INFORMATION TECHNOLOGY NETWORKING CURRICULUM FRAMEWORK

This document was prepared by:

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To improve student achievement and educator effectiveness by ensuring opportunities, facilitating learning, and promoting excellence

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INTRODUCTION

The Nevada CTE Curriculum Frameworks are a resource for Nevada's public and charter schools to design, implement, and assess their CTE programs and curriculum. The content standards identified in this document are listed as a model for the development of local district programs and curriculum. They represent rigorous and relevant expectations for student performance, knowledge, and skill attainment which have been validated by industry representatives.

The intent of this document is to provide a resource to districts as they develop and implement CTE programs and curricula.

This program ensures the following thresholds are met:

- The CTE course and course sequence teaches the knowledge and skills required by industry through applied learning methodology and, where appropriate, work-based learning experiences that prepare students for careers in high-wage, high-skill, or in-demand fields. Regional and state economic development priorities shall play an important role in determining program approval. Some courses also provide instruction focused on personal development.
- The CTE course and course sequence includes leadership and employability skills as an integral part of the curriculum.
- The CTE course and course sequence are part of a rigorous program of study and include sufficient technical challenge to meet state and/or industry standards.

The CTE program components include the following items:

- Program of Study
- State Skill Standards
- Employability Skills for Career Readiness Standards
- Career Technical Student Organizations (CTSOs)
- Curriculum Framework
- CTE Assessments:
    - Workplace Readiness Skills Assessment
    - End-of-Program Technical Assessment
- Certificate of Skill Attainment
- CTE Endorsement on a High School Diploma
- CTE College Credit

NEVADA DEPARTMENT OF EDUCATION

CURRICULUM FRAMEWORK FOR

INFORMATION TECHNOLOGY NETWORKING

PROGRAM INFORMATION

PROGRAM TITLE:	**INFORMATION TECHNOLOGY NETWORKING**
STATE SKILL STANDARDS:	**INFORMATION TECHNOLOGY NETWORKING**
STANDARDS REFERENCE CODE:	**ITN**
CAREER CLUSTER:	**INFORMATION TECHNOLOGY**
CAREER PATHWAY:	**NETWORK SYSTEMS**
PROGRAM LENGTH:	**3 LEVELS (L1, L2, L3C)**
PROGRAM ASSESSMENTS:	**INFORMATION TECHNOLOGY NETWORKING** **WORKPLACE READINESS SKILLS**
CTSO:	**FBLA / SKILLSUSA**
GRADE LEVEL:	**9-12**
INDUSTRY CERTIFICATIONS:	**CISCO CERTIFIED NETWORKING ASSOCIATE (CCNA)** **COMPTIA NETWORKING +**

PROGRAM PURPOSE

The purpose of this program is to prepare students for postsecondary education and employment in the Information Technology industry.

The program includes the following state standards:

- Nevada CTE Skill Standards: Information Technology Networking
- Employability Skills for Career Readiness
- Nevada Academic Content Standards (alignment shown in the Nevada CTE Skill Standards):
  - English Language Arts
  - Mathematics
  - Science
- Common Career Technical Core (alignment shown in the Nevada CTE Skill Standards)

CAREER CLUSTERS

The National Career Clusters™ Framework provides a vital structure for organizing and delivering quality CTE programs through learning and comprehensive programs of study (POS). In total, there are 16 Career Clusters in the National Career Clusters™ Framework, representing more than 79 Career Pathways to help students navigate their way to greater success in college and career. As an organizing tool for curriculum design and instruction, Career Clusters™ provide the essential knowledge and skills for the 16 Career Clusters™ and their Career Pathways.*

*Cite: National Association of State Directors of Career Technical Education Consortium. (2012). Retrieved from https://www.air.org/sites/default/files/CTEClusters.pdf

PROGRAM OF STUDY

The program of study illustrates the sequence of academic and career and technical education coursework that is necessary for the student to successfully transition into postsecondary educational opportunities and employment in their chosen career path. (NAC 389.803)

PROGRAM STRUCTURE

The core course sequencing provided in the following table serves as a guide to schools for their programs of study. Each course is listed in the order in which it should be taught and has a designated level. Complete program sequences are essential for the successful delivery of all state standards in each program area.

