Computer Science Course Reporting Guidance

CONNECTICUT STATE
DEPARTMENT OF EDUCATION

CSDE

Contents

Overview

Computer science (CS) is defined as the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society [1].

This definition requires that K–12 computer science curricula have the following kinds of elements: computer programming, hardware design, networks, graphics, databases and information retrieval, computer security, software design, programming languages, logic, programming paradigms, translation between levels of abstraction, artificial intelligence, the limits of computation (what computers can't do), applications in information technology and information systems, and social issues (Internet security, privacy, intellectual property, etc.).

As Connecticut schools increase efforts to provide a comprehensive computer science education to all students, a solid understanding of computer science coursework is essential. This guidance is intended to assist districts in the accurate reporting of computer science course enrollments so that the impact of computer science initiatives at the federal, state and local level can be effectively measured. It is recommended that TCS Coordinators, administrators and classroom teachers work collaboratively to identify the most appropriate code for courses based upon the content of the curriculum for the course. Feedback on improvements to this guide is welcomed. Please contact Danielle.Bousquet@ct.gov or Jennifer.Michalek@ct.gov with comments.

This is intended to be used in combination with the NCES Course Code structure [2].

Background

The CT State Board of Education is committed to supporting computer science classrooms across all of our school districts that are diverse in terms of race, gender, disability, socioeconomic status, and English language proficiency. In 2018, *CS for CT: Examining the Landscape of Computer Science in Connecticut* was released [3]. This report highlighted a variety of barriers leading to expanding CS education. One such barrier noted was the difficulty in measuring student participation in CS courses. While Connecticut requires course reporting to the state, it became clear that the data reported for CS courses was not always aligned to what was occurring in the schools. Based upon this finding, recommendations included ensuring that the Connecticut State Department of Education (CSDE) has accurate reporting of CS course participation.

In 2020, the Connecticut State Board of Education adopted Connecticut's Computer Science State Plan [4]. This plan provides a statewide vision to assist in the coherent implementation of K–12 computer science instruction and provides opportunities for all Connecticut K–12 students, regardless of race, gender, disability, socio-economic status, or English language proficiency, to engage in high-quality computer science education. Accurate CS course enrollments across all school districts will ensure the CSDE can measure and assess progress towards broadening participation in computing in our state.

CSDE has plans to report through its public data portal, EdSight, a variety of metrics relative to computer science course access and participation. These metrics will be provided at the state, district, and school levels. Through accurate measurements of CS course enrollments, advocacy efforts can be targeted to the schools and districts most in need. In order to ensure this, districts must have a clear understanding

of computer science based upon the adopted state standards [5] and identify the most appropriate course codes based upon the course content.

Teacher Authorization

Sec. 10-145d-466. of Regulations Concerning State Educator Certificates, Permits and Authorizations of the Connecticut State Board of Education [6] states that, "A certificate shall be required for anyone serving in the employ of a board of education as a teacher of computer technology, computer literacy, computer programming or electronics, data processing, or related courses." Therefore, an educator holding any grade appropriate Connecticut teaching certificate is authorized to teach computer science courses. When reporting teacher assignments into the Educator Data System, districts need to report the teaching assignment as 90295, Computer Education, to maintain compliance.

While a specific endorsement in computer science is not required, Connecticut currently offers a cross-endorsement in computer science for currently certified teachers. Teachers may obtain this endorsement through successful completion of specific coursework or by passing the Praxis II Computer Science Test. Additional information about this is available on the CSDE Certification Webpage.

Graduation Requirements

Beginning with the graduation class of 2023, students must have attained a minimum of 25 credits with at least 9 credits in Science, Technology, Engineering and Mathematics (STEM). The type of credit awarded for any course is determined at the local level. The STEM Education Act of 2015, states, "the term ''STEM education'' means education in the subjects of science, technology, engineering, and mathematics, including computer science" [7]. Therefore, computer science is permissible for a local education agency to allow courses in computer science to fulfill the STEM core graduation requirements. The credit is awarded based upon the alignment to standards of the course curriculum and must be taught by an authorized educator (Teacher Authorization).

Group 1 Computer Science

Definition

Group 1 computer science courses demonstrate strong alignment to Connecticut's Computer Science State Standards [8], which consist of CSTA Standards [9] and ISTE Standards [10]. These courses provide fundamental, foundational knowledge of computer science. Group 1 computer science courses are most readily identified in the areas of computer programming, databases, networking and cybersecurity. Below is a list of the courses Connecticut has identified as Group 1 courses. Where applicable, relevant standards are identified to provide additional guidance. However, these are general descriptions and additional standards may be addressed in some courses.

