

Information Technology Networking Supplemental Program Resources



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Table of Contents

[Introduction](#) 3

[Program of Study](#) 4

[Program Structure](#) 5

[Course Descriptions](#) 6

[Equipment List\(s\)](#) 7

[Crosswalks and Alignments](#) 9

Introduction

This document provides supplemental information for the Information Technology Networking program of study. It may be updated or revised as the base program of study, or complementary programs, are updated, added, or removed. Please contact the appropriate Education Programs Professional with any questions.

The Program of Study includes the approved courses, complementary courses, alignment(s) to industry, postsecondary options, and additional information.

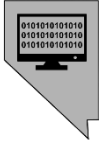
The Equipment List for the Information Technology Networking program of study is included and, if applicable, additional items used only in the complementary course(s) are noted.

The Crosswalks and Alignments connect and support the Information Technology Networking standards for the Information Technology program of study. Complementary course standards are not listed in the crosswalks and alignments.

Program of Study Information

The following program of study information sheet as well as the program structure tables for the courses are provided to be able to print separately for handouts. The information provided is based on the best available information at the time of this document and will be updated as appropriate.

Information Technology Networking



The Information Technology Networking program provides students with concepts in computer networking. Areas of study include safety procedures, network systems hardware, network protocols, and constructing and maintaining a network.

Information Technology Career Cluster

Information Technology® is focused on building linkages in information technology occupations for entry level, technical and professional careers related to the design, development, support and management of hardware, software, multimedia, and systems integration services.

Postsecondary Options

Certificate/License

- Management Network Infrastructure Analyst (CSN)
- Computer Information Technology (WNC)

Associate Degrees

- CIT Networking (TMCC)
- Computer Technology Networking AAS (GBC)

Bachelor's Degree

- Information Systems, BS (UNR)
- Digital Information Technology, BAS (GBC)
- Computer Engineering Technology, BS (NSC)

Master's/Doctoral Degree

- Computer Science and Engineering (UNLV, UNR)
- Information Systems (UNR)
- Master of Science – Cybersecurity



For additional information on this cluster, please contact:

cteinfo@doe.nv.gov

Website: <https://doe.nv.gov/offices/craleo/cte>

Approved Courses

- CISCO IT Essentials/Intro to Cybersecurity
- CCNA I Introduction to Networking
- CCNA II Routing and Switching Essentials

Complementary Courses

- IT Networking Advanced Studies
- CTE Work Experience – Information Technology

Work-Based Learning Opportunities

Job Shadowing / Internship / CTE Work Experience/ School-based Enterprise/ Apprenticeship Ready Programs

Career and Technical Student Organization



State Recognized Industry Certifications

Refer to the Governor's Office of Workforce Innovation's [Nevada Industry Recognized Credential List](#)

Aligned to Industry			
Occupation	Median Wage Per year	Annual Openings	% Growth
Computer Network Architects	\$120,520	11,800	4.0%
Computer Support Specialist	\$57,910	75,000	6%
Computer and Information Systems Managers	\$159,010	48,500	16%
Network and Computer Systems Administrator	\$80,600	23,900	3%
Computer Hardware Engineers	\$128,170	5,300	5%

Source U.S. Bureau of Labor Statistics 2022

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Program Structure for Information Technology Networking

The core course sequencing is provided in the following table. Complementary Courses are available and provided later in this document. The following courses provide a completed program of study.

Core Course Sequence (R) with Lab Course(s) (C)

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
R	Cisco IT Essentials	CISCO IT ESST	11.1002	10	102	G	.5	13	10102G0.5013
R	Cisco Introduction to Cybersecurity	CISCO IT CYBR	11.1002	10	102	G	.5	13	10102G0.5013
R	CCNA I Introduction to Networking	CISCO CCNA I	11.1002	10	102	G	1.00	23	10102G1.0023
R	CCNA II Routing and Switching Essentials	CISCO CCNA II	11.1002	10	102	G	1.00	33	10102G1.0033

The complementary courses are provided in the following table. **The qualifying program of study must be completed prior to enrolling in the complementary course(s).** A program does not have to utilize the complementary courses for students to complete their program of study.