INFORMATION TECHNOLOGY NETWORKING

Core Course Sequence

COURSE NAME	LEVEL
CISCO-IT Essentials / CISCO-Introduction to Cybersecurity	L1
CISCO-CCNA I Introduction to Networking	L2
CISCO-CCNA II Routing and Switching Essentials	L3C

The core course sequencing with the complementary courses provided in the following table serves as a guide to schools for their programs of study. Each course is listed in the order in which it should be taught and has a designated level. A program does not have to utilize all the complementary courses for their students to complete their program of study. Complete program sequences are essential for the successful delivery of all state standards in each program area.

INFORMATION TECHNOLOGY NETWORKING

Core Course Sequence with Complementary Courses

COURSE NAME	LEVEL
CISCO-IT Essentials / CISCO-Introduction to Cybersecurity	L1
CISCO-CCNA I Introduction to Networking	L2
CISCO-CCNA II Routing and Switching Essentials	L3C
IT-Networking Advanced Studies*	AS

*Complementary Courses

STATE SKILL STANDARDS

The state skill standards are designed to clearly state what the student should know and be able to do upon completion of an advanced high school career and technical education (CTE) program. The standards are designed for the student to complete all standards through their completion of a program of study. The standards are designed to prepare the student for the end-of-program technical assessment directly aligned to the standards. (Paragraph (a) of Subsection 1 of NAC 389.800)

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS

Employability skills, often referred to as "soft skills," have for many years been a recognizable component of the standards and curriculum in career and technical education programs. The twenty-one standards are organized into three areas: (1) Personal Qualities and People Skills; (2) Professional Knowledge and Skills; and (3) Technology Knowledge and Skills. The standards are designed to ensure students graduate high school properly prepared with skills employers prioritize as the most important. Instruction on all twenty-one standards must be part of each course of the CTE program. (Paragraph (d) of Subsection 1 of NAC 389.800)

CURRICULUM FRAMEWORK

The Nevada CTE Curriculum Frameworks are organized utilizing the recommended course sequencing listed in the Program of Study and the CTE Course Catalog. The framework identifies the recommended content standards, performance standards, and performance indicators that should be taught in each course.

CAREER AND TECHNICAL STUDENT ORGANIZATIONS (CTSOS)

To further the development of leadership and technical skills, students must have opportunities to participate in one or more of the Career and Technical Student Organizations (CTSOs). CTSOs develop character, citizenship, and the technical, leadership, and teamwork skills essential for the workforce and their further education. Their activities are considered a part of the instructional day when they are directly related to the competencies and objectives in the course. (Paragraph (a) of Subsection 3 of NAC 389.800)

WORKPLACE READINESS SKILLS ASSESSMENT

The Workplace Readiness Skills Assessment has been developed to align with the Nevada CTE Employability Skills for Career Readiness Standards. This assessment provides a measurement of student employability skills attainment. Students who complete a program will be assessed on their skill attainment during the completion level course. Completion level courses are identified by the letter "C". (e.g., Level = L3C) (Paragraph (d) of Subsection 1 of NAC 389.800)

END-OF-PROGRAM TECHNICAL ASSESSMENT

An end-of-program technical assessment has been developed to align with the Nevada CTE Skill Standards for this program. This assessment provides a measurement of student technical skill attainment. Students who complete a program will be assessed on their skill attainment during the completion level course. Completion level courses are identified by the letter "C". (e.g., Level = L3C) (Paragraph (e) of Subsection 1 of NAC 389.800)

CERTIFICATE OF SKILL ATTAINMENT

Each student who completes a course of study must be awarded a certificate which states that they have attained specific skills in the industry being studied and meets the following criteria: A student must maintain a 3.0 grade point average in their approved course of study, pass the Workplace Readiness Skills Assessment, and pass the end-of-program technical assessment. (Subsection 4 of NAC 389.800)