Courses

Programming

Group 1 courses categorized under the Programming cluster of courses tend to focus on the CSTA Standards Concept of **Algorithms & Programming (AP)** at a level appropriate for grade bands 9-10 and 11-12. Secondary CSTA Standards may include **Computing**

Systems (CS), **Data & Analysis (DA)**, and **Impacts of Computing (IC)**. Courses in this cluster are most connected to the following ISTE Standards: **Knowledge Constructor, Innovative Designer**, **Computational Thinker**, and **Creative Communicator**.

SCED Code	Course Name
10011	*Computer Science Principles* Computer Science Principles courses provide students the opportunity to use programming, computational thinking, and data analytics to create digital artifacts and documents representing design and analysis in areas including the Internet, algorithms, and the impact that these have on science, business, and society. Computer Science Principles courses teach students to use computational tools and techniques including abstraction, modeling, and simulation to collaborate in solving problems that connect computation to their lives.
10012	*Exploring Computer Science* Exploring Computer Science courses present students with the conceptual underpinnings of computer science through an exploration of human computer interaction, web design, computer programming, data modeling, and robotics. While these courses include programming, the focus is on the computational practices associated with doing computer science, rather than just a narrow focus on coding, syntax, or tools. Exploring Computer Science courses teach students the computational practices of algorithm design, problem solving, and programming within a context that is relevant to their lives.
10013	*PLTW Computer Science Essentials* Following Project Lead the Way's suggested curriculum, PLTW Computer Science Essentials (formerly known as PLTW Introduction to Computer Science) courses introduce students to computational thinking concepts, fundamentals, and tools. Students will increase their understanding of programming languages through the use of visual and text-based programming. Projects will include the creation of apps and websites to address real-life topics and problems.
10014	*PLTW Computer Science A* Following Project Lead the Way's suggested curriculum to prepare students for the College Board's Advanced Placement Computer Science A exam, PLTW Computer Science A (formerly known as PLTW Computer Science Applications) courses focus on extending students' computational thinking skills through the use of various industry-standard programming and software tools. In these courses, students collaborate to design and produce solutions to real-life problems.
10015	*PLTW Computer Science Principles* Following Project Lead the Way's suggested curriculum to prepare students for the College Board's Advanced Placement

Computer Science Principles exam, PLTW Computer Science Principles (formerly known as PLTW Computer Science and Software Engineering) courses are designed to help students develop computational thinking, and introduce students to possible career paths involving computing. These courses help students build programming expertise and familiarity with the Internet using multiple platforms and programming languages. Course content may include application development, visualization of data, cybersecurity, and simulation.

10019   *AP Computer Science Principles*
Following the College Board's suggested curriculum designed to parallel college-level computer science principles courses, AP Computer Science Principles courses introduce students to the fundamental ideas of computer science and how to apply computational thinking across multiple disciplines. These courses teach students to apply creative designs and innovative solutions when developing computational artifacts. These courses cover such topics as creative development, data, algorithms and programming, computer systems and networks, and the impact of computing.

10021   *CS Discoveries*
Computer Science Discoveries is a highly interactive and collaborative introduction to the field of computer science. The course takes a wide lens on computer science by covering topics such as problem solving, programming, physical computing, user centered design, and data. Students build their own websites, apps, animations, games, and physical computing systems. Students create and share their own content to meet various design challenges, as well as implement computational solutions to problems that impact their communities. Along the way, they practice design, testing, and iteration, as they come to see that failure and debugging are an expected and valuable part of the programming process.

10152   *Computer Programming*
Computer Programming courses provide students with the knowledge and skills necessary to construct computer programs in one or more languages. Computer coding and program structure are often introduced with the BASIC language, but other computer languages, such as Visual Basic (VB), Java, Pascal, C++, and C#, may be used instead. Students learn to structure, create, document, and debug computer programs. Advanced courses may include instruction in object-oriented programming to help students develop applications for Windows, database, multimedia, games, mobile and/or Web environments. An emphasis is placed on design, style, clarity, and efficiency. In these courses, students apply the skills they learn to relevant authentic applications.

10153   *Visual Basic (VB) Programming*
Visual Basic (VB) Programming courses provide an opportunity for students to gain expertise in computer programs using the Visual Basic (VB) language. As with more general computer programming courses, the emphasis is on how to structure and document computer programs and how to use problem-solving techniques. These courses cover such topics as the use of text boxes, scroll bars, menus, buttons, and Windows applications. More advanced topics may include mathematical and business functions and graphics.

