Information Technology

Program of Studies
2017-2019

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INFORMATION TECHNOLOGY

Course Title	Post-Secondary Connection	Course Code	Recommended Grade Level				Recommended Credit
			9	10	11	12	
Accessing the WAN/Connecting Networks/Cisco IV	CIT 212	110905		X	X	X	1
Advanced 3D Game Development	DGD232	113603		X	X	X	1
Advanced Game Development and Publishing	DGD131	113602		X	X	X	1
AP Computer Science A		110701		X	X	X	1
AP Computer Science Principles		110711	X	X	X	X	1
AP Computer Science Principles (PLTW)		110730	X	X	X	X	1
C# I	CIT 143	110214		X	X	X	1
C# II	CIT 243	110215		X	X	X	1
C++ I	CIT 142	110202		X	X	X	1
C++ II	CIT 242	110216		X	X	X	1
Computational Thinking	CIT 120	110251		X	X	X	1
Computer Hardware and Software Maintenance	CIT 111	110101	X	X	X	X	0.5-1
Computer Literacy	CIT 105	110110	X	X	X	X	1
Computer Science (NICERC)		110225	X	X	X	X	1
Computers, Networks and Databases	INF128	111001	X	X	X	X	1
Cyber Literacy I (NICERC)		110222	X	X	X	X	1
Cyber Literacy II (NICERC)		110223	X	X	X	X	1
Cyber Science (NICERC)		110224	X	X	X	X	1
Databases in the Cloud	CIT 170	111003	X	X	X	X	1
Design for the Digital World	INF 128	111002	X	X	X	X	1
Design for the Internet		110213		X	X	X	1
Developing a Cloud Presence	CIT 170	111004	X	X	X	X	1
+Digital 3D Graphics and Special Effects II	DGD231	113604	X	X	X	X	1
Digital Literacy	CIT 105	060112	X	X	X	X	1
+Flash with Action Script		110810		X	X	X	1
Game Design and Development Principles		113605	X	X	X	X	1
Help Desk Operations	CIT 232	110102	X	X	X	X	1
Information Technology Co-op	CIT 199	110918			X	X	1
Information Technology Internship	CIT 290	110919			X	X	1
Internet Technologies	CIT 150	110917		X	X	X	1
Introduction to Computer Science		110710	X	X	X	X	1
+Introduction to Database Design)	CIT 170	110211	X	X	X	X	1
Introduction to Digital Game Graphics	DGD 132	113601	X	X	X	X	1
Introduction to Networking Concepts (non-vendor)	CIT 160	110901	X	X	X	X	1
Introduction to Programming		110201	X	X	X	X	1
JAVA Programming I	CIT 149	110205		X	X	X	1
JAVA Programming II	CIT 249	110206		X	X	X	1
JavaScript	CIT 140	110809		X	X	X	1
LAN Switching and Wireless/Scaling Networks/Cisco III	CIT 209	110904		X	X	X	1
+Leadership Dynamics- Information Technology		110399	X	X	X	X	0.5-1
Management of Support Services		110302			X	X	1

+Microsoft Active Directory Server	*CIT 214*	*110907*		*X*	*X*	*X*	*1*
Microsoft Client/Server Configuration	CIT 213	110913		X	X	X	1
Network Fundamentals/Cisco I	CIT 161	110902	X	X	X	X	1
+Network Hardware Installation and Troubleshooting	*CIT 260*	*110906*		*X*	*X*	*X*	*1*
Perl I	CIT 145	110217		X	X	X	1
PHP I	CIT 141	110218		X	X	X	1
PHP II	CIT 241	110219		X	X	X	1
+Productivity Software	*CIT 130*	*110204*		*X*	*X*	*X*	*1*
Project-Based Programming		110226		X	X	X	1
Python I	CIT 144	110220		X	X	X	1
Python II	CIT 244	110221		X	X	X	1
Routing Protocols and Concepts/Cisco II	CIT 167	110903		X	X	X	1
Security Fundamentals	CIT 180	110912		X	X	X	1
+Special Topics, Computer Science	*CIT 299*	*110752*	*X*	*X*	*X*	*X*	*1*
+Special Topics, Information Support and Services	*CIT 299*	*110152*	*X*	*X*	*X*	*X*	*1*
+Special Topics, Networking	*CIT 299*	*110952*	*X*	*X*	*X*	*X*	*1*
+Special Topics, Programming	*CIT 299*	*110252*	*X*	*X*	*X*	*X*	*1*
+Special Topics, Web Development/Administration	*CIT 299*	*110852*	*X*	*X*	*X*	*X*	*1*
Visual Basic I	CIT 148	110207		X	X	X	1
Visual Basic II: Creating Desktop Applications	CIT 248	110208		X	X	X	1
Web Page Development	CIT 155	110801		X	X	X	1
Web Site Design and Production	CIT 157	110804		X	X	X	1

(+) Upon completion of a pathway, additional coursework to enhance student learning is encouraged. Credits earned in Advanced or Complementary Coursework "Beyond the Pathway" may not be substituted for pathway courses in order to achieve Preparatory or Completer status.

Information Technology

Overview of Information Technology

Purpose:

The vision of Kentucky Information Technology education is to promote industry professional development, enhance leadership, and provide relevant curriculum vital to the education of all students.

Kentucky Information Technology will:

- Operate as the center for industry standard desktop and communications technology in schools.
- Provide a critical link in school to employment or postsecondary education.
- Develop stronger relationships with the business community in terms of mutual advocacy, cooperative field experiences, employment placement and support for student organization experiences.
- Represent a necessary component in the education of all students.
- Require and promote critical thinking and problem solving.
- Offer a flexible curriculum based on standards that adapts to change.
- Integrate academic skills into the information technology curriculum in order to insure that students develop excellent written and verbal communication skills, computational skills and scientific problem-solving skills.

Information Technology (IT) is the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware.

The computer revolution has affected all sectors of business. Almost all employers, from the largest manufacturer to the smallest retail store, need IT workers to keep their business operating smoothly. This demand translates into a real shortage of IT workers. According to the Information Technology Association of America, there is an ever growing projected gap of unfilled IT positions. This fact makes IT the fastest growing employment opportunity in the nation.

Information Technology careers prepare individuals to apply technical knowledge and skills in the rapidly growing occupational fields, e.g. computer networking, programming, digital media, support services and e-commerce/web design. Information Technology careers include ten career pathways. They are: 1.) Network Administration; 2.) Information Support and Services; 3.) Web Development/Administration; 4.) Computer Programming; 5.) Informatics; 6.) Network Security; 7.) Computer Science; 8.) Digital Design and Game Development; 9.) Cyber Engineering; 10.) Computer Programming Blended Hybrid.

Each local school district offering classes in "Computers", "Computer Science", etc. is encouraged to submit a Career and Technical Education "Career Pathways Request Form" to the Office of Career and Technical Education, in order to become a part of the IT network of Kentucky schools. The purpose of this effort is to consolidate the many varied computer

courses, classes, programs, and etc. under one Career and Technical Education program area. This will enable schools to provide better services to students through an organized, coherent network supported by the Office of Career and Technical Education.

All schools involved in the IT program are recommended to offer a "foundations" course (preferably at the 8th or 9th grade level). Students of Information Technology, regardless of which Career Pathway they choose to pursue, would take this course as a "first course". The course "Computer Hardware and Software Maintenance" is recommended for the 10th grade level for career pathways in Information Support and Services, Network Administration, and Network Security. The course "Computational Thinking" is recommended for the 10th grade level for Computer Programming, Digital Design and Game Development, Informatics, and Computer Science.

Students following career pathway course sequences have the opportunity to earn industry recognized certifications, e.g. Network +, A +, I-Net +, Server + as they study for their pathway areas. Also many of these certifications may provide articulation opportunities for students who enter Kentucky Community and Technical Colleges, following high school graduation. It is encouraged that you utilize the Valid Industry Certification and KOSSA List appropriate for the specific school year you are working.

The Program of Study for each career pathway in Information Technology is outlined in the attached "Career Pathway – Course Sequence" charts. Also, specific information on curriculum and course description with content/process information is included in this document. A career pathway description with content/process information is attached for each of the ten "career pathways" in Information Technology.

Course descriptions/curriculum for courses such as A+, CISCO, Microsoft, etc. should be secured from the company/vendor.

Career Pathways
- *Computer Programming*
- *Computer Science*
- *Informatics*
- *Web Development/Administration*
- *Digital Design and Game Development*
- *Information Support and Services*
- *Network Administration*
- *Network Security*
- *Cyber Engineering*
- *Computer Programming Blended Hybrid*

Standards Based Curriculum
The curriculum is composed of standards based competencies. Therefore, the teaching/learning focus is on the final results rather than the process. Information Technology teachers are lecturing less and facilitating more, and as a result, students are taking charge of their own learning by using technology to research topics, collect data and present information orally and

in written form. More Information Technology programs are incorporating school-based enterprises in order for students to apply information technology concepts learned in the classroom.

Kentucky Occupational Skill Standards
The Kentucky Occupational Skill Standards are the performance specifications that identify the knowledge, skills, and abilities an individual needs to succeed in the workplace. Identifying the necessary skills is critical to preparing students for entry into employment or postsecondary education. Because of the importance of skill standards, the Office of Career and Technical Education, in conjunction with industry partners, has developed a system to certify that students have attained the necessary skills for employment or postsecondary education. Standards are developed in the areas of Web Development/Administration, Computer Programming, Information Support and Services, and Network Administration. Standards are being piloted in the area of Digital Design and Game Development. These standards describe the necessary **occupational, academic,** and **employability** skills needed to enter the workforce or post-secondary education in specific career areas. There is an ongoing effort to continue to refine these standards by which exemplary Information Technology programs are evaluated and certified. The strength of these business partnerships insures that curriculum meets industry specifications.

Link to KOSSA Skill Standards documents
via: [KOSSA Skill Standards Documents](#)

Valid KOSSA and Industry Certification for Career Readiness
The Valid List of KOSSA and Industry Certifications for Career Readiness can be viewed via the following link: [KOSSA and Industry Certifications](#). The valid list is reviewed annually through the established process and publishes by June 1 for the corresponding academic year.

Interdisciplinary Courses
The Kentucky graduation requirements allow for interdisciplinary or applied courses to substitute for specific academic courses required for graduation.

School Based Enterprises
In many Kentucky high school Information Technology programs a school based enterprise is an integral part of the curriculum. Running an actual business allows students to learn contextually without leaving school. Textbook concepts become real as students operate a business.

Work Based Learning
Cooperative experience, internships, shadowing, and mentoring opportunities provide depth and breadth of learning in the instructional program and allow students to apply the concepts learned in the classroom.

Students are encouraged to participate in cooperative education and other work-based learning experiences. Cooperative Education consists of in-school instruction combined with on-the-job work experience. Specific guidelines are outlined in 705 KAR 4:041. Information on other

types of work-based learning are described in detail in the document Work-Based Learning Manual available on the KDE web page at Work-Based Learning Manual.

Student Organizations
Each school offering a program in Information Technology is encouraged to offer an appropriate student organization: SkillsUSA, TSA, or FBLA. The student organization skills should be an integral part of the curriculum and included in daily lesson plans. They are also encouraged to have students participate in the Student Technology Leadership Program (STLP). Participation provides a vehicle for students to employ higher order thinking skills, to interact with high-level industry people and to further enhance their leadership skills through their participation in regional, state and national competitive events as well as local activities.

