

CYBERSECURITY CURRICULUM FRAMEWORK



This document was prepared by:

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All Nevadans ready for success in the 21st century

MISSION

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



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 and/or high-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 is part of a rigorous program of study and includes 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
CYBERSECURITY

PROGRAM INFORMATION

Program Title:	Cybersecurity
State Skill Standards:	Cybersecurity
Standards Reference Code:	CYBR
Career Cluster:	Information Technology
Career Pathway:	Network Systems
Program Length:	3 Levels (L1, L2, L3c)
Program Assessments:	Cybersecurity Workplace Readiness Skills
CTSO:	FBLA or SkillsUSA
Grade Level:	9-12
Industry Certifications:	See Nevada’s Approved Certification Listing

PROGRAM PURPOSE

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

The program includes the following state standards:

- Nevada CTE Skill Standards: Cybersecurity
- Employability Skills for Career Readiness
- Nevada Academic Content Standards (alignment shown in the Nevada CTE Skill Standards):
 - Science (based on the Next Generation Science Standards)
 - English Language Arts (based on the Common Core State Standards)
 - Mathematics (based on the Common Core State Standards)
- 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 <http://www.careertech.org/career-clusters/glance/careerclusters.html>

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.

CYBERSECURITY
Core Course Sequence

COURSE NAME	LEVEL
Cybersecurity I	L1
Cybersecurity II	L2
Cybersecurity III	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 of the complementary courses in order 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.

CYBERSECURITY
Core Course Sequence with Complementary Courses

COURSE NAME	LEVEL
Cybersecurity I	L1
Cybersecurity II	L2
Cybersecurity III	L3C
Cybersecurity 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 TITLE: Cybersecurity I****ABBR. NAME: CYBRSECU I****CREDITS: 1****LEVEL: L1****CIP CODE: 52.2101****PREREQUISITE: None****CTSO: FBLA or SkillsUSA****COURSE DESCRIPTION:**

This course covers the fundamentals of computer hardware and software, as well as topics in design, maintenance, and repair. Students who complete this course will be able to describe the internal components of a computer, assemble a computer system, install an operating system, and troubleshoot using system tools and diagnostic software. This course prepares students for CompTIA's A+ industry certification.

TECHNICAL STANDARDS:**CONTENT STANDARD 1.0 : SAFETY PROCEDURES AND PROPER USE OF TOOLS**

Performance Standard 1.1 : Demonstrate Proper Safety Procedures

Performance Indicators : 1.1.1-1.1.10

Performance Standard 1.2 : Identify, Categorize, and Employ Industry Standard Tools

Performance Indicators : 1.2.1-1.2.5**CONTENT STANDARD 2.0 : UNDERSTAND TECHNICAL, LEGAL, AND ETHICAL ISSUES**

Performance Standard 2.1 : Analyze Legal and Ethical Issues Related to Technology

Performance Indicators : 2.1.1-2.1.5

Performance Standard 2.2 : Evaluate Privacy Issues Related to Technology

Performance Indicators : 2.2.1-2.2.5

Performance Standard 2.3 : Describe the Importance of Customer Relations

Performance Indicators : 2.3.1-2.3.3**CONTENT STANDARD 3.0 : UNDERSTAND HARDWARE COMPONENTS**

Performance Standard 3.1 : Identify Basic Hardware Components

Performance Indicators : 3.1.1-3.1.2

Performance Standard 3.2 : Install and Configure Motherboard

Performance Indicators : 3.2.1-3.2.4

Performance Standard 3.3 : Install and Configure Audio and Video Components

Performance Indicators : 3.3.1-3.3.4

Performance Standard 3.4 : Install and Configure Storage and Other External Devices

Performance Indicators : 3.4.1-3.4.7

Performance Standard 3.3 : Install and Maintain Printers

Performance Indicators : 3.5.1-3.5.3

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CONTENT STANDARD 4.0 : UNDERSTAND OPERATING SYSTEMS

Performance Standard 4.1 : Evaluate, Install and Secure Operating Systems

Performance Indicators : 4.1.1-4.1.4

Performance Standard 4.2 : Employ and Configure Windows Tools

Performance Indicators : 4.2.1-4.2.9

Performance Standard 4.3 : Troubleshoot Common Windows Operating Systems and Software

Performance Indicators : 4.3.1-4.3.4

Performance Standard 4.4 : Analyze Other Operating Systems, Mobile, and Cloud Technologies

Performance Indicators : 4.4.1-4.4.11

Performance Standard 4.5 : Compare Features of Laptops and Tablets

Performance Indicators : 4.5.1-4.5.5

CONTENT STANDARD 5.0 : UNDERSTAND INDUSTRY STANDARDS, PRACTICES, AND NETWORK THEORY

Performance Standard 5.1 : Determine ISO Layers

Performance Indicators : 5.1.1-5.1.6

Performance Standard 5.2 : Demonstrate the Basics of Network Theory and Concepts

Performance Indicators : 5.2.1-5.2.10

Performance Standard 5.3 : Configure Equipment Location Using Best Practices

Performance Indicators : 5.3.1-5.3.7

CONTENT STANDARD 6.0 : UNDERSTAND NETWORKING

Performance Standard 6.3 : Practice Network Troubleshooting

Performance Indicators : 6.3.3-6.3.7

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

Reading Standards for Informational Text

Writing Standards for Literacy in Science and Technical Subjects

Speaking and Listening

Mathematics: Mathematical Practices

Science: Practices

* Refer to the Cybersecurity Standards for alignment by performance indicator.