10154   *C++ Programming*
C++ Programming courses provide an opportunity for students to gain expertise in computer programs using the C++ language. As with more general computer programming courses, the emphasis is on how to write logically structured programs, include appropriate documentation, and use problem-solving techniques. More advanced topics may include multi-dimensional arrays, functions, sorting, loops, and records.

10155   *Java Programming*
Java Programming courses provide students with the opportunity to gain expertise in computer programs using the Java language. As with more general computer programming courses, the emphasis is on how to structure and document computer programs, using problem-solving techniques. Topics covered in the course include syntax, I/O classes, string manipulation, and recursion.

10156   *Computer Programming - Other Language*
Computer Programming—Other Language courses provide students with the opportunity to gain expertise in computer programs using languages other than those specified (such as Pascal, FORTRAN, Python, or emerging languages). As with other computer programming courses, the emphasis is on how to structure and document computer programs, using problem-solving techniques. As students advance, they learn how to best utilize the features and strengths of the language being used.

10157   *AP Computer Science A*
Following the College Board's suggested curriculum designed to mirror college-level computer science courses, AP Computer Science A courses emphasize object-oriented programming methodology with a focus on problem solving and algorithm development. These courses cover such topics as object-oriented program design; program implementation; program analysis; standard data structures; standard algorithms; and the ethical and social implications of computing systems.

deprecated   *AP Computer Science AB - Use 10160*

10160   *Particular Topics in Computer Programming*

These courses examine particular topics in computer programming other than those already described elsewhere in this classification system. (Note: AP Computer Science AB and other advanced programming courses should be coded here.)

10197   *Computer Programming - Independent Study*
Computer Programming—Independent Study courses, often conducted with instructors as mentors, enable students to explore topics related to computer programming. Independent Study courses may serve as an opportunity for students to expand their expertise in a particular specialization, to explore a topic in greater detail, or to develop more advanced skills.

10198   *Computer Programming—Workplace Experience*
Computer Programming—Workplace Experience courses provide students with work experience in fields related to computer programming. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.

10199   *Computer Programming – Other*
Other Computer Programming courses. This should be used as a last resort.

21009   *Robotics*
Robotics courses help students develop and expand their skills and knowledge of robotics and related scientific and engineering topics. Course topics may include principles of mechanics, electronics, hydraulics, pneumatics, programmable logic controllers. These courses may emphasize the use of engineering principles to design and build robots, construct and connect sensors, and program robots in the programming language.

Databases

Group 1 courses categorized under the Databases cluster of courses tend to focus on the CSTA Standards Concepts of **Algorithms & Programming (AP)** and **Data & Analysis (DA)** at a level appropriate for grade bands 9-10 and 11-12. Secondary CSTA Standards may include **Impacts of Computing (IC)** and **Networks & the Internet (NI)**. Courses in this cluster are most connected to the following ISTE Standards: **Computational Thinker**, **Innovative Designer**, and **Global Collaborator**.

SCED Code	Course Name
10052	*Database Management and Data Warehousing*

Database Management and Data Warehousing courses provide students with the skills necessary to design databases to meet user needs. Courses typically address how to enter, retrieve, and manipulate data into useful information. More advanced

topics may cover implementing interactive applications for common transactions and the utility of mining data.

10053   *Database Applications*
Database Application courses provide students with an understanding of database development, modeling, design, and normalization. These courses typically cover such topics as SELECT statements, data definition, manipulation, control languages, records, and tables. In these courses, students may use Oracle WebDB, SQL, PL/SQL, SPSS, and SAS and may prepare for certification.

Networking

Group 1 courses that are categorized under the Networking cluster of courses tend to focus on the CSTA Standards Concepts of **Computing Systems (CS)** and **Networks & the Internet (NI)** at a level appropriate for grade bands 9-10 and 11-12. Secondary concepts may include **Algorithms & Programming (AP)**, **Data & Analysis (DA)**, and **Impacts of Computing (IC)**. Courses in this cluster are most connected to the following ISTE Standards: **Digital Citizen**, **Innovative Designer**, and **Computational Thinker**.

10101   *Network Technology*
Network Technology courses address the technology involved in the transmission of data between and among computers through data lines, telephone lines, or other transmission media, such as hard wiring, wireless, cable networks, and so on. These courses may emphasize the capabilities of networks, network technology itself, or both. Students typically learn about network capabilities and network technology, including the software, hardware, and peripherals involved in setting up and maintaining a computer network.