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

COMPUTER PROGRAMMING
CIP 11.0201.01

PATHWAY DESCRIPTION: The Computer Programming pathway courses will prepare students to design and create apps, as well as troubleshoot the latest programming languages used in industry. It is suggested that students complete the pathway with the four following courses: Computer Literacy, Computational Thinking, along with targeted courses for specific programming language(s) or Project-Based Programming as capstones. Upon completion of this career pathway, students will be prepared for an entry level position in the IT field or continue their education in computer programming.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES
Complete (2) TWO CREDITS from the following: • 110110 Computer Literacy **OR** 060112 Digital Literacy • 110251 Computational Thinking *Choose (2) TWO CREDITS from the following:* • 110201 Introduction to Programming • 110202 C++ I • 110216 C++ II • 110205 JAVA Programming I • 110206 JAVA Programming II • 110207 Visual Basic I • 110208 Visual Basic II: Creating Desktop Applications • 110809 JavaScript • 110218 PHP I • 110219 PHP II • 110214 C# I • 110215 C# II • 110220 Python I • 110221 Python II • 110217 Perl I • 110226 Project-Based Programming • 110918 Information Technology Co-op **OR** 110919 Information Technology Internship	Computer Programmer Computer Software Engineer Database Developer Computer Hardware Engineer Computer Systems Analyst Web Developer Information Security Analyst Computer Network Specialist IT Project Manager

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

COMPUTER SCIENCE
CIP 11.0701.01

PATHWAY DESCRIPTION: The Computer Science Pathway courses focus on computer theory, computing problems and solutions, and design of computer systems and user-interfaces. The coursework will include instruction in the principles of computational science, computer development and programming and applications to a variety of end use situations.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES
Choose (1) ONE CREDIT from the following: • 110110 Computer Literacy **OR** 060112 Digital Literacy • 110710 Introduction to Computer Science (May be taken in place of Computer Literacy if proficiency has been demonstrated) *Choose (1-2) ONE - TWO CREDITS from the following:* • 110251 Computational Thinking • 110205 JAVA Programming I • 110711 AP Computer Science Principles **OR** 110730 AP Computer Science Principles (PLTW) Note: PLTW courses require an agreement between Project Lead the Way and the local school district. *Choose (1-2) ONE - TWO CREDITS from the following:* • 110701 AP Computer Science A • 110226 Project-Based Programming • 110202 C++ I • 110809 JavaScript • 110206 JAVA Programming II • 110218 PHP I • 110214 C# I • 110220 Python I • 110217 Perl I • 110918 Information Technology Co-op **OR** 110919 Information Technology Internship	Computer Software Engineer Database Developer Computer Hardware Engineer Computer Network Specialist Computer Scientist Web Developer Information Security Analyst Computer Programmer IT Project Manager

INFORMATION TECHNOLOGY CAREER PATHWAYS 2017-2018

CYBER ENGINEERING
CIP 14.0902.00

PATHWAY DESCRIPTION: The Cyber Engineering pathway is a blend of programming, cyber security, and hardware engineering disciplines. Students will learn to research, design, develop, and test computer systems and components. The National Integrated Cyber Education Research Center (NICERC) courses in the pathway use project-driven, application-based curricula that engage students at the secondary level. The curricula provides the teacher with a rigorous program that showcases a systems-level understanding of real-world applications of science, technology, engineering, and mathematics. The courses provide a hands-on, context-based approach that empowers teachers to prepare students to become the next generation of engineers and cyber professionals. The coursework explores topics such as robotics, electricity, and security concerns in today's digital society.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED
Choose (4) FOUR CREDITS from the following: • 110110 Computer Literacy **OR** 060112 Digital Literacy • 110222 Cyber Literacy I (NICERC) • 110223 Cyber Literacy II (NICERC) • 110224 Cyber Science (NICERC) • 110225 Computer Science (NICERC) • 110918 Information Technology Co-op **OR** 110919 Information Technology Internship Note: There is no cost to implement NICERC courses (outside of cost of equipment). Please see the link for further curriculum information.	Security Systems Technician Computer Hardware Engineer Computer Network Specialist Computer Programmer Computer Scientist Computer Software Engineer

NOTE: PROFESSIONAL DEVELOPMENT IS AVAILABLE THROUGH NICERC DURING THE EDUCATION DISCOVERY FORUM (NICERC PROFESSIONAL DEVELOPMENT).

INFORMATION TECHNOLOGY CAREER PATHWAYS 2017-2018

DIGITAL DESIGN AND GAME DEVELOPMENT
CIP 36.0113.00

PATHWAY DESCRIPTION: The Digital Design and Game Development pathway courses provide students with a thorough understanding of techniques for designing advanced 3D games and simulations. The courses will cover 2D and 3D graphics, animation, character development, texturing, scripting, program design and coding, and game setup using state-of-the-art software development tools. Completing students will have developed the skills necessary to create 3D graphics and applications that can be used for games and simulations.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES
Choose (4) FOUR CREDITS from the following (DIGITAL DESIGN PATH): • 110110 Computer Literacy **OR** 060112 Digital Literacy • 113605 Game Design and Development Principles • 113601 Introduction to Digital Game Graphics • 113603 Advanced 3D Game Development • 113602 Advanced Game Development and Publishing • 110918 Information Technology Co-op **OR** 110919 Information Technology Internship *Choose (4) FOUR CREDITS from the following (PROGRAMMING PATH):* • 110110 Computer Literacy **OR** 060112 Digital Literacy • 113605 Game Design and Development Principles • 113601 Introduction to Digital Game Graphics • 110201 Introduction to Programming • 110251 Computational Thinking • 113602 Advanced Game Development and Publishing	IT Project Manager Computer Animator Cartoonist Game Designer Game Design Analyst Webmaster Web Developer Website Designer

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

NETWORK ADMINISTRATION
CIP 11.0901.01

PATHWAY DESCRIPTION: The network administration pathway courses will help students learn new administration support skills or upgrade existing computer information systems skills. Students will be able to properly install networking software on an appropriately sized computer; configure the software for a simple server environment and connect it correctly to a physical network; manage a simple networking environment; effectively troubleshoot problems; adding new users and attending to security concerns; and work within the ethical/professional parameters in the field of network administration.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES
Complete (1) ONE CREDIT: • 110110 Computer Literacy **OR** 060112 Digital Literacy *Choose (3-4) THREE - FOUR CREDITS (NETWORK ADMINISTRATION PATH):* • 110101 Computer Hardware and Software Maintenance • 110251 Computational Thinking • 110901 Introduction to Networking Concepts(non-vendor) • 110917 Internet Technologies *Choose (3-4) THREE - FOUR CREDITS (CISCO PATH):* • 110902 Network Fundamentals (Cisco I) • 110903 Routing Protocols and Concepts (Cisco II) • 110904 LAN Switching and Wireless Scaling Networks (CiscoIII) • 110905 Accessing the WAN & Connecting Networks (CiscoIV) *Complete (3) THREE CREDITS (MCSA PATH):* • 110101 Computer Hardware and Software Maintenance • 110901 Introduction to Networking Concepts(non-vendor) • 110913 Microsoft Client/ServerConfiguration *OPTIONAL (1) CREDIT:* • 110918 Information Technology Co-op **OR** 110919 Information Technology Internship	Network Server Administrator Support Team Member Quality Assurance System Analyst Sales Representative Technical Support Representative Technical Writing Expert Electronics Engineer Hardware Engineer System Administrator Network Administrator Microsoft Server Administrator Microsoft Server Administrator (Support Team) Cisco Network Administrator Cisco Engineer Cisco Hardware Engineer Cisco System Administrator

NOTE: NETWORK ADMINISTRATION MCSA PATHWAY (11.1001.00) AND NETWORK ADMINISTRATION CISCO PATHWAY (11.1002.00) HAVE BEEN CONSOLIDATED INTO THIS PATHWAY.

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

NETWORK SECURITY
CIP 11.1003.00

PATHWAY DESCRIPTION: The Network Security pathway will help students be able to properly design and install a wired LAN, including all network devices, physically connect servers and desktop computers, properly design and install a wireless LAN including all network devices, and make physical LAN connections for servers and desktop computers, integrate the Wireless LAN with the wired LAN and work within the ethical and professional parameters in the Computer Networking profession. Students will be a team member, learn new network administration support skills and upgrade existing computer information system skills. Students in this pathway have the opportunity to work towards the Security + certification.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES

Choose (4) FOUR CREDITS from the following:
 	
 • 110110 Computer Literacy **OR**
   060112 Digital Literacy
 • 110101 Computer Hardware and Software Maintenance
 • 110901 Introduction to Networking Concepts(non-vendor)
 • 110912 Security Fundamentals
 • 110918 Information Technology Co-op **OR**
   110919 Information Technology Internship
	Computer Network Specialist
	
	 Electronics Engineer
	
	 Computer Hardware Engineer
	
	 System Systems Technician
	
	 Quality Control Analyst

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

WEB DEVELOPMENT/ADMINISTRATION
CIP 11.0801.01

PATHWAY DESCRIPTION: The Web Development/Administration pathway involves creating, designing, and producing interactive multimedia products and services. This will include development of digitally-generated or computer-enhanced media, and the adherence to web standards, as used in business, training, communications and marketing. Organizations of all types and sizes use digital media, web pages, and websites to communicate with existing and potential customers, to track transactions, and to collaborate with colleagues. This pathway will prepare students to enter the workforce ready to participate as leaders in a broad range of careers and further their education. The courses for this pathway are designed to build on each other and should be taken in the order specified.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES
Complete (3) THREE CREDITS from the following: • 110110 Computer Literacy **OR** 060112 Digital Literacy • 110801 Web Page Development • 110804 Web Site Design and Production *Choose (1) ONE CREDIT from the following:* • 110213 Design for the Internet • 110917 Internet Technologies • 110251 Computational Thinking • 110918 Information Technology Co-op **OR** 110919 Information Technology Internship	IT Project Manager Webmaster Website Designer Web Developer Computer Programmer

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

INFORMATION SUPPORT AND SERVICES
CIP 47.0104.01

PATHWAY DESCRIPTION: The Information Support and Services pathway focuses on the design of computing systems. The courses include instruction in the principles of computer hardware & software components, algorithms, databases, and telecommunications.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES

Complete (3) THREE CREDITS from the following:
 	
 • 110110 Computer Literacy **OR**
   060112 Digital Literacy
 • 110101 Computer Hardware and Software Maintenance
 • 110102 Help Desk Operations
 	
 Choose (1) ONE CREDIT from the following:
 	
 • 110302 Management of Support Services
 • 110917 Internet Technologies
 • 110918 Information Technology Co-op **OR**
   110919 Information Technology Internship
	Computer Trainer
	
	 Customer Service Representative
	
	 Data Entry Clerk
	
	 Electronics Repair
	
	 Quality Control
	
	 Computer Support
	
	 Technical Writer

INFORMATION TECHNOLOGY CAREER PATHWAYS
2017-2018

INFORMATICS
CIP 11.0802.00

PATHWAY DESCRIPTION: Students will apply software systems such as Excel, Access and other industry software to acquire, collect, store and communicate data in meaningful ways to clients.

Students will manage projects, work in teams, think critically, solve problems and propose solutions to design problems. Further, they will learn to apply literacy, mathematics and science concepts and use technology to effectively solve real-world challenging problems. Through project-based learning, students will explore the future of informatics and learn those habits of behavior and mind unique to professionals in the field. Informatics leverages technology, data and communication by instilling in a new generation the knowledge, imagination and flexibility to tackle complex issues successfully in a data-rich digital world. It is the process of designing systems that take raw data and convert it into new knowledge that can be applied to any field while considering the impact on individuals, organizations and society. **THE SOUTHERN REGION EDUCATION BOARD (SREB) INFORMATICS COURSES MUST BE TAUGHT IN THE FOUR COURSE SEQUENCE AND REQUIRE AN AGREEMENT BETWEEN SREB AND THE LOCAL SCHOOL DISTRICT. EACH COURSE REQUIRES TEACHER SUMMER TRAINING BEFORE IMPLEMENTATION.**

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED CAREER TITLES

Choose (4) FOUR CREDITS in the following:
 	
 • 110110 Computer Literacy **OR**
  060112 Digital Literacy
 • 111001 Computer, Networks and Databases
 • 111002 Design for the Digital World
 • 111003 Databases in the Cloud
 • 111004 Developing a Cloud Presence
 • 110918 Information Technology Co-op **OR**
  110919 Information Technology Internship
 	
 Note: (SREB) courses require an agreement between the Southern Region Education Board and the District. Please see the link to [SREB](#) for further information.
	Bioinformatics Specialist
	
	 Database Developer
	
	 Information Security Analyst
	
	 Web Designer
	
	 Computer Software Engineer
	
	 IT Project Manager

INFORMATION TECHNOLOGY CAREER PATHWAYS 2017-2018	
COMPUTER PROGRAMMING BLENDED HYBRID CIP 11.0201.02	

PATHWAY DESCRIPTION: The Computer Programming Blended Hybrid pathway **(formerly the Appalachian Technology Institute (ATI) Computer Programming Pilot pathway)** courses will use a blended online environment and delivery system. Students have the opportunity to be exposed to courses from the computer science, computer programming, and web design/application pathways. Upon completion of this career pathway, students will be prepared for an entry level position in the IT field, to continue their education in computer programming, or to become an entrepreneur in the region.