CORE COURSE:**RECOMMENDED STUDENT PERFORMANCE STANDARDS****COURSE INFORMATION:****COURSE TITLE: Cybersecurity II****ABBR. NAME: CYBRSECU II****CREDITS: 1****LEVEL: L2****CIP CODE: 52.2101****PREREQUISITE: Cybersecurity I****CTSO: FBLA or SkillsUSA****COURSE DESCRIPTION:**

This course is a continuation of Cybersecurity I. This course provides intermediate cybersecurity students with computer forensics and incident handling. Students will learn to develop and execute an incident response plan, document an incident, determine investigative objectives, describe methods to trace offenders and use appropriate tools for computer forensics. Methods for deciphering encrypted data and a working knowledge of hard drive configuration are also covered. The appropriate use of technology and industry-standard equipment is an integral part of this course.

TECHNICAL STANDARDS:**CONTENT STANDARD 8.0: UNDERSTAND THE CYBERSECURITY LIFECYCLE**

Performance Standard 8.1 : Explain the Cybersecurity Lifecycle

Performance Indicators : 8.1.1-8.1.3

Performance Standard 8.2 : Develop an Incident Response Plan

Performance Indicators : 8.2.1-8.2.10

Performance Standard 8.3 : Design Specific Plans for the Protection of Property, Systems, and Data

Performance Indicators : 8.3.1-8.3.6

Performance Standard 8.4 : Explain Incident and Event Handling Functions in a System

Performance Indicators : 8.4.1-8.4.9**CONTENT STANDARD 9.0: UNDERSTAND COMPUTER FORENSICS CONCEPTS**

Performance Standard 9.1 : Determine Investigative Objectives

Performance Indicators : 9.1.1-9.1.6

Performance Standard 9.2 : Examine Exploits, Threats, Attacks, and Targets

Performance Indicators : 9.2.1-9.2.6

Performance Standard 9.3 : eDiscovery and Forensic Response Tools And Methods

Performance Indicators : 9.3.1-9.3.9

Performance Standard 9.4 : Perform Forensic Analysis and Reverse Engineering Malware

Performance Indicators : 9.4.1-9.4.6**CONTENT STANDARD 10.0: UNDERSTAND EMERGING TECHNOLOGIES**

Performance Standard 10.1 : Examine Emerging Technologies and Their Impact on Society

Performance Indicators : 10.1.1-10.1.3

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Performance Standard 10.2 : Explain Workforce Needs Related to New and Emerging Technologies

Performance Indicators : 10.2.1-10.2.2

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
Reading Standards for Informational Text
Writing Standards for Literacy in Science and Technical Subjects
Speaking and Listening

Mathematics: Mathematical Practices

Science: Practices

* Refer to the Cybersecurity Standards for alignment by performance indicator.

CORE COURSE:**RECOMMENDED STUDENT PERFORMANCE STANDARDS****COURSE INFORMATION:****COURSE TITLE: Cybersecurity III****ABBR. NAME: CYBRSECU III****CREDITS: 1****LEVEL: L3C****CIP CODE: 52.2101****PREREQUISITE: Cybersecurity II****PROGRAM ASSESSMENTS: Cybersecurity
Workplace Readiness Skills****CTSO: FBLA or SkillsUSA****COURSE DESCRIPTION:**

This course is a continuation of Cybersecurity II. This course provides advanced cybersecurity students with the general theory of switching and routing, including virtual local-area networks (VLAN), interVLAN routing, wireless local area networks (LAN), and network troubleshooting. Upon successful completion of this course, students will be prepared for CompTIA's Networking + certification exams. The appropriate use of technology and industry-standard equipment is an integral part of this course. Upon successful completion of this course, students will have acquired entry-level skills for employment and be prepared for postsecondary education.

TECHNICAL STANDARDS:**CONTENT STANDARD 6.0 : UNDERSTAND NETWORKING**

Performance Standard 6.1 : Install Networks

Performance Indicators : 6.1.1-6.1.5

Performance Standard 6.2 : Utilize and Implement Network Security Practices and Techniques

Performance Indicators : 6.2.1-6.2.9

Performance Standard 6.3 : Practice Network Troubleshooting

Performance Indicators : 6.3.1-6.3.7

Performance Standard 6.4 : Describe Network Architecture

Performance Indicators : 6.4.1-6.4.9**CONTENT STANDARD 7.0 : UNDERSTAND NETWORK OPERATIONS**

Performance Standard 7.1 : Use Appropriate Monitoring Tools

Performance Indicators : 7.1.1-7.1.8

Performance Standard 7.2 : Metrics and Reports from Monitoring and Tracking Performance Tools

Performance Indicators : 7.2.1-7.2.6

Performance Standard 7.3 : Use Appropriate Resources to Support Configuration Management

Performance Indicators : 7.3.1-7.3.5

Performance Standard 7.4 : Explain the Importance of Implementing Network Segmentation

Performance Indicators : 7.4.1-7.4.7

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Performance Standard 7.5 : Apply System Patches and Updates

Performance Indicators : 7.5.1-7.5.4

Performance Standard 7.6 : Configure a Switch Using Proper Setup and Features

Performance Indicators : 7.6.1-7.6.6

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
Reading Standards for Informational Text
Writing Standards for Literacy in Science and Technical Subjects
Speaking and Listening

Mathematics: Mathematical Practices

Science: Practices

* Refer to the Cybersecurity Standards for alignment by performance indicator.

COMPLEMENTARY COURSE(S):**RECOMMENDED STUDENT PERFORMANCE STANDARDS**

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: Cybersecurity Advanced Studies

ABBR. NAME: CYBRSECU AS

CREDITS: 1

LEVEL: AS

CIP CODE: 52.2101

PREREQUISITE: Cybersecurity III

CTSO: FBLA or SkillsUSA

COURSE DESCRIPTION:

This course is offered to students who have achieved all content standards in a program whose desire is 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:

- Teaching assistant
- CTSO officer leadership
- School-based internship
- Special projects