Required/ Complementary	Course Title	Abbreviated Name	CIP Code	SCED Subject Area	SCED Course Identifier	SCED Course Level	SCED Unit Credit	SCED Course Sequence	SCED Course Number
C	IT Networking Advanced Studies	IT NETWRKG AS	11.1002	10	102	E	1.00	11	10102E1.0011
C	CTE Work Experience – Information Technology	WORK EXPER IT	99.0011	10	298	G	1.00	11	10298G1.0011

CIP Code – Classification of Instructional Programs (CIP) Codes

SCED – School Courses for the Exchange of Data that populates the State Infinite Campus System and the System for Accountability Information in Nevada (SAIN)

Course Descriptions

CISCO-IT Essentials

Prerequisite: None

This course introduces students to the fundamentals of computer hardware and software, mobile devices, security and networking concepts, and the responsibilities of an IT professional. Students will be able to describe the internal components of a computer and assemble a computer system. Students will be able to install and understand operating systems, connect via a networked environment, and troubleshoot using system tools and diagnostic software.

CISCO-Introduction to Cybersecurity

Prerequisite: CISCO-IT Essentials

This course explores the broad topic of cybersecurity including procedures to implement data confidentiality, integrity, availability, and security controls on networks, servers, and applications. Students will understand security principles and how to protect personal data and privacy online.

CCNA I Introduction to Networking

Prerequisite: CISCO-IT Essentials/CISCO-Introduction to Cybersecurity

This course covers basic networking concepts including networking architecture, structure, and functions; principles and structure of IP addressing; router hardware; network configurations; and the fundamentals of Ethernet concepts.

CCNA II Routing and Switching Essentials

Prerequisite: CISCO-CCNA I Introduction to Networking

This course covers the architecture, components, and operations of routers and switches in a network. Students will learn how to configure a router and a switch for basic functionality. Configuration implementation of monitoring tools is also addressed. Upon successful completion of this program, students will be prepared for CompTIA's A+ and the Cisco Certified Entry Networking Technician (CCENT) certification exams.

IT Networking Advanced Studies

Prerequisite: CISCO-CCNA II Routing and Switching Essentials

This course is offered to students who have completed all content standards in the Information Technology program of study and desire to pursue advanced study through investigation and in-depth research. Students are expected to work independently or in a team and consult with their supervising teacher for guidance. The supervising teacher will give directions, monitor, and evaluate the students' topic of study. Coursework may include various work-based learning experiences such as internships and job shadowing, involvement in a school-based enterprise, completion of a capstone project, and/or portfolio development. This course may be repeated for additional instruction and credit.

CTE Work Experience – Information Technology

Prerequisite: Completion of Level 2 course in the qualifying program of study

This course is designed to expand the students' opportunities for applied learning. This course provides an in-depth CTE work experience that applies the processes, concepts, and principles as described in the classroom instruction. This course will encourage students to explore and develop advanced skills through work-based learning directly related to the program of study. The course must follow NAC 389.562, 389.564, 389.566 regulations.

Equipment List

This recommended list is based upon a classroom size of 25 students. All costs are estimated and may be adjusted once verified and justified by districts with current quotes. No specific equipment vendor or brand names are endorsed due to various possibilities, but school districts should consult with stakeholders to ensure industry-recognized equipment and software are purchased. The intent of this list is to provide school districts with guidance on the equipment needed to implement the state standards for an Information Technology Networking program.