BEST PRACTICE COURSES	EXAMPLE ILP-RELATED
Complete (1) ONE CREDIT: • 110201 Introduction to Programming *Choose (2) TWO CREDITS from the following:* • 110110 Computer Literacy **OR** 060112 Digital Literacy • 110218 Python I • 110711 AP Computer Science Principles • 110801 Web Page Development *Choose (1) ONE CREDIT from the following:* • 110701 AP Computer Science A • 110918 Information Technology Co-op • 110919 Information Technology Internship (Capstone Course in Game, App, or Web Development in collaboration with local industry)	Computer Programmer Database Developer Computer Hardware Engineer Computer Network Specialist Web Developer IT Project Manager

COMPLEMENTARY OR ADVANCED COURSEWORK BEYOND INFORMATION TECHNOLOGY PATHWAY(s)

Upon completion of a pathway, additional coursework to enhance student learning is encouraged. Credits earned in Advanced or Complementary Coursework "Beyond the Pathway" may not be substituted for pathway courses in order to achieve Preparatory or Completer status.

- 113604 Digital 3D Graphics and Special Effects II
- 110810 Flash with ActionScript
- 110211 Introduction to Database Design
- 110399 Leadership Dynamics- Information Technology
- 110907 Microsoft Active Directory Server
- 110906 Network Hardware Installation and Troubleshooting
- 110204 Productivity Software
- 110752 Special Topics, Computer Science
- 110152 Special Topics, Information Support & Services
- 110952 Special Topics, Networking
- 110252 Special Topics, Programming
- 110852 Special Topics, Web Development/Administration
- JAG Courses
- Career Options

Accessing the WAN/Connecting Networks/Cisco IV
Valid Course Code: 110905

Course Description: Covers WAN technologies and network services required by converged applications in a complex network. Enables students to understand the selection criteria of network devices and WAN technologies to meet network requirements. Helps students learn how to configure and troubleshoot network devices and resolve common issues with data link protocols. Helps students to develop the knowledge and skills needed to implement IPSec and virtual private network (VPN) operations in a complex network. Completes one of a series of four courses that helps prepare students for the Cisco Certified Network Associate (CCNA) certification exam and the Cisco Certified Entry Networking Technician (CCENT). This is the fourth course in the Cisco Curriculum.
Content/Process
Students will: 1. Describe different WAN technologies and their benefits. 2. Describe the operations and benefits of virtual private networks (VPNs) and tunneling. 3. Configure and troubleshoot serial connections. 4. Configure and troubleshoot broadband connections. 5. Configure and troubleshoot IPSec tunneling operations. 6. Demonstrate network operations using syslog, SNMP, and networking tools. 7. Design Borderless networks. 8. Design Data centers and virtualization. 9. Design Collaboration technology and solutions.
Connections
• Post-Secondary Connection— KCTCS CIT 212 (Connecting Networks) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Cisco CCNA Certification/CCENT Certification • Kentucky Occupational Skill Standards • 21st Century Skills

Advanced 3D Game Development
Valid Course Code: 113603

Course Description: Emphasizes creating 3D graphics using one or more state-of-the-art software packages. Provides students with a thorough understanding of techniques for designing advanced 3D games and simulations. Courses will cover 2D and 3D graphics, animation, character development, texturing, rigging, scripting and game setup using state-of-the-art software development tools.

Content/Process

Students will:
1. Compare and contrast modeling methodologies (i.e., polygons, NURBS, splines).
2. Explain the application of low polygon and high polygon construction.
3. Construct and manipulate polygonal objects.
4. Apply texturing/surfacing/shading to models and normal mapping.
5. Identify UVW mapping coordinates.
6. Explain how lighting and shading affects form and surface.
7. Implement basic lighting concepts for ambient and artificial light.
8. Describe the difference between forward and inverse kinematics.
9. Examine the process of particle creation and their application to game design.
10. Create a parent/child hierarchy.
11. Create a joint/bone chain.
12. Apply and adjust weight maps.
13. Create atmospheric effects.
14. Demonstrate the use of constraints to animate objects.
15. Apply various animation techniques (i.e., pose-to-pose, straight ahead).
16. Adjust the dynamic properties (i.e., gravity, wind speed).
17. Simulate rigid body dynamics (e.g., shattering wall, breaking glass).
18. Utilize cinematography in animation.
19. Describe the process of motion capture for animation.

Connections

- Post-Secondary Connection—KCTCS DGD 232 (3D Character Development)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Advanced Game Development and Publishing
Valid Course Code: 113602

Course Description: This course will focus on creating games using code, 3d characters, objects, and animation utilizing game engines. Students will see how the skills and knowledge acquired in Game Design I-III come together. Students will create work ready products for the industry. Students will participate in Game Jams to practice working with teams and deadlines.
Content/Process

Students will:
1. Compare and contrast licensed vs. proprietary game engines.
2. Debate the strengths and weaknesses of various game engines.
3. Discuss the impact of a game engine on the development of a game
4. Explain how game engines work.
5. Explain character advancement in relation to storyline and gameplay.
6. Define the size of player environment.
7. Explain location and purpose of non-player character (NPC).
8. Specify boundaries and borders of the levels within the game.
9. Justify placement of triggers and scripted events.
10. Develop a game with multiple levels.
11. Research types of GUI.
12. Recognize and implement required feedback for the GUI.
13. Create a flowchart that maps the GUI's functionality.
14. Design and implement a GUI using wireframes.
15. Create a victory condition.
16. Assemble immersive elements into a game.
17. Establish a reward system and in-game economies.
18. Apply game mechanics to game world.
19. Balance and test game mechanics.
20. Integrate different types of audio (i.e., sound effects, ambient background, dialog, and score).
21. Practice creating sound loops.
22. Determine acceptable media files for game development (i.e., sound, graphics, video).
23. Import appropriate media for a game.
24. Incorporate feedback sounds.
25. Compare and contrast the benefits of various platforms and their target markets.
26. Evaluate need for flexibility and scalability when developing for a PC.
27. Explore development tools specific to various consoles.
28. Research procedures to deliver a game to mobile markets.
29. Pitch a project and defend why it is entertaining.
30. Explain the role of social media in marketing.
31. Describe crowd sourcing and crowd funding.
32. Explain the merchandizing and branding behind video games.
33. Analyze successful trailers.
34. Explain the concept of localization and its impact on design.

35. Describe various pay models, e.g., free-to-play, pay-to-play, single-user license, freemium.
36. Describe integration of social components in a game.
37. Explain the role of social media in the gaming community.
38. Describe professional events in digital gaming.
39. Summarize characteristics of cloud gaming.
40. Evaluate the advances of multi-player gaming.
41. Discuss trends in input devices.
42. Examine current trends in output devices and displays.
43. Explore advances in peripheral devices.

Connections

- Post-Secondary Connection—KCTCS DGD 131 (3D Texturing and Lighting I)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

AP Computer Science A
Valid Course Code: 110701

Course Description: The Advanced Placement Program enables willing and academically prepared students to pursue college level studies – with the opportunity to earn college credit, advanced placement, or both – while still in high school; AP Exams are given each year in May. Students who earn a qualifying score on an AP Exam are typically eligible to receive college credit and/or placement into advanced courses in college. Every aspect of AP course and exam development is the result of collaboration between AP teachers and college faculty. They work together to develop AP courses and exams, set scoring standards, and score the exams. College faculties review every AP teacher's course syllabus
Content/Process
Students will:

1. Design, implement, and analyze solutions to problems.
2. Use and implement commonly used algorithms.
3. Develop and select appropriate algorithms and data structures to solve new problems.
4. Write solutions fluently in an object-oriented paradigm.
5. Write, run, test, and debug solutions in the Java programming language, utilizing standard Java library classes and interfaces from the AP Java Subset.
6. Read and understand programs consisting of several classes and interacting objects.
7. Read and understand a description of the design and development process leading to such a program.
8. Understand the ethical and social implications of computer use.

Connections

- Post-Secondary Connection— KCTCS course determined through local dual/articulation agreement
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

AP Computer Science Principles
Valid Course Code: 110711

Course Description: AP Computer Science Principles is designed to introduce students to the central ideas of computer science, to instill ideas and practices of computational thinking, and to have students engage in activities that show how computing changes the world. The course is rigorous and rich in computational content, includes computational and critical thinking skills, and engages students in the creative aspects of the field. Through both its content and pedagogy, this course aims to appeal to a broad audience.

Content/Process

Students will:
1. Use computing tools and techniques to create artifacts.
2. Collaborate in the creation of computational artifacts.
3. Analyze computational artifacts; use computing tools and techniques for creative expression.
4. Use programming as a creative tool.
5. Describe the combination of abstractions used to represent data.
6. Explain how binary sequences are used to represent digital data.
7. Develop an abstraction.
8. Use multiple levels of abstraction in computation.
9. Use models and simulations to raise and answer questions.
10. Use computers to process information to gain insight and knowledge.
11. Collaborate when processing information to gain insight and knowledge.
12. Communicate insight and knowledge gained from using computer programs to process information.
13. Use computing to facilitate exploration and the discovery of connections in information.
14. Use large data sets to explore and discover information and knowledge.
15. Analyze the considerations involved in the computational manipulation of information.
16. Develop an algorithm designed to be implemented to run on a computer.
17. Express an algorithm in a language.
18. Appropriately connect problems and potential algorithmic solutions.
19. Evaluate algorithms analytically and empirically.
20. Explain how programs implement algorithms.
21. Use abstraction to manage complexity in programs.
22. Evaluate a program for correctness.
23. Develop a correct program.
24. Collaborate to solve a problem using programming.
25. Employ appropriate mathematical and logical concepts in programming.
26. Explain the abstractions in the Internet and how the Internet functions.
27. Explain characteristics of the Internet and the systems built on it.
28. Analyze how characteristics of the Internet and systems built on it influence their use.
29. Connect the concern of cybersecurity with the Internet and the systems built on it.
30. Analyze how computing affects communication, interaction, and cognition.
31. Collaborate as part of a process that scales.
32. Connect computing with innovations in other fields.

33. Analyze the beneficial and harmful effects of computing.
34. Connect computing within economic, social, and cultural context.

Connections
- Post-Secondary Connection— KCTCS course determined through local dual/articulation agreement   - CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   - Kentucky Occupational Skill Standards   21st Century Skills   - Nationally Recognized Industry Standards and Certifications – refer back to pathway document

AP Computer Science Principles (PLTW)
Valid Course Code: 110730

Course Description: Using Python® as a primary tool and incorporating multiple platforms and languages for computation, this course aims to develop computational thinking, generate excitement about career paths that utilize computing, and introduce professional tools that foster creativity and collaboration. While this course can be a student's first in computer science, students without prior computing experience are encouraged to start with Introduction to Computer Science. Computer Science Principles helps students develop programming expertise and explore the workings of the Internet. Projects and problems include app development, visualization of data, cybersecurity, and simulation. PLTW is recognized by the College Board as an endorsed provider of curriculum and professional development for AP® Computer Science Principles (AP CSP). This endorsement affirms that all components of PLTW CSP's offerings are aligned to the AP Curriculum Framework standards and the AP CSP assessment.

Content/Process

Students will:

1. Use computing tools and techniques to create artifacts.
2. Collaborate in the creation of computational artifacts.
3. Analyze computational artifacts; use computing tools and techniques for creative expression.
4. Use programming as a creative tool.
5. Describe the combination of abstractions used to represent data.
6. Explain how binary sequences are used to represent digital data.
7. Develop an abstraction.
8. Use multiple levels of abstraction in computation.
9. Use models and simulations to raise and answer questions.
10. Use computers to process information to gain insight and knowledge.
11. Collaborate when processing information to gain insight and knowledge.
12. Communicate insight and knowledge gained from using computer programs to process information.
13. Use computing to facilitate exploration and the discovery of connections in information.
14. Use large data sets to explore and discover information and knowledge.
15. Analyze the considerations involved in the computational manipulation of information.
16. Develop an algorithm designed to be implemented to run on a computer.
17. Express an algorithm in a language.
18. Appropriately connect problems and potential algorithmic solutions.
19. Evaluate algorithms analytically and empirically.
20. Explain how programs implement algorithms.
21. Use abstraction to manage complexity in programs.
22. Evaluate a program for correctness.
23. Develop a correct program.
24. Collaborate to solve a problem using programming.
25. Employ appropriate mathematical and logical concepts in programming.
26. Explain the abstractions in the Internet and how the Internet functions.

27. Explain characteristics of the Internet and the systems built on it.
28. Analyze how characteristics of the Internet and systems built on it influence their use.
29. Connect the concern of cybersecurity with the Internet and the systems built on it.
30. Analyze how computing affects communication, interaction, and cognition.
31. Collaborate as part of a process that scales.
32. Connect computing with innovations in other fields.
33. Analyze the beneficial and harmful effects of computing.
34. Connect computing within economic, social, and cultural context.