10102   *Networking Systems*
Network Technology courses address the technology involved in the transmission of data between and among computers through data lines, telephone lines, or other transmission media, such as hard wiring, wireless, cable networks, and so on. These courses may emphasize the capabilities of networks, network technology itself, or both. Students typically learn about network capabilities and network technology, including the software, hardware, and peripherals involved in setting up and maintaining a computer network.

10108   *Network Security*
Network Security courses provide students with an understanding of network security principles and implementation. Course topics usually include authentication, the types of attacks and malicious code that may be used against computer networks, the threats and countermeasures for email, Web applications, remote access, and file and print services. These courses may also cover a variety of security

topologies as well as technologies and concepts used for providing secure communication channels, secure internetworking devices, intrusion detection systems, and firewalls.

10109   *Essentials of Network Operating Systems*
Essentials of Network Operating Systems courses provide students with an overview of multi-user, multi-tasking network operating systems. In these courses, students study the characteristics of operating systems, such as Linux, and various Windows network operating systems and explore a range of topics including installation procedures, security issues, back-up procedures, and remote access. Advanced topics may include network administration, including account management, training, evaluating new technology, developing system policies, troubleshooting, email and business communications and Web site management.

10111   *Particular Topics in Networking Systems*
These courses examine particular topics in networking systems other than those already described elsewhere in this classification system.

10112   *Local Area Networking*
Local Area Networking courses introduce students to local area networking (LAN) administration skills, operating systems, basic user skills, defining network objects, building a simple LAN topology applying principles of cabling, LAN switching, designing file systems, managing user access, securing file systems, working with directory service software security, implementing network printing, implementing login scripts, and managing user environments.

10147   *Networking Systems - Independent Study*
Networking Systems—Independent Study courses, often conducted with instructors as mentors, enable students to explore topics related to networking systems. Independent Study courses may serve as an opportunity for students to expand their expertise in a particular specialization, to explore a topic in greater detail, or to develop more advanced skills.

10148   *Networking Systems - Workplace Experience*
Networking Systems—Workplace Experience courses provide students with work experience in fields related to networking systems. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.

10149   *Networking Systems – Other*
Other Networking Systems courses.

10255	*CISCO - The Panduit Network Infrastructure Essentials (PNIE)* CISCO—PNIE courses provide students with the knowledge to create innovative network infrastructure solutions. These courses offer students basic cable installer information and help them acquire the skills to build and use the physical layer of network infrastructure and develop a deeper understanding of networking devices.

Cybersecurity

Group 1 courses categorized under the Cybersecurity cluster of courses tend to focus on the CSTA Standards Concepts of **Impacts of Computing (IC)** and **Networks & the Internet (NI)** at a level appropriate for grade bands 9-10 and 11-12. Secondary concepts may include **Algorithms & Programming (AP)**, **Computing Systems (CS)**, and **Data & Analysis (DA)**. Courses in this cluster are most connected to the following ISTE Standards: **Digital Citizen**, **Innovative Designer**, and **Computational Thinker**.

SCED Code	Course Name
10016	*PLTW Cybersecurity* Following Project Lead the Way's suggested curriculum, PLTW Cybersecurity courses introduce students to the tools and concepts of cybersecurity. In these courses, students are encouraged to understand vulnerabilities in computational resources and to create solutions that allow people to share computing resources while retaining privacy. These courses also introduce students to issues related to ethical computing behavior.
10020	*Cybersecurity* Cybersecurity courses introduce students to the concepts of cybersecurity. These courses provide students with the knowledge and skills to assess cyber risks to computers, networks, and software programs. Students will learn how to create solutions to mitigate cybersecurity risks. These courses may also cover the legal environment and ethical computing behavior related to cybersecurity.
10301	*Computer Forensics* These courses examine particular topics in networking systems other than those already described elsewhere in this classification system.
10302	*Cyber Crime Cyber* Crime courses cover legal and ethical behavior associated with network security. Topics may include discussions about current common practices used to secure networks, how to test these networks, and presents methods that can be used to create a secure network environment. These courses may also cover the impact federal and state legislation has had on information technology practices.

