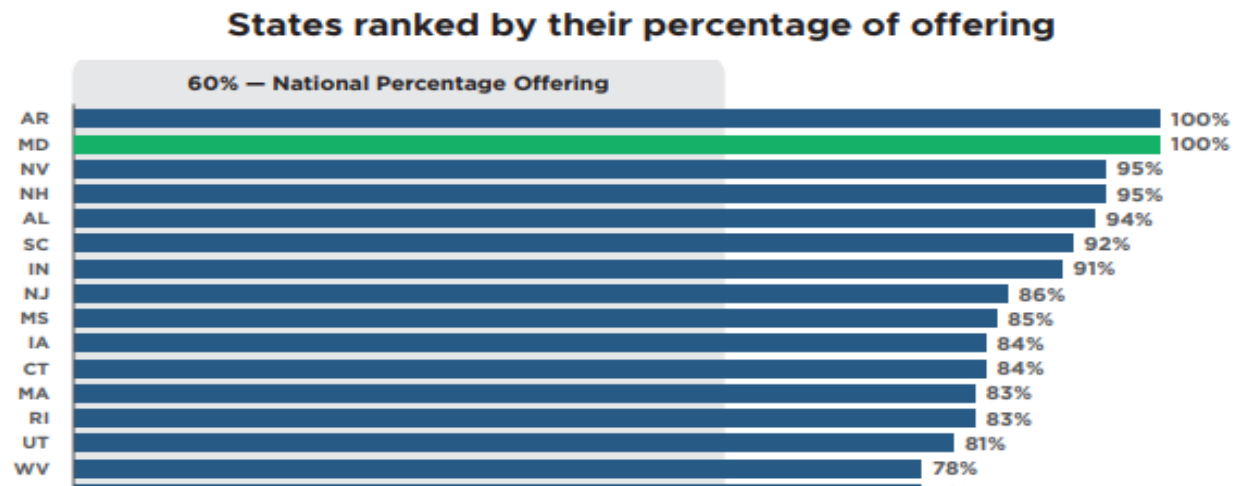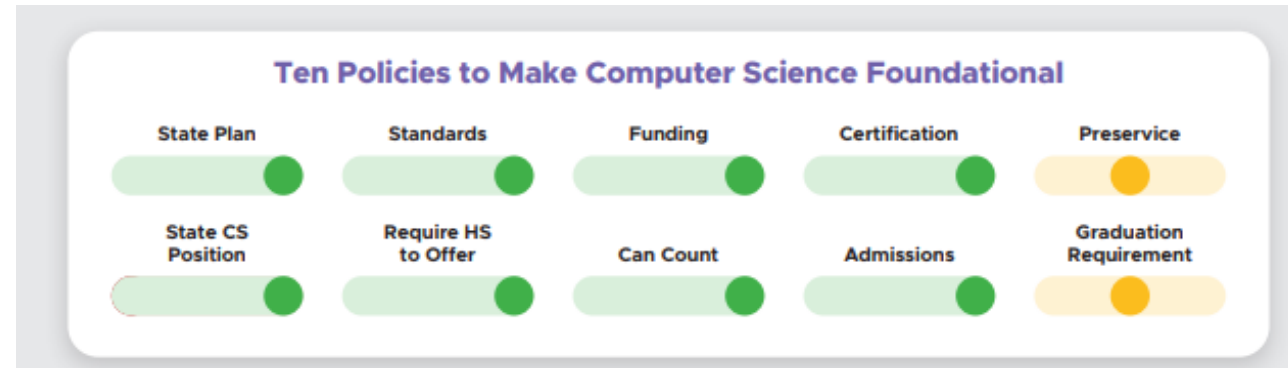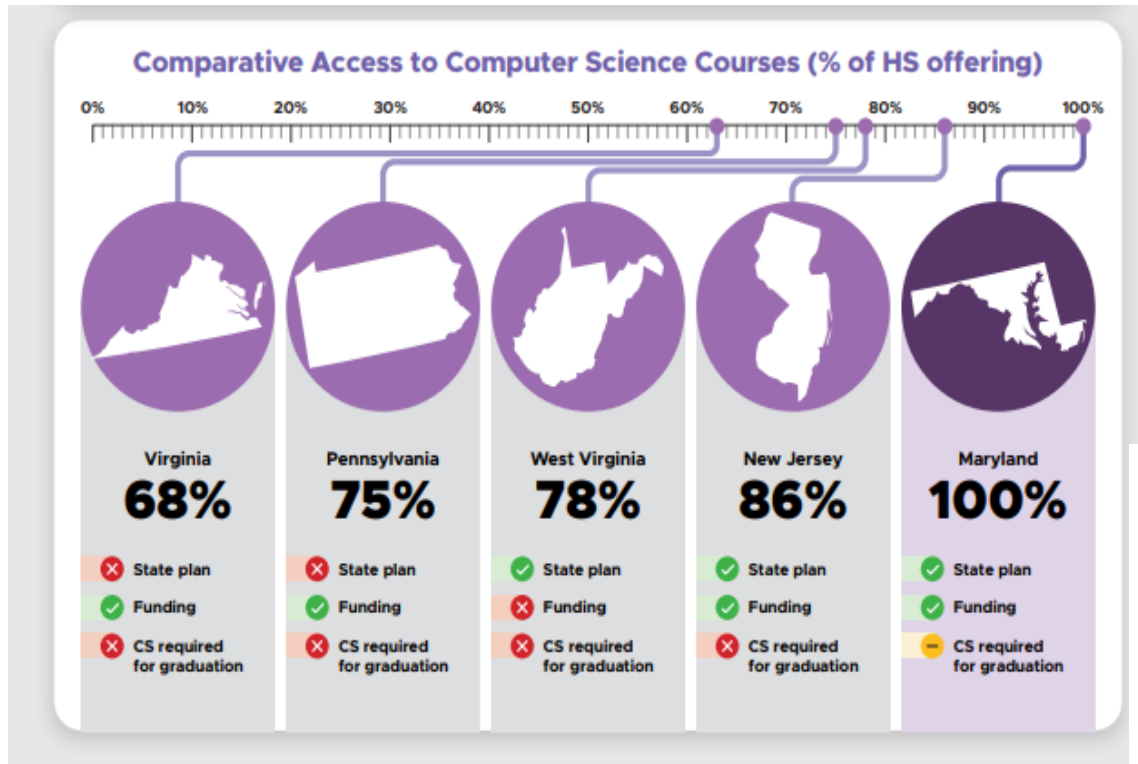# We Believe That To Go Far, You Must Go Together