Connections
• Post-Secondary Connection— KCTCS course determined through local dual/articulation agreement • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills • Nationally Recognized Industry Standards and Certifications – refer back to pathway document

C# I
Valid Course Code: 110214

Course Description: Introduces students to fundamental programming concepts using the C# programming language. Includes data types, control structures, simple data structures, error-handling, object-oriented programming, graphical user interfaces, and modular programming.

Content/Process
Students will: 1. Demonstrate knowledge of the program development life cycle.   2. Design, develop, compile, debug, test, run, and document programs in the C# language.   3. Design and develop programs using operators and assignments.   4. Design and develop programs using primitive data types.   5. Design and develop programs that use sequence, selection, and repetition structures.   6. Design and develop programs that use array data structures.   7. Design and develop programs that use effective error and exception handling.   8. Design and develop programs that implement user-defined methods and modular programming.   9. Design and develop programs that implement file processing.   10. Design and develop event-driven programs that work with a graphical user interface (GUI).   11. Design and develop programs using object oriented programming features.   12. Evaluate and critique effectiveness and efficiency of code.

Connections
• Post-Secondary Connection—KCTCS CIT 143 (C# I)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

C# II
Valid Course Code: 110215

Course Description: Provides students with an extensive overview of designing and developing advanced object-oriented applications using the C# programming language. Includes advanced graphical user interfaces, event-driven programming, advanced data types and structures, concurrency, file and data base processing, mobile computing, and other advanced topics.
Content/Process
Students will: 1. Design and develop event-driven programs that use advanced GUI components.   2. Design and develop programs that use object oriented programming concepts.   3. Design and develop programs that use advanced data types and structures.   4. Design and develop programs that use concurrency.   5. Design and develop programs that implement file and database processing.   6. Design and develop programs that introduce mobile application concepts.   7. Design and develop programs that incorporate other advanced features of C# programming.   8. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 243 (C# II)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

C++ I
Valid Course Code: 110202

Course Description: Introduces students to fundamental programming concepts using the C++ programming language. Topics include data types, control structures, simple data structures, error-handling, modular programming, and information and file processing

Content/Process

Students will:
1. Demonstrate knowledge of the program development life cycle.
2. Design, develop, compile, debug, test, run, and document programs in the C++ language using a software development kit.
3. Design and develop programs using operators and assignments.
4. Design and develop programs using primitive data types.
5. Design and develop programs using sequence, selection, and repetition structures.
6. Design and develop programs using single and multi-dimensional arrays.
7. Design and develop programs using pointers.
8. Design and develop programs using void and value passing function.
9. Design and develop programs using object oriented programming features, including defining classes and instantiating objects.
10. Design and develop programs using effective error and exception handling.
11. Evaluate and critique effectiveness and efficiency of code.

Connections

- Post-Secondary Connection—KCTCS CIT 142 (C++ I)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

C++ II
Valid Course Code: 110216

Course Description: Introduces students to advanced programming concepts using C++. Includes advanced data structures, concurrency, innovative algorithms, advanced file processing, and topics that are unique to C++.

Content/Process

Students will:
1. Demonstrate knowledge of advanced C++ concepts and associated definitions.
2. Design, develop, compile, debug, test, run, and document advanced programs in C++.
3. Design and develop programs that use advanced data structures.
4. Design and develop programs that use concurrency.
5. Design and develop programs that use innovative algorithms and techniques, including recursion.
6. Design and develop programs using polymorphism, inheritance, and overloading.
7. Design and develop programs that use advanced file processing.
8. Examine and evaluate the strengths and weaknesses of C++.
9. Design and develop programs that incorporate other advanced features of C++.
10. Evaluate and critique effectiveness and efficiency of code written.

Connections

- Post-Secondary Connection—KCTCS CIT 242 (C++ II)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Computational Thinking
Valid Course Code: 110251

Course Description: Promotes understanding of computer programming and logic by teaching students to think like a computer. Covers skills needed to develop and design language-independent solutions to solve computer-related problems. Covers development and design basics including use of variables, control and data structures, and principles of command-line and object-oriented languages.

Content/Process

Students will:
1. Demonstrate an understanding of elementary logic, truth tables, and Boolean algebra.
2. Demonstrate programming style best practices.
3. Illustrate the flow of a program.
4. Illustrate concepts using one or more programming language(s).
5. Explain the implications of file processing.
6. Describe the steps addressed in the design of a program to solve the stated problem.
7. Describe the principles of object-oriented programming.
8. Develop algorithms with increasing degree of complexity using structured programming techniques such as: sequence, selection, and repetition.
9. Use fundamental data types and data structures such as: integers, reals, characters, strings, Booleans, one- and two-dimensional arrays.
10. Analyze the binary representation of data.
11. Use modular programming.

Connections

- Post-Secondary Connection—KCTCS CIT 120 (Computational Thinking)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Computer Hardware and Software Maintenance
Valid Course Code: 110101

Course Description: Presents a practical view of computer hardware and client operating systems. Covers computer hardware components; troubleshooting, repair, and maintenance; operating system interfaces and management tools; networking components; computer security; and operational procedures.

Content/Process

Students will:
1. Identify and explain motherboard components.
2. Identify, install, configure, and upgrade personal computer components.
3. Perform device driver installation, scheduled maintenance, and memory and firmware updates.
4. Identify common tools, basic diagnostic procedures, troubleshooting techniques, and preventive maintenance methods.
5. Explain and apply the troubleshooting process to diagnose and repair common hardware and software problems.
6. Demonstrate an understanding of conversion between binary, decimal, hexadecimal number systems.
7. Compare and contrast client operating systems and their features.
8. Use multiple user interfaces, including command-line, to perform operating system management tasks; to configure, optimize, and upgrade the current client operating systems; and to diagnose network connection issues.
9. Use and manage file systems, operating system utilities, backup programs, and optimization tools.
10. Describe the process to install, configure, secure, and troubleshoot a basic small or home office network.
11. Identify the fundamental principles of networking and security.
12. Describe and apply appropriate operational procedures including safety, environmental procedures, good communication skills, and professional behavior.

Connections

- Post-Secondary Connection—KCTCS CIT 111 (Computer Hardware and Software)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Computer Literacy
Valid Course Code: 110110

OR

Digital Literacy
Valid Course Code: 060112

Course Description: Provides an introduction to the computer and the convergence of technology as used in today's global environment. Introduces topics including computer hardware and software, file management, the Internet, e-mail, the social web, green computing, security and computer ethics. Presents basic use of application, programming, systems, and utility software. Basic keyboarding skills are strongly recommended.
Content/Process
Students will:

1. Describe basic computer functions and use correct computer terminology.
2. Use a course management system.
3. Utilize computer technology as a tool to access, manage, prepare, and present information.
4. Identify trends in information processing and new emerging technologies.
5. Explain the impact of computers upon society including effects of social technologies, green computing, dangers of excessive use, and disposal of obsolete equipment.
6. Identify and analyze ethical issues such as copyright, privacy, and security as related to computing.
7. Explain the difference between application, programming, system, and utility software.
8. Use a graphical user interface-based operating system to manage files, folders and disks.
9. Use application software packages to prepare basic documents, spreadsheets, databases, and presentations.
10. Describe and explain basic data communications and network technologies and functions.
11. Identify and use basic e-mail and Internet functions and understand their capabilities.
12. Describe globalization and challenges including technological barriers, electronic payments, and varying cultures.
13. Describe cloud computing and its impact on business and personal systems.

Connections

- Post-Secondary Connection—KCTCS CIT 105 (Introduction to Computers)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Computer Science (NICERC)
Valid Course Code: 110225

Course Description: Computer Science is a project-driven, application-based course spread over 11 topic areas and divided into four overarching instructional units. Computer Science engages students in an immersive exploration of the breadth of the field of computer science. Students design and create programs, construct simple circuits, and discuss impacts of computer science in society. Students also hone their problem solving skills through several puzzles that accompany each topic area.

Content/Process

Students will:

1. Apply algorithms (e.g., develop algorithms as solutions to problems while discovering the importance of understanding problems in order to develop efficient step-by-step solutions).
2. Apply computer programming (e.g., explore the reasons for using computers to execute problem solutions; translate algorithms to a language computers can understand).
3. Apply data structures (e.g., explore various major data manipulation and processing structures used by computers; explore and utilize structures as to design algorithms to solve problems).
4. Apply computer architecture (e.g., use a Raspberry Pi platform to learn how computer hardware provides a powerful platform on which to run software).

Connections

- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Computers, Networks, Databases
Valid Course Code: 111001

Course Description: This project-based-learning course engages students who are curious about informatics. In this course, students will learn how to use a design process to create systems that acquire, store and communicate data for a variety of career fields. Students will work collaboratively in teams to design systems, solve problems, think critically, be creative and communicate with each other and business partners. Students will participate in real-world experiences such as designing an inventory system for a retail store, comparing stores in a company to project future sales, track customer buying habits and more. Last, students will engage in leadership skill sets encompassing their student organization responsibilities.

Content/Process
Students will: 1. Use the technical design process to design, build and test prototypes. 2. Use terminology of the field. 3. Use data and informatics tools to make decisions and solve problems. 4. Apply project management principles. 5. Use appropriate and effective research skills. 6. Demonstrate proficiency in word processing, spreadsheets/databases, and presentation software. 7. Communicate information, including descriptive statistics, to various stakeholder groups.

Connections
• Post-Secondary Connection— KCTCS INF 128 (Principles of Informatics) • CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Cyber Literacy I (NICERC)
Valid Course Code: 110222

Course Description: Cyber Literacy I is a hands-on course that builds a strong cyber foundation for high school students. The course introduces students to cyber by blending robotics, programming, electricity, and elements of liberal arts. Students learn about the opportunities, threats, responsibilities, and legal constraints associated with operating in cyberspace. Throughout the course, students learn the basics of electricity, programming, and networking as well as develop critical thinking skills. Cyber Literacy I lays a foundation for further exploration into STEM and cyber-related topics.

Content/Process
Students will: - Apply the fundamentals of electricity (e.g., basic movement of electrons and experiments that include chemistry, circuitry, and magnetism).   - Apply BASIC Programming (e.g., basic coding essentials through flowcharts; use of simple programming languages; use of pseudocode; and use of simple programming tasks).   - Apply robotics (e.g., use Parallax® Boe-Bot® microcontroller as the platform for learning robotics fundamentals; assemble robots to perform various functions through the implementation of sensors; apply programming knowledge; use autonomous devices; use of programming components such as conditional and unconditional loops, subroutines, variable manipulation; and use electrical components like LEDs, piezo-crystal elements, infrared light, and tactile sensors).   - Apply liberal arts content (e.g., illustrate real world applications and implications of computers and the internet in our society today; deliberate the historical and societal context of cyber; and work through a variety of labs and project-driven lessons that engage learning about cyberspace, the ethical concerns about online behavior, cyber bullying, cyber security, the ethical concerns about designing autonomous devices, and artificial intelligence).

Connections
- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   - Kentucky Occupational Skill Standards   21st Century Skills

Cyber Literacy II (NICERC)
Valid Course Code: 110223

Course Description: Cyber Literacy II is a project-driven course that expands a student's understanding of cyberspace through two primary topics: systems engineering and liberal arts. The Cyber Literacy II course builds upon fundamental cyber skills developed in Cyber Literacy I and challenges students to go deeper into the world of cyberspace. Students will utilize a microcontroller to construct complex systems that bring together a variety of components and will identify real-world connections as they discuss the liberal arts/ humanities crossovers that exist with today's technologies. Many aspects of science, engineering, technology, and mathematics are discussed throughout each of the projects. Students are challenged to create flowcharts with each build as well as read schematics instead of relying on wiring diagrams.

Content/Process
Students will:

1. Apply systems engineering (e.g., use the Parallax Boe-Bot® microcontroller as the platform to build a variety of multi-component projects such as a binary counter, a four-pushbutton, hackable vault, an infrared remote-controlled Boe-Bot®, a planetoid rover, and a minesweeper; use flowcharts to discuss data flow and pseudo-code; work through a variety of labs and project-driven lessons that engage learning about robotics; and combine components onto a platform to design autonomous systems while considering the real-world impact of the systems and how they impact the students' environment).
2. Apply liberal arts content (e.g., make connections to issues such as: privacy, security, and technology; search warrants, digital media, and the requirements to obtain a search warrant; and cyberbullying with real-world examples of the implications of cyberbullying; participate in debates on national security; complete a literary analysis of a novel; work through a variety of labs and project-driven lessons that engage in learning extensively about the Fourth Amendment to the US Constitution, the impact and relationship between expectations of privacy and security, and cyberbullying).