Computer Applications

Group 1 courses categorized under the Computer Applications cluster of courses tend to focus on the CSTA Standards Concepts of **Algorithms & Programming (AP)** at a level appropriate for grade bands 9-10 and 11-12. Secondary concepts may include **Impacts of Computing (IC)**. Courses in this cluster are most connected to the following ISTE Standards: **Knowledge Constructor**, **Innovative Designer**, **Computational Thinker**, and **Creative Communicator**.

SCED Code	Course Name
10110	*Microsoft Certified Professional (MCP)* Microsoft Certified Professional courses provide students with the knowledge and skills necessary to be employed as a network administrator in the latest Windows server-networking environment. Topics include installing, configuring, and trouble-shooting the Windows server. These courses prepare students to set up network connections; manage security issues and shares; and develop policies. Students are typically encouraged to take the MCP exam.
10201	*Web Page Design* Web Page Design courses teach students how to design websites by introducing them to and refining their knowledge of site planning, page layout, graphic design, and the use of markup languages—such as Extensible Hypertext Markup, JavaScript, Dynamic HTML, Document Object Model, and Cascading Style Sheets—to develop and maintain a web page. These courses may also cover security and privacy issues, copyright infringement, trademarks, and other legal issues relating to the use of the Internet. Advanced topics may include the use of forms and scripts for database access, transfer methods, and networking fundamentals.
10205	*Computer Gaming and Design Computer* Gaming and Design courses prepare students to design computer games by studying design, animation, artistic concepts, digital imaging, coding, scripting, multimedia production, and game play strategies. Advanced course topics include, but are not limited to, level design, environment and 3D modeling, scene and set design, motion capture, and texture mapping.
10206	*Mobile Applications* Mobile Applications courses provide students with opportunities to create applications for mobile devices using a variety of commercial and open source software. These courses typically address the installation and modification of these applications, as well as customer service skills to handle user issues.

Business

Group 1 courses categorized under the Business cluster of courses tend to focus on the CSTA Standards Concepts of **Algorithms & Programming (AP)** at a level appropriate for grade bands 9-10 and 11-12. Secondary concepts may include **Data & Analysis (DA)** and **Impacts of Computing (IC)**. Courses in this cluster are most connected to the following ISTE Standards: **Knowledge Constructor**, **Innovative Designer**, and **Computational Thinker**.

SCED Code	Course Name
10054	*Data Systems/Processing Data* Systems/Processing courses introduce students to the uses and operation of computer hardware and software and to the programming languages used in business applications. Students typically use BASIC, COBOL, and/or RPL languages as they write flowcharts or computer programs and may also learn data-processing skills.
10151	*Business Programming* Business Programming courses provide students with experience in using previously written software packages. Topics may include loops, arrays, and functions as well as instruction on how to design and write programs of their own. These courses contain a business industry focus and provide an overview of the principles of object-oriented design and programming (e.g., Visual Basic [VB], C++, Java, RPL) related to the business industry.

Other

SCED Code	Course Name
10159	*IB Computing Studies* IB Computer Science courses prepare students to take the International Baccalaureate Computer Science exams. The courses emphasize system fundamentals, computer organization, and networks, as well as the fundamental concepts of computational thinking, the development of practical computational solutions, and programming. IB Computer Science courses also cover the applications and effects of the computer on modern society as well as the limitations of computer technology.

Group 2 Computer Science

Definition

Group 2 computer science courses have alignment to some of Connecticut's Computer Science State Standards but often also contain substantial non-CS elements. The foundational computer science skills learned within these courses vary across the state and is dependent upon the curricula taught. Group 2 computer science courses are often found in the areas of computer

applications and general computer literacy. Below is a list of the courses Connecticut has identified as Group 2 courses, including the SCED Code, title, and description.

Courses

Networking

SCED Code	Course Name
10103	*Area Network Design and Protocols*

Area Network Design and Protocols courses address the role of computers in a network system, the Open Systems Interconnection (OSI) model, structured wiring systems, and simple LAN (local area network) and WAN (wide area network) designs.

10104	*Router Basics*

Router Basics courses teach students about router components, installation, and configuration using routers (e.g., CISCO) switches and the IOS (Internetwork Operation System). These courses also cover such topics as TCP/IP protocol, IP addressing, subnetting concepts, and network troubleshooting.

10105	*Netware Routing*

NetWare Routing courses introduce students to such topics as Virtual LANs (VLAN) and switched internetworking, comparing traditional shared local area network (LAN) configurations with switched LAN configurations, and they also discuss the benefits of using a switched VLAN architecture. These courses also may cover routing protocols like RIP, IGRP, Novell IPX, and Access Control Lists (ACLs).