- In September 2024, MSDE and MCCE executed a new **Memorandum of Understanding** (MOU) which forges a **new path forward** for computer science education and support for Maryland.

- The MOU stipulates how each organization will support the work, such as:

  - Partnering to develop a **PK-12 plan for Computer Science Education** with a priority on reaching school districts with high poverty, large rural areas, and student populations that are underrepresented in computer science fields.

  - Ensuring Maryland's **computer science standards are current and aligned to national standards** developed by the Computer Science Teachers Association.

  - Provide **professional learning aligned to the Learning Forward Standards and Computer Science standards** and other relevant content area standards and programs to broaden the pool of teachers available to teach computer science in Maryland public schools.

  - **MSDE develops the system, programs, and accountability; MCCE provides professional learning, curriculum development, and vendor support.**

We Believe That To Go Far, You Must Go Together

- The MOU also **increases MSDE's staffing and financial commitment** to Computer Science education. This is accomplished by:

  - Taking a **team-based approach**, through the Office of College and Career Pathways (OCCP), for the **development of computer science pathways, standards, and implementation support.**

  - Hiring a **School Support Coordinator** on the OCCP team to work directly with MCCE and LEAs to support the systems and implementation work for all Computer Science pathways.

  - MSDE no longer receiving **$105k annually** for the purpose of hiring a computer science contractor.

  - Beginning in FY25, MSDE provides up to **$60k** annually to MCCE to carry out **professional learning activities**.