CTE Classroom Equipment **Total: \$5,400**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
2	Storage Cabinets (36" x 12" x 72") (lockable)	\$400	\$800
1	Presentation Equipment (e.g., interactive whiteboard (IWB), or other interactive display system with software and accessories)	\$3,500	\$3,500
1	Networkable Laser Printer (black/white or color)	\$1,000	\$1,000
1	First Aid Kit	\$100	\$100

Program Equipment **Total: \$70,600**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Computers	\$1,000	\$25,000
1	Teacher Computer (enhanced memory/storage, download capable)	\$1,500	\$1,500
1	Technology Storage/Charging System	\$2,000	\$2,000
2	Tablets (enhanced memory/speed)	\$500	\$1,000
15	Integrated Service Routers	\$2,000	\$30,000
6	Rackmount Patch Panels w/12 ports	\$600	\$3,600
15	PC Assembly Kits	\$500	\$7,500

Instructional Materials **Total: \$3,000**

QTY	ITEM DESCRIPTION	UNIT	TOTAL
25	Student Textbooks Approved CTE Instructional Materials list can be found here .	\$100	\$2,500
1	Teacher Textbook Edition and Resources	\$500	\$500

Supplemental Program Resources

2024

Instructional Supplies

Total:

\$17,275

QTY	ITEM DESCRIPTION	UNIT	TOTAL
5	Open Frame Networking Racks, (hold 6 devices	\$450	\$2,250
1	Cat6 Bulk Cable (unshielded twisted pair (UTP), 1000 ft roll)	\$450	\$450
15	8-10 Port Switches (rack mountable)	\$200	\$3,000
1	Cat5e Bulk Cable (unshielded twisted pair (UTP), 1000 ft roll)	\$175	\$175
15	Anti-static Screen Wipe	\$150	\$2,250
15	Network Antivirus Software	\$100	\$1,500
1	Wireless Access Point/Network Device	\$100	\$100
5	Digital Multimeters	\$100	\$500
15	Network Technician Toolkits (to include 3-in-1 crimping tool, UTP/STP wire stripper and cutter, punchdown tool, LAN cable tester, tone and probe)	\$80	\$1,200
15	VGA Cables (various lengths/endings)	\$100	\$1,500
5	Electric Blower/ Dusters	\$100	\$500
15	PC Technician Toolkits	\$75	\$1,125
15	Mounting Brackets	\$30	\$450
25	Anti-Static Wristbands	\$25	\$625
25	Anti-Static Work Mats	\$25	\$625
25	Safety Goggles	\$5	\$125
Varies	Computer Accessories (cases, covers, etc.) (optional)	\$600	\$600
Varies	Assorted RJ45 Accessories (connectors, inline couplers, punchdown keystone jacks)	\$300	\$300

Other

Total:

\$0

QTY	ITEM DESCRIPTION	UNIT	TOTAL
N/A	N/A	\$0	\$0

Category Totals:

Classroom Equipment	\$5,400
Program Equipment	\$70,600
Instructional Materials	\$3,000
Instructional Supplies	\$17,275
Other	\$0

Estimated Program Total

\$96,275

Crosswalks and Alignments for Program of Study Standards

Crosswalks and alignments are intended to assist the teacher make connections for students between the technical skills within the program and academic standards. The crosswalks and alignments are not intended to teach the academic standards but to assist students in making meaningful connections between their CTE program of study and academic courses. The crosswalks are for the required program of study courses, not the complementary courses.

Crosswalks (Academic Standards)

The crosswalks of the Information Technology Networking Standards show connections with the Nevada Academic Content Standards. The crosswalk identifies the performance indicators in which the learning objectives in the Information Technology Networking program connect with and support academic learning. The performance indicators are grouped according to their content standard and are crosswalked to the Nevada Academic Content Standards in English Language Arts, Mathematics, and Science.

Alignments (Mathematical Practices)

In addition to connections with the Nevada Academic Content Standards for Mathematics, many performance indicators support the Mathematical Practices. The following table illustrates the alignment of the Information Technology Networking Standards Performance Indicators and the Mathematical Practices. This alignment identifies the performance indicators in which the learning objectives in the Information Technology Networking program connect with and support academic learning.

Alignments (Science and Engineering Practices)

In addition to connections with the Nevada Academic Content Standards for Science, many performance indicators support the Science and Engineering Practices. The following table illustrates the alignment of the Information Technology Networking Standards Performance Indicators and the Science and Engineering Practices. This alignment identifies the performance indicators in which the learning objectives in the Information Technology Networking program connect with and support academic learning.