10106	*Wide Area Telecommunications and Networking*

Wide Area Telecommunications and Networking courses provide students with the knowledge and skills to enable them to design Wide Area Networks (WANs) using ISDN, Frame-Relay, and PPP. These courses provide students with an understanding of internetworking and expertise in troubleshooting and assessing the adequacy of network configurations to meet changing conditions. Topics may also include Local Area Network (LAN) segmentation.

10107	*Wireless Networks*

Wireless Networks courses focus on the design, planning, implementation, operation, and troubleshooting of wireless computer networks, including local access networks (LANs). These courses typically include a comprehensive overview of best practices in technology, security, and design.

General Computer Literacy

SCED Code	Course Name
10001	*Introduction to Computer Technology*

Formerly known as Introduction to Computers, Introduction to Computer Technology courses introduce students to computers, including peripheral and mobile devices; the functions and uses of computer technology; the language used in the industry; possible applications of various computer-based technologies; and occupations related to computer technology hardware and software industries. These courses typically explore legal and ethical issues associated with computer technology use, as well as how changes influence modern society. Students may also be required to perform some computer technology operations.

10002   *Computing Systems*
Computing Systems courses offer a broad exploration of the use of computers in a variety of fields. These courses have a considerable range of content, but typically include the introduction of robotics and control systems, computer-assisted design, computer-aided manufacturing systems, and other computer technologies as they relate to industry applications.

10251   *Computer Technology*
Computer Technology courses introduce students to the features, functions, and design of computer hardware and provide instruction in the maintenance and repair of computer components and peripheral devices.

10252   *Computer Maintenance*
Computer Maintenance courses prepare students to apply basic electronic theory and principles in diagnosing and repairing personal computers and input/output devices. Topics may include operating, installing, maintaining, and repairing computers, network systems, digital control instruments, programmable controllers, and processors.

10254   *IT Essentials: PC Hardware and Software*
IT Essentials: PC Hardware and Software courses provide students with in-depth exposure to computer hardware and operating systems. Course topics include the functionality of hardware and software components as well as suggested best practices in maintenance and safety issues. Students learn to assemble and configure a computer, install operating systems and software, and troubleshoot hardware and software problems. In addition, these courses introduce students to networking and often prepare them for industry certification.

Computer Applications

SCED Code	Course Name
10202	*Computer Graphics*

Computer Graphics courses provide students with the opportunity to explore the ways in which computers can produce visual imagery that communicates information and ideas effectively to multiple audiences using a variety of media

and formats. Course topics may include principles and elements of design, image creation, image manipulation, and image types.

10203	*Interactive Media*
	Interactive Media courses provide students with the knowledge and skills to create, design, and produce interactive digital media products and services. The courses may emphasize the development of digitally generated and/or computer-enhanced media. Course topics may include 3D animation, graphic media, web development, and virtual reality. Upon completion of these courses, students may be prepared for industry certification.
10204	*Particular Topics in Media Technology*
	These courses examine particular topics in internet design and applications other than those already described elsewhere in this classification system.
10247	*Media Technology - Independent Study*
	Media Technology—Independent Study courses, often conducted with instructors as mentors, enable students to explore topics related to media technology. Independent Study courses may serve as an opportunity for students to expand their expertise in a particular specialization, to explore a topic in greater detail, or to develop more advanced skills.
10248	*Media Technology - Workplace Experience*
	Media Technology—Workplace Experience courses provide students with work experience in fields related to media technology. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.
10249	*Media Technology – Other*
	Other Media Technology courses.

Business

SCED Code	Course Name
10051	*Information Management*
	Information Management courses provide students with the knowledge and skills to develop and implement a plan for an information system that meets the needs of business. Students develop an understanding of information system theory, skills in administering and managing information systems, and the ability to analyze and design information systems.

Engineering

SCED Code	Course Name
10006	*Telecommunications*

Telecommunications courses address the growth in global communications and the emerging equipment and systems needed to successfully communicate in a global environment. These courses cover such topics as data communication protocol and systems, government regulations of the communications industry, the use of cost-effective and productive tools to transmit messages and data, and live synchronistic video exchanges. Other topics may include telecommunications terminology, tools and test equipment; customer service experience; and installation, repair, and delivery of telecommunications systems. In these courses, students may learn about such communication systems as email, internet, or e-commerce, local area network (LAN), wide area network (WAN), voice transmission, cell phone technology, teleconferencing, and videoconferencing.