CTE ENDORSEMENT ON A HIGH SCHOOL DIPLOMA

A student qualifies for a CTE endorsement on their high school diploma after successfully completing the following criteria: (1) completion of a CTE course of study in a program area; (2) completion of academic requirements governing receipt of a standard diploma; and (3) meet all requirements for the issuance of the Certificate of Skill Attainment. (NAC 389.815)

CTE COLLEGE CREDIT

CTE College Credit is awarded to students based on articulation agreements established by each college for the CTE program, where the colleges will determine the credit value of a full high school CTE program based on course alignment. An articulation agreement will be established for each CTE program designating the number of articulated credits each college will award to students who complete the program.

CTE College Credit is awarded to students who: (1) complete the CTE course sequence with a grade-point average of 3.0 or higher; (2) pass the state end-of-program technical assessment for the program; and (3) pass the Workplace Readiness Assessment for employability skills.

Pre-existing articulation agreements will be recognized until new agreements are established according to current state policy and the criteria shown above.

Please refer to the local high school's course catalog or contact the local high school counselor for more information. (Paragraph (b) of Subsection 3 of NAC 389.800)

ACADEMIC CREDIT FOR CTE COURSEWORK

Career and technical education courses meet the credit requirements for high school graduation (1 unit of arts and humanities or career and technical education). Some career and technical education courses meet academic credit for high school graduation. Please refer to the local high school's course catalog or contact the local high school counselor for more information. (NAC 389.672)

CORE COURSE:

RECOMMENDED STUDENT PERFORMANCE STANDARDS

COURSE INFORMATION:

COURSE TITLES: CISCO-IT Essentials and CISCO-Introduction to Cybersecurity
ABBR. NAME: CISCO IT ESST and CISCO IT CYBR
CREDITS: 1
LEVEL: L1
CIP CODE: 11.1002
SCED CODE: 10102
PREREQUISITE: None
CTSO: FBLA / SkillsUSA

COURSE DESCRIPTIONS:

Note: These are semester courses which are both required as part of the program of study.

CISCO-IT Essentials
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
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.

TECHNICAL STANDARDS:

CONTENT STANDARD 1.0: UTILIZE SAFETY PROCEDURES AND PROPER TOOLS
Performance Standard 1.1: Utilize Safety Procedures
Performance Indicators: 1.1.1-1.1.9
Performance Standard 1.2: Utilize Proper Tools
Performance Indicators: 1.2.1-1.2.4
CONTENT STANDARD 2.0: EXAMINE NETWORK SYSTEM HARDWARE
Performance Standard 2.1: Identify Computer and Network Hardware
Performance Indicators: 2.1.1-2.1.14
Performance Standard 2.2: Explore Routers and Switches
Performance Indicators: 2.2.1-2.2.13
Performance Standard 2.3: Investigate Wireless Networks
Performance Indicators: 2.3.1-2.3.7
Performance Standard 2.4: Troubleshoot Hardware
Performance Indicators: 2.4.1-2.4.4