Crosswalks (Common Career Technical Core)

The crosswalks of the Information Technology Networking Standards show connections with the Common Career Technical Core. The crosswalk identifies the performance indicators in which the learning objectives in the Information Technology Networking program connect with and support the Common Career Technical Core. The Common Career Technical Core defines what students should know and be able to do after completing instruction in a program of study. The Information Technology Networking Standards are crosswalked to the Information Technology Career Cluster™ and the Network Systems Career Pathway.

Crosswalk of Information Technology Networking Program of Study Standards
and the Nevada Academic Content Standards

English Language Arts: Language Standards

Nevada Academic Content Standards		Performance Indicators
L.11-12.6	Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.	1.5.2

English Language Arts: Reading Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards		Performance Indicators
RST.11-12.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.	6.2.2; 7.4.4, 7.4.5; 8.2.1 8.2.2
RST.11-12.4	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.	2.1.2, 2.1.5; 3.1.2; 5.1.2 7.1.2, 7.1.3, 7.2.5, 7.2.6 7.4.1, 7.4.2; 8.1.2, 8.1.4
RST.11-12.5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.	7.4.3
RST.11-12.6	Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved.	3.3.5
RST.11-12.7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	6.1.2, 6.1.7
RST.11-12.9	Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	2.1.2; 7.1.1, 7.1.4, 7.1.5 7.2.4; 8.1.2, 8.1.4

English Language Arts: Speaking and Listening Standards

Nevada Academic Content Standards		Performance Indicators
SL.11-12.1	Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.	4.3.5
SL.11-12.1a	Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2, 1.5.2
SL.11-12.1c	Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.	4.3.1
SL.11-12.1d	Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task.	4.3.5
SL.11-12.2	Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2; 3.1.7
SL.11-12.4	Present information, findings, and supporting evidence, conveying a clear and distinct perspective, such that listeners can follow the line of reasoning, alternative or opposing perspectives are addressed, and the organization, development, substance, and style are appropriate to purpose, audience, and a range of formal and informal tasks.	1.1.1, 1.1.2, 1.2.1, 1.2.4 1.4.2, 1.5.2; 3.1.7; 4.3.2 4.4.2, 4.4.5; 5.1.3, 5.1.4 5.1.5, 5.1.7; 6.3.5, 6.3.10

English Language Arts: Writing Standards for Literacy in Science and Technical Subjects

Nevada Academic Content Standards	Performance Indicators
WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.	6.3.3, 6.3.7
WHST.11-12.2d Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.	6.2.3, 6.3.3, 6.3.8
WHST.11-12.4 Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.	1.2.5, 1.4.1; 2.1.2, 2.2.3; 3.1.2, 3.3.5, 3.3.6, 3.4.4; 5.1.2; 7.1.1, 7.1.3, 7.2.3, 7.2.4, 7.2.5, 7.2.6, 7.1.2, 7.4.1, 7.4.2, 7.4.3; 8.1.2, 8.1.4, 8.2.3, 8.2.4
WHST.11-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.	1.4.4
WHST.11-12.6 Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	1.4.5
WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.	1.1.2, 1.1.3, 1.4.2, 1.4.3, 1.5.2
WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.	2.1.5; 4.4.2, 4.4.5; 5.1.1, 5.2.5

Alignment of Information Technology Networking Standards and the Mathematical Practices