  - Beginning in FY25, MSDE provides **$500k annually** to MCCE to **expand PreK-12 Computer Science programming** and programs of study, prioritizing historically underserved communities and students, in collaboration with the Office of College and Career Pathways and the Office of Instructional Programs and Services.
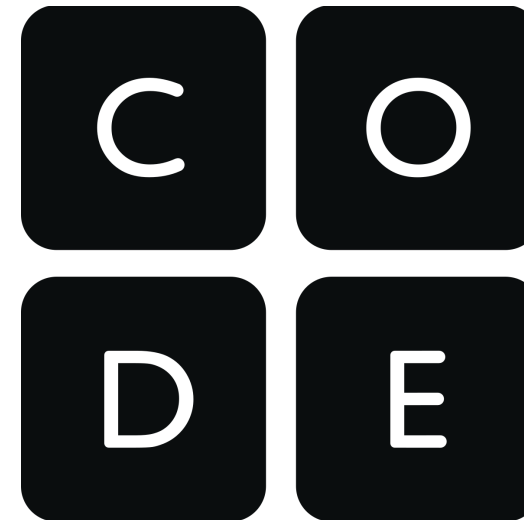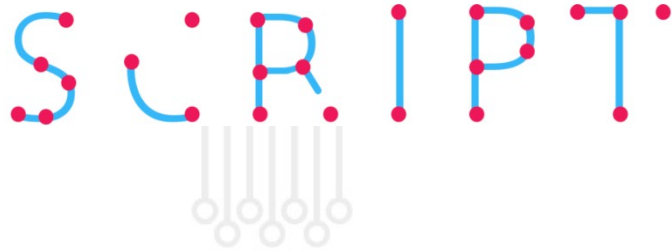
The result is a **700% increase of direct and indirect staffing and financial support** for Computer Science programming at the state level.

Maryland is a National Computer Science Leader

Comparative Access to Computer Science Courses (% of HS offering)

Virginia	Pennsylvania	West Virginia	New Jersey	Maryland
68%	**75%**	**78%**	**86%**	**100%**
❌ State plan	❌ State plan	✅ State plan	✅ State plan	✅ State plan
✅ Funding	✅ Funding	❌ Funding	✅ Funding	✅ Funding
❌ CS required for graduation	❌ CS required for graduation	❌ CS required for graduation	❌ CS required for graduation	➖ CS required for graduation

Ten Policies to Make Computer Science Foundational

State Plan	Standards	Funding	Certification	Preservice
State CS Position	Require HS to Offer	Can Count	Admissions	Graduation Requirement

States ranked by their percentage of offering

60% — National Percentage Offering

State	%
AR	100%
MD	100%
NV	95%
NH	95%
AL	94%
SC	92%
IN	91%
NJ	86%
MS	85%
IA	84%
CT	84%
MA	83%
RI	83%
UT	81%
WV	78%

https://code.org/assets/advocacy/stateofcs/2024/Maryland.pdf

No One Reaches The Summit Alone

We Have a Solid Foundation to Build On

1. **Tied for 1st place in the country** for availability of computer science to students

2. **Comprehensive support** for professional development for teachers

3. Creating **network of coordinated resources** between secondary and post-secondary

4. **Supporting existing courses** and **development of future computer science** CTE **programs**

Moving Beyond The Binary

The path forward requires Maryland to move beyond single experience courses and towards career-connected pathways leading to postsecondary options and good jobs.

- **Advanced Computing Options**: Offer Cyberops Capstone, Linux Essentials, and other advanced courses to build technical expertise.

- **Expanding Web Development Options**: Include courses in Webpage Design, HTML, and Advanced Web Tools for hands-on skills in website creation.

- **Adding and enhancing AI, Data Science, and Cybersecurity opportunities**: Develop locally relevant programs aligned with industry demand in emerging tech fields.

- **Pathway-Based Approach**: Move from stand-alone CS courses to cohesive pathways, allowing for deeper specialization.