13203   *Machining*
Machining courses enable students to design and manufacture metal parts using various machine tools and equipment. Course content may include interpreting specifications using blueprints; preparing and using manual and computer numerical controlled (CNC) lathes and milling machines, shapers, and grinders with skill, safety, and precision; maintenance; developing part specifications; and selecting appropriate materials. Advanced course topics may include quality control; statistical process control; and application of measurements, metalworking theory, and properties of materials. Courses may prepare students for industry certification.

21006   *Engineering Design*
Engineering Design courses offer students experience in solving problems by applying a design development process. Often using solid modeling computer design software, students develop, analyze, and test product solutions models as well as communicate the features of those models.

21007   *Engineering Design and Development*
Engineering Design and Development courses provide students with the opportunity to apply engineering research principles as they design and construct a solution to an engineering problem. Students typically develop and test solutions using computer simulations or models but eventually create a working prototype as part of the design solution.

21008   *Digital Electronics*
Digital Electronics courses teach students how to use applied logic in the development of electronic circuits and devices.

Students may use computer simulation software to design and test digital circuitry prior to the actual construction of circuits and devices.

21023   *PLTW Digital Electronics*
Following Project Lead the Way's suggested curriculum, PLTW Digital Electronics courses introduce students to digital circuits in appliances and mobile devices. Course topics include combinational and sequential logic, logic gates, integrated circuits, programmable logic devices, along with other circuit design tools.

21059   *Modeling and Simulation Technology*
Modeling and Simulation Technology courses allow students to explore the use of modeling, simulation, and game development software to solve real-world problems in science, technology, engineering, and mathematics (STEM). These courses typically address the systems, processes, tools, and implications of the field of modeling and simulation technology. Courses topics may also include evaluating and testing engineering designs, modeling geospatial data, observing and analyzing physics simulations, programming games for educational purposes, and creating visualization systems with 3D models.

Other

There are additional courses that meet the criteria for a Group 2 computer science course. These courses are listed below.

SCED Code	Course Name
03206	*IB Design Technology* IB Design Technology courses prepare students to take the International Baccalaureate Design Technology exams. In keeping with the general aim of IB Experimental Sciences courses, IB Design Technology courses promote using critical-thinking and design skills to solve problems in a practical context. Practical/investigative work centers on the design process; product design, development, and innovation; green design; materials; and evaluation.
03153	*Principles of Technology* Principles of Technology courses focus on the study of the forces and laws of nature and their application to modern technology. Equilibrium, motion, momentum, energy conversion, electromagnetism, and optical phenomena are presented in the context of current, real-world applications. Demonstrations, mathematics labs, and applied laboratory experiments are an integral part of the Principles of Technology curriculum. These courses may enable students to gain a solid

foundation for careers in electronics, robotics, telecommunications, and other technological fields.

10003   *Computer and Information Technology*
Computer and Information Technology courses teach students to operate and use computer and information technology, emphasizing their role as tools to communicate more effectively, conduct research more efficiently, and increase productivity. Course content includes the legal and ethical issues involved with computer technology and use.

10007   *IB Information Technology in a Global Society*
IB Information Technology in a Global Society courses prepare students to take the International Baccalaureate Information Technology exams and examine the interaction among information, technology, and society. Course content is designed to help students develop a systematic, problem solving approach to processing and analyzing information using a range of information tools. In these courses, students also discuss and evaluate how modern information technology affects individuals, relationships among people, and institutions and societies.

10055   *Particular Topics in Management Information Systems*
These courses examine particular topics in management information systems other than those already described elsewhere in this classification system.

10097   *Management Information Systems - Independent Study*
Management Information Systems—Independent Study courses, often conducted with instructors as mentors, enable students to explore topics related to management information systems. Independent Study courses may serve as an opportunity for students to expand their expertise in a particular specialization, to explore a topic in greater detail, or to develop more advanced skills.

10098   *Management Information Systems - Workplace Experience*
Management Information Systems—Workplace Experience courses provide work experience in fields related to management information systems. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.

10099   *Management Information Systems – Other*
Other Management Information Systems courses.

10253   *Information Support and Services*
Information Support and Services courses prepare students to assist users of personal computers by diagnosing their problems

in using application software packages and maintaining security requirements.

10256   *Particular Topics in Information Support and Services*
These courses examine particular topics in computer support, maintenance, and repair other than those already described elsewhere in this classification system.