Mathematical Practices	Information Technology Networking Performance Indicators
1. Make sense of problems and persevere in solving them.	1.1.1, 1.1.2, 1.5.6, 1.5.10 3.4.4; 4.2.6, 4.3.1; 8.1.8, 8.2.5
2. Reason abstractly and quantitatively.	1.1.1, 1.1.2, 1.2.1, 1.2.3 1.4.3, 1.5.6, 1.5.10; 3.3.7
3. Construct viable arguments and critique the reasoning of others.	1.2.1, 1.2.3, 1.3.3, 1.5.6 1.5.8; 6.1.2; 7.1.3, 7.2.6
4. Model with mathematics.	1.1.1, 1.1.2, 1.2.1, 1.3.3 1.5.6, 1.5.9, 1.5.10
5. Use appropriate tools strategically.	1.3.1, 1.3.3; 2.1.6, 2.2.2 2.2.3; 4.1.3
6. Attend to precision.	1.4.3, 1.5.8, 1.5.9; 2.2.4 3.1.15, 3.2.3, 3.2.8; 4.1.2 4.2.1, 4.2.2, 4.4.3
7. Look for and make use of structure.	1.1.1, 1.1.2, 1.3.1, 1.3.3 1.4.3; 5.2.4; 6.1.2, 6.3.2
8. Look for and express regularity in repeated reasoning.	1.1.1, 1.1.2

Alignment of Information Technology Networking Standards and the Science and Engineering Practices

Science and Engineering Practices	Information Technology Networking Performance Indicators
1. Asking questions (for science) and defining problems (for engineering).	1.2.2, 1.5.1; 4.1.3, 4.3.1; 6.2.3
2. Developing and using models.	
3. Planning and carrying out investigations.	7.1.3, 7.1.5, 7.1.6, 7.4.5; 8.1.5 8.1.7, 8.1.8
4. Analyzing and interpreting data.	
5. Using mathematics and computational thinking.	1.5.4, 1.5.9; 5.1.9
6. Constructing explanations (for science) and designing solutions (for engineering).	3.1.15, 3.2.3; 4.2.2; 5.2.1; 7.2.3 7.2.4
7. Engaging in argument from evidence.	1.2.3
8. Obtaining, evaluating, and communicating information.	1.5.3, 1.5.4, 1.5.5, 1.5.8, 1.5.9 1.5.10; 7.4.1; 8.2.4

Crosswalks of Information Technology Networking Standards and the Common Career Technical Core

Information Technology Career Cluster	Performance Indicators
1. Demonstrate effective professional communication skills and practices that enable positive customer relationships.	2.1.1; 4.3.1 - 4.3.5
2. Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.	3.1.15, 3.2.3, 3.2.7, 3.2.8 3.2.11 - 3.2.13; 4.4.1 - 4.4.5
3. Demonstrate the use of cross-functional teams in achieving IT project goals.	1.5.4
4. Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.	1.5.7; 4.3.5; 6.4.1 - 6.4.4
5. Explain the implications of IT on business development.	
6. Describe trends in emerging and evolving computer technologies and their influence on IT practices.	
7. Perform standard computer backup and restore procedures to protect IT information.	8.1.1 - 8.1.8, 8.2.1 - 8.2.5
8. Recognize and analyze potential IT security threats to develop and maintain security requirements.	6.1.1 - 6.1.7, 6.2.1 - 6.2.5 6.3.1 - 6.3.11
9. Describe quality assurance practices and methods employed in producing and providing quality IT products and services.	1.5.12, 1.5.13; 3.4.1 - 3.4.4 5.1.2
10. Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.	6.3.1 - 6.3.11
11. Demonstrate knowledge of the hardware components associated with information systems.	2.2.1; 4.1.1 - 4.1.3, 4.2.1 - 4.2.7, 4.4.1 - 4.4.5
12. Compare key functions and applications of software and determine maintenance strategies for computer systems.	4.1.1, 4.2.1, 4.2.2

Network Systems Career Pathway	Performance Indicators
1. Analyze customer or organizational network system needs and requirements	7.1.3-7.1.6, 7.3.1-7.3.6
2. Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power, security)	3.3.1 - 3.3.7; 7.3.5
3. Design a network system using technologies, tools and standards.	3.1.1-3.1.15, 3.2.1-3.1.13, 5.2.5; 6.2.1-6.2.5; 7.2.1- 7.2.6
4. Perform network system installation and configuration.	5.1.1-5.1.10, 5.2.1-5.2.5
5. Perform network administration, monitoring and support to maintain a network system.	7.4.1-7.4.5; 8.1.1-8.1.8 8.2.1-8.2.5