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CONTENT STANDARD 3.0:	**UNDERSTAND COMPUTER SERVICE**
Performance Standard 3.1:	Practice Installation of Hardware and Network Systems
Performance Indicators:	3.1.1-3.1.3
Performance Standard 3.2:	Configure, Install, and Maintain Peripherals
Performance Indicators:	3.2.1-3.2.7
Performance Standard 3.3:	Communicate Effectively with Customers
Performance Indicators:	3.3.1-3.3.5
Performance Standard 3.4:	Operating Systems
Performance Indicators:	3.4.1-3.4.5
CONTENT STANDARD 4.0:	**ANALYZE SYSTEM NETWORK PROTOCOLS**
Performance Standard 4.1:	Understand Network Protocols
Performance Indicators:	4.1.1-4.1.10
Performance Standard 4.2:	Implement Network Protocols
Performance Indicators:	4.2.1-4.2.5
CONTENT STANDARD 5.0:	**UNDERSTAND SECURITY OF PHYSICAL LAYERS, SOFTWARE, AND NETWORK ACCESS**
Performance Standard 5.1:	Protecting Networks
Performance Indicators:	5.1.1-5.1.7
Performance Standard 5.2:	Configuration
Performance Indicators:	5.2.1-5.2.5
Performance Standard 5.3:	Event Handling
Performance Indicators:	5.3.1-5.3.11
Performance Standard 5.4:	Understand Ethics in Relation to Cybersecurity
Performance Indicators:	5.4.1-5.4.5
CONTENT STANDARD 6.0:	**CONSTRUCT NETWORK SYSTEMS**
Performance Standard 6.1:	Identify Network System Needs
Performance Indicators:	6.1.1-6.1.6
Performance Standard 6.2:	Design and Evaluate Network Systems
Performance Indicators:	6.2.1-6.2.6
Performance Standard 6.3:	Construct Network Systems
Performance Indicators:	6.3.1-6.3.6
Performance Standard 6.4:	Perform Network Administration and Monitoring
Performance Indicators:	6.4.1-6.4.5
CONTENT STANDARD 7.0:	**MAINTAIN NETWORK SYSTEMS**
Performance Standard 7.1:	Demonstrate Network Troubleshooting and Diagnostics
Performance Indicators:	7.1.1-7.1.8
Performance Standard 7.2:	Demonstrate Network Maintenance
Performance Indicators:	7.2.1-7.2.5

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS:

CONTENT STANDARD 1.0:	**DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS**
Performance Standard 1.1:	Demonstrate Personal Qualities and People Skills
Performance Indicators:	1.1.1-1.1.7
Performance Standard 1.2:	Demonstrate Professional Knowledge and Skills
Performance Indicators:	1.2.1-1.2.10
Performance Standard 1.3:	Demonstrate Technology Knowledge and Skills
Performance Indicators:	1.3.1-1.3.4

ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS*:

English Language Arts:	Reading Standards for Literacy in Science and Technical Subjects Writing Standards for Literacy in Science and Technical Subjects Speaking and Listening
Mathematics:	Mathematical Practices

* Refer to the Information Technology Networking Standards for alignment by performance indicator.

CORE COURSE:

RECOMMENDED STUDENT PERFORMANCE STANDARDS

COURSE INFORMATION:

COURSE TITLE: CISCO-CCNA I Introduction to Networking
ABBR. NAME: CISCO CCNA I
CREDITS: 1
LEVEL: L2
CIP CODE: 11.1002
SCED CODE: SCED Code per course catalog
PREREQUISITE: CISCO-IT Essentials and CISCO-Introduction to Cybersecurity
CTSO: FBLA / SkillsUSA

COURSE DESCRIPTION:

This course is a continuation of Information Technology Networking program and is part of the preparation for the Certified Cisco Networking Associate (CCNA) certification exam. This course provides intermediate students with the general theory of distance vector routing protocols and skills required for advanced router configuration, including interfaces, Routing Information Protocol (RIP) and Enhanced Interior Gateway Routing Protocol (EIGRP). Concepts learned will provide the students with the opportunity to further their education in Information Technology (IT) and prepare for entry-level IT careers.

TECHNICAL STANDARDS:

CONTENT STANDARD 1.0: UTILIZE SAFETY PROCEDURES AND PROPER TOOLS
Performance Standard 1.1: Utilize Safety Procedures
Performance Indicators: 1.1.1-1.1.9
Performance Standard 1.2: Utilize Proper Tools
Performance Indicators: 1.2.1-1.2.4
CONTENT STANDARD 2.0: EXAMINE NETWORK SYSTEM HARDWARE
Performance Standard 2.1: Identify Computer and Network Hardware
Performance Indicators: 2.1.1-2.1.14
Performance Standard 2.2: Explore Routers and Switches
Performance Indicators: 2.2.1-2.2.13
Performance Standard 2.3: Investigate Wireless Networks
Performance Indicators: 2.3.1-2.3.7
Performance Standard 2.4: Troubleshoot Hardware
Performance Indicators: 2.4.1-2.4.4
CONTENT STANDARD 3.0: UNDERSTAND COMPUTER SERVICE
Performance Standard 3.1: Practice Installation of Hardware and Network Systems
Performance Indicators: 3.1.1-3.1.3
Performance Standard 3.2: Configure, Install, and Maintain Peripherals
Performance Indicators: 3.2.1-3.2.7