Connections

- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Cyber Science (NICERC)
Valid Course Code: 110224

Course Description: Cyber Science is an innovative, project-driven course that integrates science, technology, engineering, and mathematics (STEM) disciplines with liberal arts. Cyber Science uses the Parallax® Boe-Bot® robot as a platform for teaching important cyber concepts and fundamentals. Throughout the course, students are engaged in a systems-level approach to problem-solving using robotics and computer science in the context of liberal arts. Seamlessly integrating the different disciplines provides students with a dynamic learning environment and a unique educational experience. Through Cyber Science, students are not only able to make meaningful connections between STEM and liberals arts, they also learn how to become better cyber citizens. The lessons in the course are divided into five main units: Programming Basics, Foundations of Computer Science, Networking and Security, Artificial Intelligence, and Ethics and Societal Issues. A major strength of the course is that unit components are purposefully interwoven together and provide the students with a holistic view of cyber.

Content/Process

Students will:

1. Apply programing basics (e.g., develop programming skills through a progression of Boe-Bot® activities).
2. Apply foundations of computer science (e.g., apply concepts including Boolean logic, variables, flow charts, data structures, and sorting using Boe-Bot® applications).
3. Apply networking and security (e.g., showcase the structure of networks as well as the vulnerabilities; illustrate the need for security through emphasizing man-in-the-middle attacks, cryptography, and steganography).
4. Utilize artificial intelligence (e.g., apply the concepts of heuristics and utilize sensors to read input in order to produce a desired output through various Boe-Bot® projects).
5. Apply ethics and social issues (e.g., explore the historical, ethical, and societal impacts of cyber; interpret articles; write essays; and participate in debates).

Connections

- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Databases in the Cloud
Valid Course Code: 111003

Course Description: This project-based-learning course is for students who successfully completed courses one and two and who want to tackle the more complex challenges that business and industry face. Students at this level will learn about Web technologies, cloud storage, information security, data, animation, introductory computer programming and database applications. Students will take more responsibility for their own learning, problem solving and thinking outside of the box. Real-world challenges will require higher levels of research, building, testing, analyzing and improving systems. Students will develop solutions for real-world problems by designing a database for ticket sales; designing security for a database; creating a game with animation; reporting information based on population data in a community; and designing, building and testing an application for a database.
Content/Process
Students will: 1. Use terminology of the field. 2. Research informatics technical texts, journal articles, and other related documents in developing a plan. 3. Use the five-step software/system life cycle (i.e., design, build, test, implement, and evolve). 4. Use informatics concepts to solve problems. 5. Use data and informatics tools to make decisions and solve problems. 6. Apply project management principles. 7. Gain information on how the American computer industry works. 8. Use appropriate and effective research skills. 9. Use best practices to design and implement research studies. 10. Use the scientific method to design investigations. 11. Demonstrate proficiency in word processing, spreadsheets/databases, and presentation software. 12. Communicate information, including descriptive statistics, to various audiences.
Connections
• Post-Secondary Connection—KCTCS CIT 170 (Database Design Fundamentals) • CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Design for the Digital World
Valid Course Code: 111002

Course Description: This project-based-learning course engages students who are interested in applying the design process to create systems such as a cloud-based digital storage system for images. Students will design a system to automatically collect and report data on highway usage. They will apply a geospatial system to map a store and develop a database that studies shopping habits. Through these projects, students will learn about data management and logic-based queries by collecting data, using the Global Positioning System (GPS) and analyzing data utilizing a geographic information system (GIS). They will learn how to automate data collection to make processes more effective and efficient. Students will work collaboratively in teams and demonstrate their knowledge and skills by presenting new and innovative ideas, techniques and solutions to business and industry partners.

Content/Process

Students will:
1. Use terminology of the field.
2. Research informatics technical texts, journal articles, and other related documents in developing a plan.
3. Use the five-step software/system life cycle (i.e., design, build, test, implement, and evolve).
4. Use informatics concepts to solve problems.
5. Use data and informatics tools to make decisions and solve problems.
6. Apply project management principles.
7. Gain information on how the American computer industry works.
8. Use appropriate and effective research skills.
9. Use best practices to design and implement research studies.
10. Use the scientific method to design investigations.
11. Demonstrate proficiency in word processing, spreadsheets/databases, and presentation software.
12. Communicate information, including descriptive statistics, to various audiences.

Connections

- Post-Secondary Connection— KCTCS INF 128 (Principles of Informatics)
- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Design for the Internet
Valid Course Code: 110213

Course Description: Introduces basic computer graphics with special emphasis on graphics for games.
Content/Process
Students will: 1. Identify the principles of communication through visual medium using text, still imagery and video technology. 2. Explain copyright laws affecting digital graphics including images and image use. 3. Identify the purpose of, audience, storyboarding and audience needs for preparing image(s). 4. Explain the design process for various forms of digital media. 5. Identify considerations of designing for a specific audience, including paid customers. 6. Analyze and evaluate digital media content for audience, purpose and design techniques. 7. Identify trends in the use and creation of digitally generated media. 8. Explain the key elements of drawing and painting. 9. Explain image resolution, image size, and image file format for web, video, and print. 10. Demonstrate effective message composition and design using industry standard design elements and principles. 11. Explain the principles of image composition. 12. Explain digital typography. 13. Differentiate between typeface and font. 14. Demonstrate digital camera and scanner operation. 15. Define digital image terminology. 16. Explain image and editing layers. 17. Demonstrate importing, exporting, organizing, and saving digital graphic files. 18. Manipulate image selections and measurement. 19. Use digital graphic editing software guides and rulers. 20. Transform digital images using editing applications. 21. Adjust or correct the tonal range, color, or distortions of an image using editing applications. 22. Explain retouching and blending images. 23. Explain and apply digital image editing filters. 24. Prepare images for web, print, and video. 25. Identify career and entrepreneurial opportunities in digital graphics technology.
Connections
• Post-Secondary Connection—KCTCS course determined through local dual/articulation agreement • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Developing a Cloud Presence
Valid Course Code: 111004

Course Description: Students in this capstone course will focus on the ethics of privacy, social networking, designing for clients and artificial intelligence through six authentic projects. Students will select a business partner and design, build and test a Web presence for a company that will apply the concepts from the three prior courses. Student teams will work collaboratively with a business partner to develop a proposal for the project with evaluation criteria. Once the business partner accepts the proposal, the student team will implement it by designing, planning, building the system, and testing and revising the system to meet the needs of the business. Depending on articulation agreements or state policy, opportunity for dual credit may be available to students who successfully complete this course.

Content/Process

Students will:
1. Use terminology of the field.
2. Research informatics technical texts, journal articles, and other related documents in developing a plan.
3. Use the five-step software/system life cycle (i.e., design, build, test, implement, and evolve).
4. Use informatics concepts to solve problems.
5. Use data and informatics tools to make decisions and solve problems.
6. Apply project management principles.
7. Gain information on how the American computer industry works.
8. Use appropriate and effective research skills.
9. Use best practices to design and implement research studies.
10. Use the scientific method to design investigations.
11. Demonstrate proficiency in word processing, spreadsheets/databases, and presentation software.
12. Communicate information, including descriptive statistics, to various audiences.

Connections

- Post-Secondary Connection— KCTCS CIT 170 (Database Design Fundamentals)
- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Digital 3D Graphics & Special Effects II
Valid Course Code: 113604

Course Description: This course will focus on creating games using code, 3d characters, objects, and animation utilizing game engines. Students will see how the skills and knowledge acquired in the first three courses of the Digital Design and Game Development pathway come together. Students will create work ready products for the industry. Introduces advanced texturing and lighting techniques to enhance depth perception and realism within 3D environments.
Content/Process
Students will: 1. Demonstrate an understanding of how to add textures to objects. 2. Use appropriate types of lighting techniques to designs. 3. Demonstrate adding depth using different types of shadowing techniques. 4. Create custom connections and color utilities to innovative designs. 5. Use indirect and direct illumination to designs.
Connections
• Post-Secondary Connection—KCTCS DGD 231 (3D Texturing and Lighting II) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Flash with Action Script
Valid Course Code: 110810

Course Description: This course will help students gain knowledge about Flash and apply the fundamental principles for creating video, web sites, and interactive gaming projects. Flash CS4 can be used in this course.

Content/Process

Students will:
1. Work with Flash Tools and Menus.
2. Demonstrate an understanding of Graphics using FLASH.
3. Understand and work on Editing Objects.
4. Demonstrate usage of Working with Layers.
5. Work on Editing and Formatting Text.
6. Use the Creating Symbols: Graphic, Movie Clip, and Button in FLASH.
7. Use the Creating Buttons in FLASH.
8. Demonstrate an understanding of using Animations – Designing and Editing.
9. Understand ActionScript in FLASH.
10. Use Audio – Acquiring and Editing in FLASH.
11. Demonstrate an understanding for Putting Components Together in FLASH.
12. Demonstrate how to Publish Flash Files.
13. Demonstrate Game Design using Flash ActionScript.

Connections

- Post-Secondary Connection—KCTCS course determined through local dual/articulation agreement
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Game Design and Development Principles
Valid Course Code: 113605

Course Description: This course is an introduction to Game Design and Gaming. The course provides an overview of story development, gaming history, game reviews, current gaming trends and industry software. Students will begin to create and develop a game story/plot that can be further developed in higher level courses as well as critique current games. In addition, 2D game development software and image manipulation will be explored to further enhance their design skills. Career exploration into game design will be researched and gain awareness of job and post-secondary opportunities.

Content/Process

Students will:

1. Explain the history of computing technologies that impact the game development industry.
2. Explore non-digital games.
3. Research the evolution of video games.
4. Describe the different game genres.
5. Evaluate contributions of individual game designers and developers.
6. Explore careers as a game artist and sound designer.
7. Describe the role of game designer.
8. Explore careers as a game developer.
9. Describe career pathways in quality assurance/testing.
10. Explain the role of the producer.
11. Explain the career path of an independent developer.
12. Research salary structures in the industry.
13. Define common terminology and their acronyms.
14. Identify the tools to develop a game (e.g., engine, application program interface [API], digital content creation tools, editors).
15. Communicate both in writing and verbally using appropriate industry terminology.
16. Compare and contrast the entertainment software rating board (ESRB) ratings for game.
17. Explain the principles of visual design.
18. Explain the elements of design.
19. Analyze artwork/designs for specific design theories.
20. Explore the components of game structure.
21. Analyze the essentials of storytelling.
22. Write an outline of a nonlinear story.
23. Create rules for a game.
24. Compare conflict and outcomes.
25. Develop objectives and outcomes for a game.
26. Explain the importance of usability and how it impacts user experience.
27. Explain in-game economies, motivators, and reward systems.
28. Research various styles of game documentation.
29. Develop a technical design document (TDD).
30. Describe components of a game design document (GDD).
31. Produce a game design document.

32. Produce a game pitch document.
33. Present game documentation.
34. Compare and contrast categories of game mechanics.
35. Research victory condition mechanics of a game.
36. Discuss relationship between game mechanics and game complexity and interaction.
37. Incorporate game mechanics into a game.
38. Explain basic logic statements (e.g., if/then; cause/effect).
39. Describe uses of Boolean operators and symbols associated with them.
40. Generate truth tables for game events.
41. Examine different number systems (i.e., binary, decimal, hexadecimal, etc.).
42. Demonstrate proper use of order of operations.
43. Convert mathematical formulas into code.
44. Explain when to apply mathematical concepts common to game coding.
45. Use logical thinking to create a diagram of code execution.
46. Research laws that govern intellectual property in diverse forms.
47. Evaluate Creative Commons and open source licensure.
48. Cite the boundaries of third-party work.
49. Explain copyright, trademarks, and other intellectual property protection.
50. Explain invasion of privacy in the use of technology.
51. Model acceptable security practices.
52. Explore the issues of piracy and digital rights management (DRM).
53. Analyze your personal digital footprint.
54. Discuss social responsibility and issues concerning video gaming.
55. Model legal and ethical use of information.
56. Identify key elements of non-disclosure agreements (NDA) and contracts.

Connections
• Post-Secondary Connection—KCTCS course determined through local dual/articulation agreement
• CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
• Kentucky Occupational Skill Standards
• 21st Century Skills

Help Desk Operations
Valid Course Code: 110102

Course Description: Introduces a variety of tools and techniques to provide user support in help desk operations. Explores help desk concepts, customer service skills, troubleshooting problems, writing for end users, help desk operations and software, needs analysis, facilities management, and other topics related to end user support.