10297   *Information Support and Services—Independent Study*
Information Support and Services—Independent Study courses, often conducted with instructors as mentors, enable students to explore topics related to computer information support and services. Independent Study courses may serve as an opportunity for students to expand their expertise in a particular specialization, to explore a topic in greater detail, or to develop more advanced skills.

10298   *Information Support and Services—Workplace Experience*
Information Support and Services—Workplace Experience courses provide students with work experience in fields related to information support and/or service. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.

10299   *Information Support and Services—Other*
Other Information Support and Services courses.

10997   *Information Technology—Independent Study*
Formerly Computer and Information Sciences—Independent Study, Information Technology—Independent Study courses, often conducted with instructors as mentors, enable students to explore computer-related topics of interest. Independent Study courses may serve as an opportunity for students to expand their expertise in a particular specialization, to explore a topic in greater detail, or to develop more advanced skills.

10998   *Information Technology—Workplace Experience*
Formerly Computer & Information Sciences —WE, Information Technology—Workplace Experience courses provide students with work experience in fields related to computer and/or information sciences. Goals are typically set cooperatively by the student, teacher, and employer (although students are not necessarily paid). These courses may include classroom activities as well, involving further study of the field or discussion regarding experiences that students encounter in the workplace.

10999   *Information Technology—Other*
Other Information Technology courses.

14157   *Health Informatics and Data Management*
Health Informatics and Data Management courses introduce students to automated information systems in the healthcare delivery system. These courses teach students terminology and essential concepts of health information systems and management of data, including the purpose, content, and structure of health data; numbering and filing systems; storage and retention methods; and the construction and design of forms, records, indexes, and registers. These courses may also examine data integrity, privacy/security issues, and the purposes of accreditation and regulatory standards in developing health record practice guidelines.

References

[1] Allen Tucker. 2003. A Model Curriculum for K--12 Computer Science: Final Report of the ACM K--12 Task Force Curriculum Committee. Technical Report. Association for Computing Machinery, New York, NY, USA.

[2] "NCES Course Code Structure Explanation." *CT.gov*, portal.ct.gov/-/media/SDE/Performance/Data-Collection/Help-Sites/TCS/CourseCodeStructure.pdf.

[3] Corricelli, Jacqueline; Freeman, Seth; Uche, Chinma. "CS for CT: Examining the Landscape of Computer Science in Connecticut." CS for CT Landscape Study, ECEP (Expanding Computing Education Pathways), Aug. 2018, utexas.app.box.com/s/nn7a0n8eg5tctvbtr751iifxys3j9smq.

[4] "Connecticut Computer Science Plan." *CT.gov*, Connecticut State Board of Education, portal.ct.gov/-/media/SDE/Computer-Science/Connecticut_Computer_Science_State_Plan_FINAL.pdf.

[5] U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics

[6] "REGULATIONS OF THE CONNECTICUT STATE BOARD OF EDUCATION." *CT.gov*, Connecticut Board of Education, 6 Aug. 1998, portal.ct.gov/-/media/SDE/Certification/regulations.pdf.

[7] Smith, Lamar. "H.R.1020 - 114th Congress (2015-2016): STEM Education Act of 2015." *Congress.gov*, 7 Oct. 2015, www.congress.gov/bill/114th-congress/house-bill/1020.

[8] Wentzell, Dianna R. "Memo: Adoption of the Computer Science Teacher Association (CSTA) K-12 Standards and the International Society for Technology Education (ISTE) Standards for Students." *CT.gov*, Connecticut State Board of Education, 6 June 2018, portal.ct.gov/-/media/SDE/Board/Board Materials060618/Adoption_of_the_Computer_Science_Teacher_Association_CSTAK12_Standards.pdf.

[9] "Computer Science Teachers Association (CSTA) Standards." *CSTeachers.org*. CSTA, https://www.csteachers.org/page/standards.

[10] "ISTE Standards for Students". *ISTE.org*, https://www.iste.org/standards/for-students.

[11] ECEP NE Metrics: *Expanding Computing Education Pathways*, ecepalliance.org/connecticut-0.

Contributors

Thank you to the following individuals for contributing to this document:

Susan Auchincloss, ReadyCT
Danielle Bousquet, CT State Department of Education
Jacqueline Corricelli, West Hartford Public Schools
Seth Freeman, Capital Community College
Jennifer Michalek, CT State Department of Education
Chinma Uche, CREC Academy of Aerospace and Engineering

Thank you to the following districts for piloting this document:

Bridgeport Public Schools
Capitol Region Education Council
New Haven Public Schools
New London Public Schools
Newtown Public Schools

Acknowledgments