- **Capstone Projects and Work-Based Learning Options**: Integrate capstone experiences to apply skills in real-world projects and enhance career readiness.
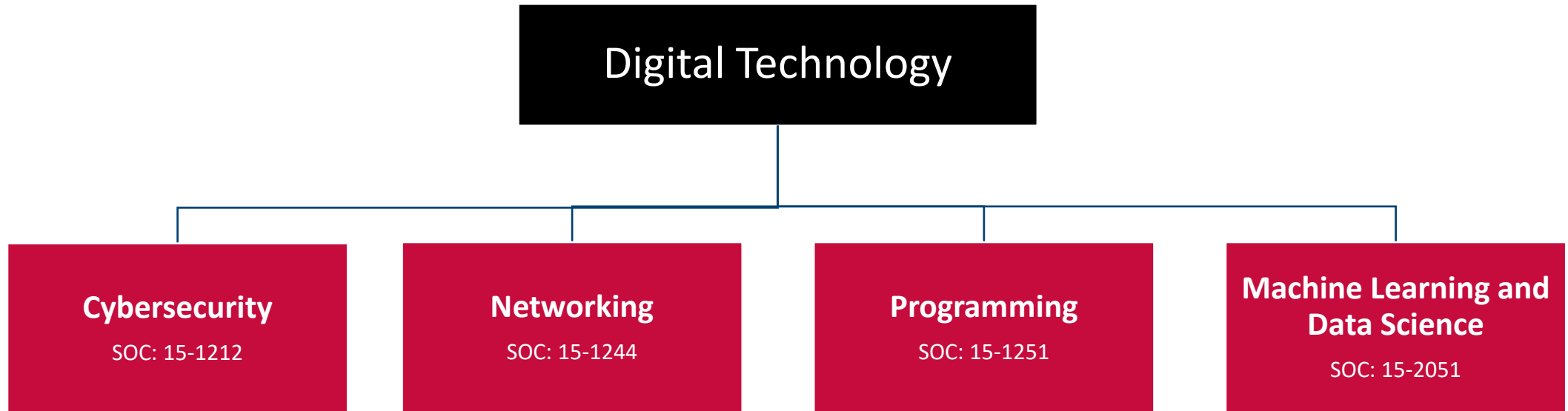
Our Theory of Change

- If **computer science** programs are **aligned with labor market** information (LMI) and regional workforce needs, then students will have **clearer pathways to high-demand, high-wage careers**.

- If **students** are **offered a variety** of computer science pathways that connect to postsecondary and industry opportunities, then they will have **increased agency** in selecting and pursuing their career goals.

- If **computer science** programs are designed to **include real-world applications** and **industry-recognized credentials**, then students will graduate with the skills and qualifications needed to **compete in a global economy**.

- If **schools** provide **targeted supports** and **equitable access** to computer science pathways, then historically underrepresented groups will have **greater participation** in computer science fields.

- If **educators** receive **professional development** to teach cutting-edge computer science curriculum effectively, then student outcomes in computer science will improve, leading to **greater program success and sustainability**.

Implementing Pathways with Purpose

Course 1	Course 2
Computer Programming I	Computer Programming II

CTE Core Concentrator (Required)
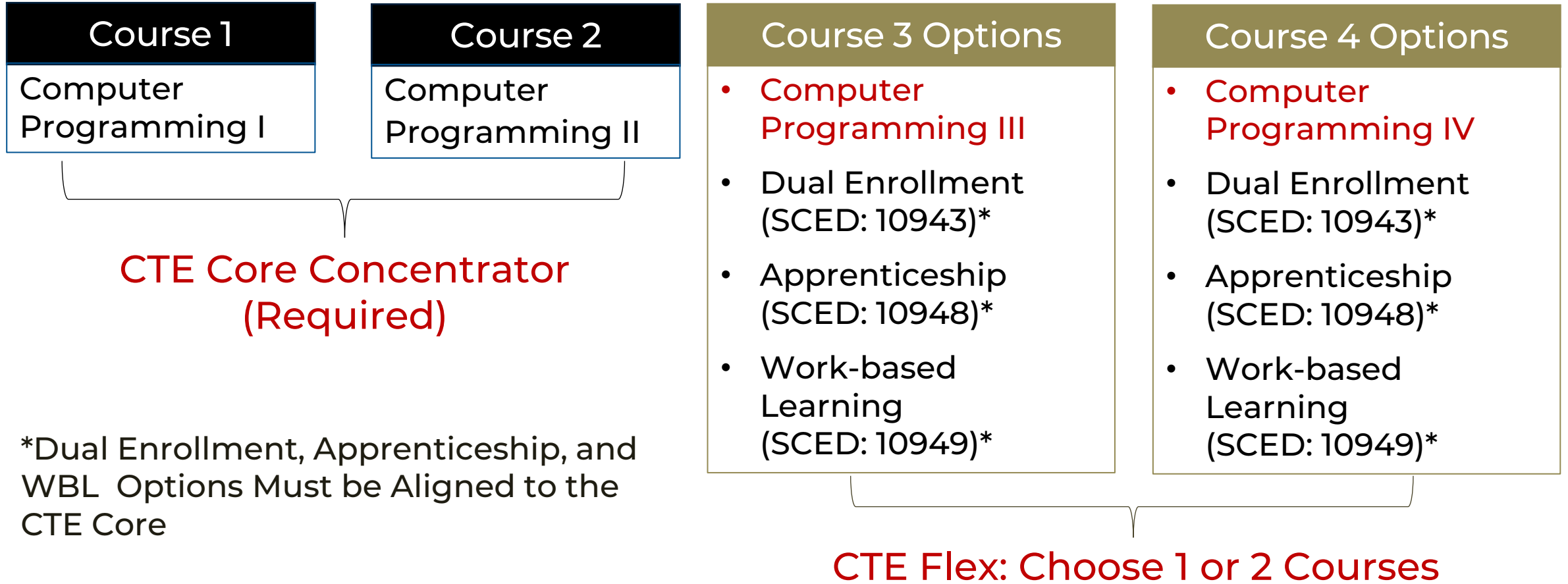
*Dual Enrollment, Apprenticeship, and WBL Options Must be Aligned to the CTE Core