Content/Process

Students will:

1. Define the role of help desk and customer service in an organization.
2. Evaluate help desk technology, tools and techniques.
3. Identify common support problems, including software tools and features.
4. Identify service technology trends.
5. Demonstrate professional and effective communication skills.
6. Demonstrate team building strategies.
7. Develop technical training materials, and other user documentation to support help desk operations.
8. Demonstrate a methodical approach to the problem-solving process.
9. Apply conflict resolution techniques and skills in customer support.
10. Exhibit positive professionalism with customers and technical writing skills.
11. Demonstrate personal, system, and stress management by way of using self-help tools.
12. Use support performance and reporting tools, call management software, problem resolution software, asset and change management tools, and notification tools for support in additional level two and level three support tools.

Connections

- Post-Secondary Connection— KCTCS CIT 232 (Help Desk Operations)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Information Technology Co-op
Valid Course Code: 110918

Course Description: Cooperative Education for CTE courses provide supervised work site experience related to the student's identified career pathway. A student must be enrolled in an approved capstone course during the same school year that the co-op experience is completed. Students who participate receive a salary for these experiences, in accordance with local, state and federal minimum wage requirements according to the Work Based Learning Guide.
Content/Process
Students will: 1. Demonstrate and practice safe work habits at all times. 2. Gain career awareness and the opportunity to test career choice(s). 3. Receive work experience related to career interests. 4. Integrate classroom studies with work experience. 5. Receive exposure to facilities and equipment unavailable in a classroom setting. 6. Increase employability potential.
Connections
• CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Information Technology Internship
Valid Course Code: 110919

Course Description: Internship for CTE courses provide supervised work-site experience for high school students who are enrolled in a capstone course associated with their identified career pathway. Internship experiences consist of a combination of classroom instruction and field experiences. A student receiving pay for an intern experience is one who is participating in an experience that lasts a semester or longer and has an established employee-employer relationship. A non-paid internship affects those students who participate on a short-term basis (semester or less). All information referenced to the Work Based Learning Guide.
Content/Process
Students will: 1. Demonstrate and practice safe work habits at all times.   2. Gain career awareness and the opportunity to test career choice(s).   3. Receive work experience related to career interests.   4. Integrate classroom studies with work experience.   5. Receive exposure to facilities and equipment unavailable in a classroom setting.   6. Increase employability potential.
Connections
• Post-Secondary Connection—KCTCS CIT 290 (Instructor Consent Required Internship)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

Internet Technologies
Valid Course Code: 110917

Course Description: Provides students with a study of traditional and emerging Internet technologies. Covers topics including Internet fundamentals, Internet applications, Internet delivery systems, and Internet client/server computing. Provides a hands-on experience and some rudimentary programming in an Internet environment.
Content/Process

Students will:
1. Describe the history of the Internet and its impact on government, society, and business.
2. Describe the models used to organize Internet technologies.
3. Explain how the Internet is governed and the standards that are used.
4. Describe the protocols that make the Internet work.
5. Use Internet technologies for data transfer, remote access, information delivery, email, content presentation, and real-time collaboration.
6. Describe how the Internet is used for e-commerce.
7. Describe Internet naming conventions, URLs, and web server file organization.
8. Describe core connectivity issues such as NAT, ISPs, and IP addresses.
9. Create and publish simple web content using basic HTML (Hypertext Markup Language).
10. Use existing scripting applications and create simple client/server applications to enhance information delivery.

Connections

- Post-Secondary Connection—KCTCS CIT 150 (Internet Technologies)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Introduction to Computer Science
Valid Course Code: 110710

Course Description: Introduction to Computer Science is designed to introduce students to the breadth of the field of computer science through an exploration of engaging and accessible topics. Rather than focusing the entire course on learning particular software tools or programming languages, the course is designed to focus on the conceptual ideas of computing and help students understand why certain tools or languages might be utilized to solve particular problems. The goal of the course is to develop in students the computational practices of algorithm development, problem solving and programming within the context of problems that are relevant to the lives of today's students. Students will also be introduced to topics such as interface design, limits of computers, and societal and ethical issues.

Content/Process

Students will:

1. Analyze the characteristics of hardware components to determine the applications for which they can be used.
2. Use appropriate tools and methods to execute Internet searches which yield requested data.
3. Evaluate the results of web searches and the reliability of information found on the Internet.
4. Explain the differences between tasks that can and cannot be accomplished with a computer.
5. Analyze the effects of computing on society within economic, social, and cultural contexts.
6. Communicate legal and ethical concerns raised by computing innovation.
7. Explain the implications of communication as data exchange.
8. Name and explain the steps they use in solving a problem.
9. Solve a problem by applying appropriate problem-solving techniques.
10. Express a solution using standard design tools.
11. Determine if a given algorithm successfully solves a stated problem.
12. Create algorithms that meet specified objectives.
13. Explain the connections between binary numbers and computers.
14. Summarize the behavior of an algorithm.
15. Compare the tradeoffs between different algorithms for solving the same problem.
16. Explain the characteristics of problems that cannot be solved by an algorithm.
17. Use appropriate algorithms to solve a problem.
18. Design, code, test, and execute a program that corresponds to a set of specifications.
19. Select appropriate programming structures.
20. Locate and correct errors in a program.
21. Explain how a particular program functions.
22. Justify the correctness of a program.
23. Create programs with practical, personal, and/or societal intent.
24. Describe the features of appropriate data sets for specific problems.
25. Apply a variety of analysis techniques to large data sets.
26. Use computers to find patterns in data and test hypotheses about data.
27. Compare different analysis techniques and discuss the tradeoffs among them.

28. Justify conclusions drawn from data analysis.
29. Describe ways in which computing enables innovation.
30. Discuss the ways in which innovations enabled by computing affect communication and problem solving.
31. Analyze how computing influences and is influenced by the cultures for which they are designed and the cultures in which they are used.
32. Analyze how social and economic values influence the design and development of computing innovations.
33. Discuss issues of equity, access, and power in the context of computing resources.
34. Communicate the legal an ethical concerns raised by computational innovations.
35. Discuss privacy and security concerns related to computational innovations.
36. Explain positive and negative effects of technological innovations on human culture.

Connections

- Post-Secondary Connection— KCTCS course determined through local dual/articulation agreement
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Introduction to Database Design
Valid Course Code: 110211

Course Description: Provides an overview of database and database management system concepts, internal design models, normalization, network data models, development tools, and applications.

Content/Process

Students will:
1. Define a database and its uses.
2. Describe the difference between traditional files and databases.
3. Define a database management system (DBMS) and describe the services a DBMS provides to users.
4. Identify and describe the main features of hierarchical, network, and relational database models.
5. Demonstrate an understanding of the difference between logical and physical design.
6. Model a realistic business application using a technology-independent data model.
7. Design and implement a database using the relational model, with emphasis on data integrity and security.
8. Define and use the normalization process to further refine the relational table definitions.
9. Demonstrate an understanding of the database administration function.
10. Define and be able to use data definition language, data manipulation language, and instructions that apply relational algebra.
11. Demonstrate an understanding of distributed database systems.
12. Evaluate and select an appropriate DBMS for a given application.

Connections

- Post-Secondary Connection—KCTCS CIT 170 (Database Design Fundamentals)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Introduction to Digital Game Graphics
Valid Course Code: 113601

Course Description: This course will focus on creating games using code, animation, and an introduction to 3D design software utilized in the industry. In addition, students will see how the skills and knowledge acquired in Game Design I and II come together utilizing a game engine.

Content/Process

Students will:

1. Identify the target audience of a game.
2. Explain impact of "feature creep" on production.
3. Explain the interdependence of team members between artistic, technical and production disciplines.
4. Explain the purpose of prototyping.
5. Outline in detail the process of developing a game from concept to delivery and support.
6. Describe each step of the production process.
7. Explain how the project is going to be managed according to a milestone plan.
8. Explain the various types of collaboration tools.
9. Utilize the production pipeline in the development of a game.
10. Explain the value of version control.
11. Explain the purpose of vertical slice.
12. Demonstrate version control i.e., Node Version Manager (NVM).
13. Demonstrate good quality assurance practices.
14. Conceptualize and illustrate original game characters and assets.
15. Utilize illustration to create assets.
16. Establish a standard for world scale.
17. Create a storyboard for planning animation.
18. Change an object's state or position over time.
19. Establish an object's relative speed.
20. Simulate a naturally occurring or mechanical cycle (i.e., walking).
21. Apply animation to game assets.
22. Describe the role of typography.
23. Evaluate the use of layout and composition.
24. Explain color theory.
25. Describe the principles of animation.
26. Describe the role of perspective.
27. Demonstrate 1 and 2 point perspective.
28. Draw a proportionally correct figure.
29. Describe the characteristics and purposes of 2D, 2.5D, and 3D art.
30. Recognize the importance of and implement continuity of art style.
31. Describe environments within a game.
32. Compare process of creating an interior vs. exterior environment.
33. Identify components in an environment.
34. Generate terrains for a specific environment.
35. Create hard surface assets.

36. Create an environment.
37. Develop organics for a specific environment.
38. Describe archetypes of characters.
39. Explain character personalities and stereotypes.
40. Compare and contrast methods to design characters.
41. Describe the character's evolution throughout the game.
42. Examine importance of non-player characters (NPC).
43. Construct character(s) for a game.
44. Differentiate between syntax and semantics.
45. Incorporate primitive data types.
46. Utilize arrays to store a list of primitive data types.
47. Demonstrate input from different sources.
48. Construct and register a callback function.
49. Compare and contrast constants and variables.
50. Select and implement conditional control.
51. Implement functions.
52. Select and implement iteration (i.e., loops, recursion, etc.).
53. Recognize and implement sequential control.
54. Test and debug programs.
55. Design and implement user-defined data types.
56. Demonstrate output to different destinations.
57. Practice object-oriented programming (OOP).
58. Identify expected input and output.
59. Utilize basic steps in algorithmic problem solving.
60. Discuss top-down versus bottom-up development.
61. Generate test cases and expected results.
62. Apply simple data structures.
63. Explain how algorithms are used to produce artificial intelligence (AI).

Connections
• Post-Secondary Connection—KCTCS DGD 132 (Introduction to 3D Graphics)
• CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
• Kentucky Occupational Skill Standards
• 21st Century Skills

Introduction to Networking Concepts (non-vendor)
Valid Course Code: 110901

Course Description: Introduces technical level concepts of non-vendor specific networking including technologies, media, topologies, devices, management tools, and security. Provides the basics of how to manage, maintain, troubleshoot, install, operate, and configure basic network infrastructure.

Content/Process

Students will:

1. Differentiate between network protocols in terms of routing, addressing schemes, interoperability, and naming conventions.
2. Identify addressing format, schemes, and technologies; and required settings for connectivity including classful/classless address ranges, public/private addressing, and subnetting.
3. Identify the common ports associated with TCP (Transmission Control Protocol) and UDP (User Datagram Protocol).
4. Identify the basic standards of WAN and remote access technologies.
5. Categorize standard cable types and their properties.
6. Explain logical and physical network structures, topologies, and characteristics.
7. Identify the basic attributes, purposes, and functions of network components including wireless technologies.
8. Identify the functions of specialized network devices such as multilayer switches, load balancer, proxy, and DNS servers, and CSU/DSU.
9. Plan and implement a basic wired and wireless network.
10. Explain the function of each layer of the OSI and TCP/IP models.
11. Identify types of configuration management documentation such as network diagrams, wiring schematics, and configurations.
12. Summarize and explain different methods and rationales for network performance.
13. Diagnose a network problem using a systematic approach identifying the appropriate tools, selecting an appropriate course of action to resolve the problem, and document the solution.
14. Select the appropriate hardware and software tools to test, scan, and analyze network connectivity and performance.
15. Identify and explain common methods to ensure network security including antivirus software, user authentication, and firewall setup.
16. Identify issues that affect physical and remote access device security.