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Performance Standard 3.3:	Communicate Effectively with Customers
Performance Indicators:	3.3.1-3.3.5
Performance Standard 3.4:	Operating Systems
Performance Indicators:	3.4.1-3.4.5
CONTENT STANDARD 4.0:	**ANALYZE SYSTEM NETWORK PROTOCOLS**
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Performance Standard 1.2:	Demonstrate Professional Knowledge and Skills
Performance Indicators:	1.2.1-1.2.10
Performance Standard 1.3:	Demonstrate Technology Knowledge and Skills
Performance Indicators:	1.3.1-1.3.4

ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS*:

English Language Arts:	Reading Standards for Literacy in Science and Technical Subjects Writing Standards for Literacy in Science and Technical Subjects Speaking and Listening
Mathematics:	Mathematical Practices

* Refer to the Information Technology Networking Standards for alignment by performance indicator.

CORE COURSE:

RECOMMENDED STUDENT PERFORMANCE STANDARDS

COURSE INFORMATION:

COURSE TITLE: **CISCO-CCNA II Routing and Switching Essentials**
ABBR. NAME: **CISCO CCNA II**
CREDITS: **1**
LEVEL: **L3C**
CIP CODE: **11.1002**
SCED CODE: **10102**
PREREQUISITE: **CISCO-CCNA I Introduction to Networking**
PROGRAM ASSESSMENTS: **Information Technology Networking**
Workplace Readiness Skills
CTSO: **FBLA / SkillsUSA**

COURSE DESCRIPTION:

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.

TECHNICAL STANDARDS:

CONTENT STANDARD 1.0: **UTILIZE SAFETY PROCEDURES AND PROPER TOOLS**
Performance Standard 1.1: Utilize Safety Procedures
Performance Indicators: 1.1.1-1.1.9
Performance Standard 1.2: Utilize Proper Tools
Performance Indicators: 1.2.1-1.2.4
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Performance Standard 3.1: Practice Installation of Hardware and Network Systems
Performance Indicators: 3.1.1-3.1.3
Performance Standard 3.2: Configure, Install, and Maintain Peripherals
Performance Indicators: 3.2.1-3.2.7
Performance Standard 3.3: Communicate Effectively with Customers

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS:

CONTENT STANDARD 1.0:	**DEMONSTRATE EMPLOYABILITY SKILLS FOR CAREER READINESS**
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Performance Standard 1.2:	Demonstrate Professional Knowledge and Skills
Performance Indicators:	1.2.1-1.2.10
Performance Standard 1.3:	Demonstrate Technology Knowledge and Skills
Performance Indicators:	1.3.1-1.3.4

ALIGNMENT TO THE NEVADA ACADEMIC CONTENT STANDARDS*:

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Mathematics:	Mathematical Practices

* Refer to the Information Technology Networking Standards for alignment by performance indicator.

COMPLEMENTARY COURSE(S):

Programs that utilize the complementary courses can include the following courses. The Advanced Studies course allows for additional study through investigation and in-depth research.

COURSE INFORMATION:

COURSE TITLE: IT Networking Advanced Studies

ABBR. NAME: IT NETWORKING AS

CREDITS: 1

LEVEL: AS

CIP CODE: 11.1002

SCED CODE: SCED Code per course catalog

PREREQUISITE: CISCO-CCNA II Routing and Switching Essentials

CTSO: FBLA / SkillsUSA

COURSE DESCRIPTION:

This course is offered to students who have achieved all content standards in a program 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.

TECHNICAL STANDARDS:

Students have achieved all program content standards and will pursue advanced study through investigation and in-depth research.

EMPLOYABILITY SKILLS FOR CAREER READINESS STANDARDS:

Students have achieved all program content standards and will pursue advanced study through investigation and in-depth research.

SAMPLE TOPICS:

- School-based work experience
- Internships
- Special projects