Course 3 Options

- Computer Programming III
- Dual Enrollment (SCED: 10943)*
- Apprenticeship (SCED: 10948)*
- Work-based Learning (SCED: 10949)*

Course 4 Options

- Computer Programming IV
- Dual Enrollment (SCED: 10943)*
- Apprenticeship (SCED: 10948)*
- Work-based Learning (SCED: 10949)*

CTE Flex: Choose 1 or 2 Courses

Aligning Pathways to Labor Market Needs

Digital Technology

Cybersecurity	Networking	Programming	Machine Learning and Data Science
SOC: 15-1212	SOC: 15-1244	SOC: 15-1251	SOC: 15-2051

- **Each pathway consists of two core courses that result in an industry-recognized credential.**
- Also included are a variety options for program completion, such as: **apprenticeship**, **internship**, **dual enrollment**, as well as a continuation of the **courses taken at higher levels** than the core courses.

Connecting Computer Science to Good Jobs

Labor Market Information related to Computer Science pathway options.

Occupation	Standard Occupational Classification (SOC)	Annual Wage (25th percentile)	Current Openings (25th percentile)	Projected Growth in MD (All Levels, 2024-2029)
Information Security Analysts	15-1212	$78,603	724	**19%**
Network and Computer Systems Administrators	15-1244	$64,937	596	**5%**
Computer Programmers	15-1251	$58,136	190	**-4%**
Data Scientists	15-2051	$76,170	257	**33%**

Data source: This report uses state data from the following agencies: Maryland Department of Labor. Lightcast Q4 occupation employment data are based on final Lightcast Q4 industry data and final Lightcast Q4 staffing patterns. Wage estimates are based on Occupational Employment Statistics (QCEW and Non-QCEW Employees classes of worker) and the American Community Survey (Self-Employed and Extended Proprietors). Occupational wage estimates are also affected by county-level Lightcast Q4 earnings by industry.

Computer Programmers: Next Step Job Potential

Occupation	Category	Relevance	Avg. Monthly Job Postings	Mean Salary Difference
Software Developers	Advancement	90%	1,334	+$46,188
Computer Occupations (all other)	Advancement	86%	1,389	+35,396
Data Scientists	Lateral	86%	439	+$33,371
Computer Systems Analyst	Similar	85%	219	+$4,714
Database Administrator	Advancement	85%	227	+$23,118
Database Architects	Advancement	84%	184	+$27,758
Web Developers	Advancement	83%	122	+$37,723
Software Quality Assurance	Advancement	79%	110	+$12,090
Management Analyst	Lateral	79%	323	+$12,235

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Thank you for your time.

We appreciate your questions and conversation.