Connections

- Post-Secondary Connection— KCTCS CIT 160 (Introduction to Networking)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Introduction to Programming
Valid Course Code: 110201

Course Description: Focuses on the general writing and implementation of generic and atomized programs to drive operating systems. Includes software design, languages, and program writing, trouble-shooting, etc. Introduces students to fundamental programming concepts using an industry-specific or emerging programming language. Includes data types, control structures, simple data structures, error-handling, modular programming, information and file processing, and uniqueness of the language used in the course.
Content/Process
Students will: 1. Demonstrate knowledge of the program development life cycle. 2. Design, develop, compile, debug, test, run, and document programs in the language studied. 3. Design and develop programs using operators and assignments. 4. Design and develop programs that properly use variable, constants, data types, and objects. 5. Design and develop programs that use sequence, selection, and repetition structures. 6. Design and develop programs that use simple data structures. 7. Design and develop programs that use effective error and exception handling. 8. Design and develop programs that implement user-defined methods and modular programming. 9. Design and develop programs that implement file processing. 10. Design and develop programs that implement fundamental features that are unique to the language studied. 11. Design and develop programs using object oriented programming features, if applicable to the language studied. 12. Evaluate and critique effectiveness and efficiency of code written.
Connections
• Post-Secondary Connection—KCTCS course determined through local dual/articulation agreement • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills • Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Java Programming I
Valid Course Code: 110205

Course Description: Introduces students to fundamental programming concepts using the Java programming language. Topics include data types, control structures, simple data structures, error-handling, object-oriented programming, graphical user interfaces, and modular programming**.**
Content/Process
Students will: 1. Design, develop, compile, debug, test, run, and document programs in the Java language using a software development kit. 2. Design and develop programs using operators and assignments. 3. Design and develop programs using primitive data types. 4. Design and develop programs using sequence, selection, and repetition structures. 5. Design and develop programs using single and multi-dimensional arrays. 6. Design and develop programs using effective error and exception handling. 7. Design and develop programs using object oriented programming features, including defining classes, instantiating objects, and using arrays of objects. 8. Design and develop programs implementing user-defined methods and modular programming. 9. Design and develop programs using method overloading. 10. Design and develop programs using inheritance, encapsulation, and polymorphism. 11. Design and develop GUI interfaces for Java applications. 12. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 149 (Java I) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Java Programming II
Valid Course Code: 110206

Course Description: Provides students with an extensive overview of designing and developing advanced object-oriented applications using the Java programming language. Topics include input and output streams (file processing), polymorphism, inheritance, multithreading, recursion, mobile computing, and other advanced topics.

Content/Process
Students will: 1. Design and develop programs that use advanced GUI components. 2. Design and develop programs that use input and output streams including character and binary streams. 3. Design and develop programs that use multithreading. 4. Design and develop programs that use polymorphism. 5. Design and develop programs that use inheritance. 6. Design and develop programs that use recursion. 7. Design and develop programs that introduce mobile application concepts. 8. Design and develop programs that incorporate other advanced features of Java programming. 9. Evaluate and critique effectiveness and efficiency of code.

Connections
• Post-Secondary Connection— KCTCS CIT 249 (Java II) • CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

JavaScript
Valid Course Code: 110809

Course Description: Provides students with an overview of the JavaScript scripting language. Includes coding, testing, and debugging JavaScript programs; using variables, operators, and data types; creating dynamic web pages using JavaScript; controlling the behavior of forms, buttons, and text elements; and using control structures, pattern matching, objects, and application scripts.
Content/Process
Students will: 1. Design, develop, compile, debug, test, run, and document programs in the JavaScript language.   2. Design and develop programs using operators and assignments.   3. Design and develop programs using a variety of data types.   4. Demonstrate the input and output processes in JavaScript.   5. Design and develop programs using sequence, selection, and repetition structures.   6. Demonstrate pattern matching using JavaScript.   7. Demonstrate JavaScript objects.   8. Demonstrate the ability to write JavaScript application scripts.   9. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 140 (Java Script I)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

LAN Switching and Wireless/Scaling Networks/Cisco III
Valid Course Code: 110904

Course Description: Covers the architecture, components, and operations of routers and switches in a larger and more complex network. Helps students learn how to configure routers and switches for advanced functionality. Helps students to configure and troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, STP, and VTP in both IPv4 and IPv6 networks. Helps students to develop the knowledge and skills needed to implement DHCP and DNS operations in a network. Completes one of a series of four courses that helps prepare students for the Cisco Certified Network Associate (CCNA) certification exam and the Cisco Certified Entry Networking Technician (CCENT). This is the third course in the Cisco Curriculum.

Content/Process

Students will:

1. Configure and troubleshoot DHCP and DNS operations for IPv4 and IPv6.
2. Describe the operations and benefits of the Spanning Tree Protocol (STP).
3. Configure and troubleshoot STP operations.
4. Describe the operations and benefits of link aggregation and Cisco VLAN Trunk Protocol (VTP).
5. Configure and troubleshoot VTP, STP, and RSTP.
6. Configure and troubleshoot basic operations of routers in a complex routed network for IPv4 and IPv6.
7. Configure Open Shortest Path First (OSPF) protocol (single-area OSPF and multi-area OSPF).
8. Configure Enhanced Interior Gateway Routing Protocol (EIGRP).
9. Configure and troubleshoot advanced operations of routers and implement RIP, OSPF, and EIGRP routing protocols for IPv4 and IPv6.
10. Configure and manage Cisco IOS® Software licensing and configuration files.

Connections

- Post-Secondary Connection— KCTCS CIT 209 (Scaling Networks)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Leadership Dynamics- Information Technology
Valid Course Code: 110399

Course Description: This course is designed to assist students with developing skills needed to be successful leaders and responsible members of society. This student will develop personal attributes and social skills. Emphasis will be placed on interpersonal skills, team building, communication, personal development and leadership. This course will include opportunities for students to apply their knowledge.
Content/Process

Students will:
1. Investigate types of leadership and determine personal style.
2. Compare and contrast positive and negative characteristics of leaders.
3. Identify the role of leadership in the global society.
4. Assess the role that qualified leaders have on the success of organizations.
5. Explain how cultural and social diversity and equity impact leadership skills.
6. Identify and explain the importance of team membership skills for individuals and groups.
7. Develop interpersonal skills for resolving conflicts that occur in the home, school, community and workplace.
8. Demonstrate verbal and nonverbal communication skills needed for personal and leadership roles.
9. Make informed decisions using decision-making process.
10. Demonstrate appropriate parliamentary procedure skills used in meetings.
11. Analyze leadership opportunities available in school and community.
12. Describe how ethical and social behaviors affect individuals.
13. Develop personal goals.
14. Demonstrate appropriate business, professional and social etiquette.
15. Analyze the role self-management has on use of time and stress.

Connections

- Post-Secondary Connection—KCTCS course determined through local dual/articulation agreement
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Management of Support Services
Valid Course Code: 110302

Course Description: Digitally organizing the information technology and information and support services milestones achieved by the student that is reflective of their industry certification readiness, understanding the cost of doing business and preparation of technical and behavioral job performances i.e. interviews. The course also focuses on employability skills to include: a professional digital portfolio that emphasizes critical milestones focusing on entry level information technology technical and employability skills. This course could be taken with the help desk course enhancing skills in both courses.

Content/Process

Students will:
1. Determine purpose and goals using a project management method.
2. Define, Design, Develop, Deploy, Reflect, Redesign, and Present utilizing presentation software visualizing the process.
3. Determine roles, tasks, calendars.
4. Utilize Software packages for project management (MS Project, Excel, Visio, Dream-Spark, Prezi, etc.).
5. Utilize and define appropriate terminology.
6. Present information in a technical report.
7. Publish information presenting to an advisory board member.
8. Identify potential employment barriers for non-traditional groups and ways to overcome the barrier.
9. Research potential barriers placing information in a spreadsheet.
10. Present information to school principal and peers.
11. Synthesize the information collecting producing a product that could help overcome the barrier with non-traditional groups.

Connections

- Post-Secondary Connection— KCTCS course determined through local dual/articulation agreement
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Microsoft Active Directory Server
Valid Course Code: 110907

Course Description: Provides students with the knowledge and skills to configure and administer a network server infrastructure including DNS, WINS, DHCP and RRAS Servers. Covers how to implement and configure secure network access and implement fault tolerant storage technologies, network technologies most commonly used with Windows Servers and IP-enabled networks, and secure servers and maintain update compliance. Assists in prepping students for the Microsoft certification exam series.

Content/Process

Students will:
1. Install and configure servers.
2. Describe and demonstrate administration of DNS.
3. Configure and manage WINS.
4. Configure and troubleshoot DHCP.
5. Demonstrate knowledge of IPv4 TCP/IP
6. Demonstrate practical application of IP Addressing and Subnetting.
7. Demonstrate knowledge of IPv6 TCP/IP.
8. Configure and troubleshoot Routing and Remote Access.
9. Install, configure, and troubleshoot the Network Policy Server Role service.
10. Configure Network Access Protection.
11. Describe and configure IPsec.
12. Monitor and troubleshoot IPsec.
13. Describe and demonstrate management of a Distributed File System.
14. Configure and manage storage technologies.
15. Configure availability of network resources and content.
16. Configure server security compliance.

Connections

- Post-Secondary Connection— KCTCS CIT 214 (Microsoft Server Configuration)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Microsoft Client/Server Configuration
Valid Course Code: 110913

Course Description: Covers installation and configuration of Microsoft Windows client and server operating systems. Helps prepare students for exams in the Microsoft certification exam series.
Content/Process
Students will: 1. Evaluate hardware compatibility for installation. 2. Install and upgrade the Windows client operating system and migrate user data. 3. Manage file systems, partitions, disks and devices. 4. Install, configure, and control access to applications including desktop applications and Windows Store apps. 5. Configure Client Hyper-V. 6. Configure Transmission Control Protocol/Internet Protocol (TCP/IP) settings and network security settings. 7. Configure Remote Management and remote connections. 8. Configure local and shared access for files and folders. 9. Configure, secure, and manage mobile computing. 10. Monitor and optimize operating system performance and resource usage. 11. Implement disaster protection, including backup and file recovery options. 12. Create and manage user accounts and groups. 13. Configure printing and print services. 14. Configure and troubleshoot the boot process and System Recovery options.
Connections
• Post-Secondary—KCTCS CIT 213 (Microsoft Client Configuration) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Network Fundamentals/Cisco I
Valid Course Code: 110902

Course Description: Introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. Introduces the principles and structure of IP addressing and the fundamentals of Ethernet concepts, media, and operations. Helps students to be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes. Completes one of a series of four courses that helps prepare students for the Cisco Certified Network Associate (CCNA) certification exam and the Cisco Certified Entry Networking Technician (CCENT). This is the first course in the Cisco Curriculum.

Content/Process

Students will:
1. Describe the devices and services used to support communications in data networks and the Internet.
2. Describe the role of protocol layers in data networks.
3. Describe the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments.
4. Design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks.
5. Explain fundamental Ethernet concepts such as media, services, and operations.
6. Design a simple Ethernet network using routers, switches, cables, connectors and other hardware.
7. Demonstrate the Cisco command-line interface (CLI) commands to perform basic router and switch configurations.
8. Utilize common network utilities to verify small network operations and analyze data traffic.

Connections

- Post-Secondary Connection— KCTCS CIT 161 (Introduction to Networks)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills
- Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Network Hardware Installation and Troubleshooting
Valid Course Code: 110906

Course Description: This course is designed to provide students with the knowledge and skills necessary to design, install, configure, and troubleshoot cabling systems and equipment used to connect a local area network.

Content/Process
Students will:

Students will:
1. Design a basic network layout using copper and/or fiber optic cabling systems.
2. Terminate, test, and trouble shoot copper wire systems.
3. Install and configure network interface cards and connection equipment.
4. Use industrial standard testing and certification equipment.

Connections

- Post-Secondary Connection— KCTCS CIT 260 (Network Hardware Installation and Troubleshooting)
- CTSO— SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Cisco CCNA Certification/CCENT Certification
- Kentucky Occupational Skill Standards
- 21st Century Skills

Perl I
Valid Course Code: 110217

Course Description: Provides students with an overview of the Perl scripting language. Includes coding, testing, and debugging Perl programs; using variables, operators, and data types; and using control structures, pattern matching, objects, and application scripts.
Content/Process
Students will: 1. Design, develop, compile, debug, test, run, and document programs in the Perl language. 2. Design and develop programs using operators and assignments. 3. Design and develop programs using a variety of data types. 4. Demonstrate the input and output processes in Perl. 5. Design and develop programs using sequence, selection, and repetition structures. 6. Demonstrate pattern matching using Perl. 7. Demonstrate Perl objects. 8. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 145 (Perl I) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

PHP I
Valid Course Code: 110218

Course Description: Explores the fundamentals of PHP, with emphasis on syntax, structure, and current usage. Includes dynamic generation of web pages, fluid forms, and web security.
Content/Process
Students will: 1. Demonstrate basic knowledge of programming in PHP.   2. Demonstrate knowledge of variables, strings, data types, and operators.   3. Utilize sequence, selection, and repetition structures.   4. Create functions and use built-in functions.   5. Utilize arrays.   6. Create forms and utilize scripts.   7. Manipulate files on a server.   8. Demonstrate an understanding of the object-oriented features of PHP.   9. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 141 (PHP I)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

PHP II
Valid Course Code: 110219

Course Description: Explores the dynamic features of PHP and how it can interact to form spontaneous websites and dynamic feature rich content.
Content/Process
Students will: 1. Demonstrate knowledge of a secure PHP environment.   2. Apply global Windows extensions.   3. Demonstrate multiple field queries.   4. Identify form elements.   5. Demonstrate knowledge of relational databases and normalization.   6. Identify SQL databases used with PHP scripts.   7. Create a complex Content Management System (CMS).   8. Utilize XML as a data storage scheme.   9. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 241 (PHP II)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

Productivity Software
Valid Course Code: 110204

Course Description: Utilizes current word processing, spreadsheet, database, and presentation application software to solve common technology and business problems. Covers basic features of each software application.

Content/Process

Students will:

1. Use a productivity software package to create, edit, print, and save documents.
2. Use productivity tools such as spelling and grammar.
3. Apply formatting features such as font, color, margins, headers, and footers.
4. Use tools such as cut, copy and paste within a document and between documents.
5. Create HTML file formats for web publishing.
6. Create new documents using templates and wizards.
7. Use a word processing program to insert and use table features.
8. Use a word processing program to insert and use table column features.
9. Insert pictures and Clipart into word processing documents.
10. Use a spreadsheet package to create common business reports and budgets.
11. Use mathematical formulas and common statistical, date, financial, and logical functions.
12. Make formatting changes to a worksheet including column width, row height, cell, and table formatting.
13. Use autofill to copy and paste formulas and repeat patterns.
14. Create effective charts, including bar, line, and pie charts, to accompany business reports.
15. Use a relational database management program to create tables, queries, forms, reports, and labels.
16. Use query feature to extract information from a database using simple and compound conditions.
17. Use relationship feature to join tables in a database and obtain information from multiple tables.
18. Plan and create an electronic slide show presentation using a presentation software package.
19. Use timing, transition, and animation features to enhance a presentation.

Connections

- Post-Secondary Connection—KCTCS CIT 130 (Productivity Software)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Project-Based Programming
Valid Course Code: 110226

Course Description: This project-based learning course engages students who are interested about programming. In this course, students will create projects that require computer science fundamentals and extensive research to successfully complete. Students will work either solo or in a team to execute a project decided upon by the student(s). Students must learn and demonstrate proficiency in time management, scope, research, computer science, and teamwork to be successful in this course. Finally, students will engage in leadership skills by being held accountable for completion of their tasks or project. Note: the teacher is highly encouraged to create his/her own project (to demonstrate teacher "buy in").

Content/Process
Students will: 1. Manage and modify scope to ensure success.   2. Apply time management skills to effectively complete project to specifications.   3. Use programming language of choice to develop a project of choice.   4. Demonstrate continuous improvement through feedback from 1-on-1 meetings each week and 6 week project updates with an instructor.   5. Use appropriate and effective research skills.   6. Demonstrate proficiency in computer science fundamentals and design patterns.   7. Architect a project for the semester.   8. Demonstrate use of version control through git.   9. Demonstrate manipulation of search terms in Google to obtain valid and useful results.

Connections
• CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

Python I
Valid Course Code: 110220

Course Description: Introduces students to fundamental programming concepts using the Python programming language. Includes data types, control structures, simple data structures, error-handling, modular programming, object-oriented programming, graphical user interfaces and file processing.

Content/Process

Students will:
1. Design, develop, compile, debug, test, run, and document programs in the Python language.
2. Design and develop programs using operators and assignments.
3. Design and develop programs using a variety of data types.
4. Demonstrate the input and output processes in Python.
5. Design and develop programs using sequence, selection, and repetition structures.
6. Design and develop programs using arrays, lists, and tuples.
7. Design and develop programs using simple GUI components.
8. Demonstrate Python objects.
9. Evaluate and critique effectiveness and efficiency of code.

Connections

- Post-Secondary Connection—KCTCS CIT 144 (Python I)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Python II
Valid Course Code: 110221

Course Description: Provides students with an extensive overview of designing advanced computer applications using the Python programming language. Includes graphical user interfaces, event-driven programming, modular programming, advanced object-oriented programming, advanced data types and structures, input validation, error-handling, database processing, and client/server programming.

Content/Process

Students will:

1. Demonstrate knowledge of advanced concepts and associated definitions.
2. Design and implement programs that use well developed GUI components
3. Design, develop, compile, debug, test, run, and document advanced programs in the language.
4. Design and develop programs that use advanced data structures.
5. Design and develop programs that use Python for client and server programming.
6. Design and develop programs that use innovative algorithms and techniques, including recursion.
7. Design and develop programs using polymorphism, inheritance, and overloading.
8. Design and develop programs that use advanced file processing.
9. Examine and evaluate the strengths and weaknesses of the language.
10. Design and develop programs that incorporate other advanced features of the language.
11. Evaluate and critique effectiveness and efficiency of code written.

Connections

- Post-Secondary Connection—KCTCS CIT 244 (Python II)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Routing Protocols and Concepts/Cisco II
Valid Course Code: 110903

Course Description: Covers the architecture, components, and operations of routers and switches in a small network. Helps students learn how to configure a router and a switch for basic functionality. Helps students configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks. Completes one of a series of four courses that helps prepare students for the Cisco Certified Network Associate (CCNA) certification exam and the Cisco Certified Entry Networking Technician (CCENT). This is the second course in the Cisco Curriculum.

Content/Process

Students will:

1. Describe basic switching concepts and the operation of Cisco switches.
2. Describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1q.
3. Troubleshoot basic operations of a small switched network.
4. Describe the purpose, nature, and operations of a router, routing tables, and the route lookup process.
5. Configure and troubleshoot static routing and default routing.
6. Describe how VLANs create logically separate networks and how routing occurs between them.
7. Describe dynamic routing protocols, distance vector routing protocols, and link-state routing protocols.
8. Configure and troubleshoot basic operations of routers in a small routed network using Routing Information Protocol (RIPv1 and RIPv2).
9. Configure and troubleshoot basic operations of routers in a small routed network using Configure Open Shortest Path First (OSPF) protocol (single-area OSPF).
10. Configure and troubleshoot VLANs and inter-VLAN routing.
11. Describe the purpose and types of access control lists (ACLs).
12. Prepare, monitor, and troubleshoot ACLs for IPv4 and IPv6.
13. Describe the operations and benefits of Dynamic Host Configuration Protocol (DHCP) and Domain Name System (DNS) for IPv4 and IPv6.
14. Describe the operations and benefits of Network Address Translation (NAT).
15. Configure and troubleshoot NAT operations.

Connections

- Post-Secondary Connection—KCTCS CIT 167 (Routing & Switching Essentials)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Cisco CCNA Certification/CCENT Certification
- Kentucky Occupational Skill Standards
- 21st Century Skills

Security Fundamentals
Valid Course Code: 110912

Course Description: Introduces basic computer and network security concepts and methodologies. Covers principles of security; compliance and operational security; threats and vulnerabilities; network security; application, data, and host security; access control and identity management; and cryptography. Helps to prepare students for the COMPTIA Security+ examination.

Content/Process
Students will:

1. Explain basic security concepts.
2. Identify and explain appropriate use of security tools to facilitate security.
3. Evaluate current security issues related to computer and network systems.
4. Evaluate and select appropriate incident response procedures, disaster recovery, and risk identification techniques to ensure business continuity.
5. Differentiate various malware and systems security threats against computers and networks.
6. Explain the vulnerabilities and mitigations associated with computers and network devices.
7. Explain the proper use of common tools for carrying out vulnerability assessments.
8. Identify and describe potential application and data vulnerabilities, including buffer overflow, DLL injection, and SQL injection.
9. Explain how host firewalls, malware protection, and updates are important to application and data security.
10. Describe the importance of user accounts and associated permissions.
11. Compare and discuss logical and physical access control security methods.
12. Explain authentication models and identify components of each model.
13. Summarize and explain general cryptography concepts.
14. Demonstrate public and private key pairs for digital signing and encryption/decryption.

Connections

- Post-Secondary Connection—KCTCS CIT 180 (Security Fundamentals)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Special Topics, Computer Science
Valid Course Code: 110752

Special Topics, Information Support and Services
Valid Course Code: 110152

Special Topics, Networking
Valid Course Code: 110952

Course Special Topics, Programming
Valid Course Code: 110252

Special Topics, Web Development/Administration
Valid Course Code: 110852

Course Description: Special Topics courses may be utilized, with justification for course and course objectives, upon approval by the Information Technology Consultant Related to Career Major.
Content/Process
Students will: 1. Complete tasks defined by the teacher and approved by the Information Technology Consultant in the Office of Career and Technical Education.
Connections
• Post-Secondary Connection—KCTCS CIT 299 (Special Topics in CIT) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills

Visual Basic I
Valid Course Code: 110207

Course Description: Introduces students to fundamental programming concepts using the Visual Basic programming language. Topics include data types, control structures, simple data structures, error-handling, modular programming, event-driven programming, graphical user interfaces, and file processing.

Content/Process

Students will:
1. Demonstrate knowledge of the program development life cycle.
2. Design, develop, compile, debug, test, run, and document event-drive programs in the Visual Basic programming language.
3. Design and develop programs using operators and assignments.
4. Design and develop programs using primitive data types.
5. Design and develop programs using sequence, selection, and repetition structures.
6. Design and develop programs using single and multi-dimensional arrays.
7. Demonstrate knowledge of file processing in Visual Basic.
8. Demonstrate knowledge of object oriented programming features in Visual Basic.
9. Design and develop programs using effective error and exception handling.
10. Evaluate and critique effectiveness and efficiency of code.

Connections

- Post-Secondary Connection—KCTCS CIT 148 (Visual Basic I)
- CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)
- Kentucky Occupational Skill Standards
- 21st Century Skills

Visual Basic II: Creating Desktop Applications
Valid Course Code: 110208

Course Description: Provides students with an extensive overview of designing advanced computer applications using the Visual Basic programming language. Includes graphical user interfaces, event-driven programming, modular programming, object-oriented programming, advanced data types and structures, input validation, error-handling, and file and database processing.
Content/Process
Students will: 1. Design and develop an event-driven application, including a well-designed user interface.   2. Demonstrate understanding of modular design.   3. Demonstrate understanding of object-oriented programming.   4. Design and code applications using advanced data types and structures.   5. Implement input validation and processing.   6. Demonstrate error-checking and error handling.   7. Implement file and database processing.   8. Evaluate and critique effectiveness and efficiency of code.
Connections
• Post-Secondary Connection—KCTCS CIT 248 (Visual Basic II)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills

Web Page Development
Valid Course Code: 110801

Course Description: Introduces web page design through the use of HTML and CSS. Uses text and/or web editors to create web documents with various formats and page layouts, multimedia, tables and forms. Emphasizes W3C web design and accessibility standards.
Content/Process
Students will: 1. Plan the layout of a website. 2. Use HTML (Hypertext Markup Language). 3. Use CSS (Cascading Style Sheets). 4. Create lists and tables in organizing content. 5. Use HTML and CSS in page layout. 6. Create web forms. 7. Use multimedia in the creation of a website (such as images, sound, and video). 8. Publish web pages to a web site.
Connections
• Post-Secondary Connection—KCTCS CIT 155 (Web Page Development) • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review) • Kentucky Occupational Skill Standards • 21st Century Skills • Nationally Recognized Industry Standards and Certifications – refer back to pathway document

Web Site Design and Production
Valid Course Code: 110804

Course Description: Introduces web site production processes with particular emphasis on design involving layout, navigation, interactivity, and using web production software.

Content/Process
Students will: 1. Utilize principles of graphic and content creation for online media.   2. Use fundamental online graphic design principles including appropriate interactivity, content sensitive navigation schemes and user interface criteria.   3. Select task-appropriate software tools.   4. Utilize web site accessibility.   5. Utilize web site implementation and hosting.   6. Edit and enhance digital video images using state-of-the-art software.

Connections
• Post-Secondary Connection—KCTCS CIT 157 (Web Site Design & Production)   • CTSO—SkillsUSA, TSA, FBLA (STLP encouraged even though not a recognized student organization for program review)   • Kentucky Occupational Skill Standards   • 21st Century Skills   • Nationally Recognized Industry Standards and Certifications – refer back to pathway document