Glendale Unified School District

High School

February 18, 2020
Revised Course Outline Board Approved February 15, 2022

Department:	Career Technical Education
Course Title:	Networking and Cyber Security Honors *(formerly Information Technology Networking and Cyber Security 3-4)*
Course Code:	5146V/5147V
Grade Level(s):	10-12
School(s) Course Offered:	Clark Magnet High School
UC/CSU Approved (Y/N, Subject):	Y, "g" College Prep Elective
Course Credits:	10
Prerequisite:	IT 1-2: Information Technology and Cloud Computing Foundations Honors
Recommended Textbook:	CompTIA Network+ Certification All-in-One Exam Guide, Seventh Edition, Mike Meyers, ISBN: 978-1260122381 CompTIA Security+ All-in-One Exam Guide, Sixth Edition, Wm. Arthur Conklin, and Greg White, ISBN: 978-1260464009
Course Overview:	This course covers the hands-on foundations of Networking and Security topics. The networking topics include the model, architecture, function and components of computer networks and the internet. Also covered is Internet Protocol addressing, computer networks media and operations, Open Systems Interconnection and TCP Transmission Control Protocol models, and implementation of various networking setups in a lab environment. The security topics including Risk Management, how to address security for organizational needs of hardware and software systems secure, maintaining security policies, processes, and

communications. Cyber Security reconnaissance, vulnerability and attacks will also be covered and implemented via hands-on hardware and software tools. This course provides preparation for students to take the CompTIA Network+ or the TestOut Network Pro and the CompTIA Security+ or the TestOut Security Pro certification exams.

For High Schools: Most importantly, use the unit and key assignment descriptions to demonstrate that the curriculum meets the a-g course criteria. Courses are to be academically challenging, involving substantial reading, writing, problems, and laboratory work (as appropriate), and show serious attention to analytical thinking, factual content and developing students' oral and listening skills, this is the criteria UC analysts use to review courses for "a-g" approval.

Course Content-First Semester

Unit 1: **<u>Network Models, Topology, Network Cabling, and Ethernet</u>**   *(3 weeks)*

STANDARDS
Information and Communication Technologies Pathway Standards
Networking Pathway: B1.1, B1.2, B1.3, B2.1, B3.1, B3.2
Common Core State Standards (RSIT 11-12.3, 11-12.7. WS 11-12.4, 11-12.6)

A. The topics covered in this unit include the evolution of networking models, the evolutions of cabling standards, making network cables, and the evolutions of the Ethernet Standards. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Network+ or the TestOut Network Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of Network Architecture. Students will write a research paper on the various Network Architecture failures and provide recommendations to fix these failures based on referenced best practices. The students will create network cabling and test their cables to meet expected performance metrics. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 2: **Physical Network Installation, Basics and Applications of TCP/IP, and Network Routing** *(3 weeks)*

STANDARDS
Information and Communication Technologies Pathway Standards Networking Pathway: B1.2, B2.1, B3.1, B3.5, B3.6, B6.1 Common Core State Standards (RSIT 11-12.3, 11-12.7. WS 11-12.4, 11-12.6)

A. The topics covered in this unit include the hands-on creation and best practices of network cabling, the details of TCP/IP in a network and practical applications of routing protocols in a modern network. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Network+ or the TestOut Network Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of Network Installation and Network Routing. Students will write a research paper on the various Network Installation failures and provide recommendations to fix these failures based on referenced best practices. The students will implement a network installation, designate IPs, and confirm network routing details in groups. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 3: **Network Naming, TCP/IP Securing, Advanced Networking and IPv6** *(3 weeks)*

STANDARDS
Information and Communication Technologies Pathway Standards Networking Pathway: B1.6, B2.3, B3.4, B3.5, B3.6, B3.7. B8.1 Common Core State Standards (RSIT 11-12.3, 11-12.7. WS 11-12.4, 11-12.6)

A. The topics covered in this unit network naming conventions, methods of securing TCP/IP against modern threats, Advanced Networking techniques and best practices and IP version 6 (IPv6). The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Network+ or the TestOut Network Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of Advanced Networking and IPv6. Students will write a research paper on the various Advanced Network failures and provide recommendations to fix these failures

based on referenced best practices. The students will update their network installation from the previous unit and improve the installation with Advanced Networking practices including implementing IPv6 with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 4: **Remote Connectivity, Wireless and Mobile Networking, and Cloud Computing**
(4 weeks)

STANDARDS
Information and Communication Technologies Pathway Standards Networking Pathway: B1.6, B2.3, B3.4, B3.5, B3.6, B3.7. B8.1 Common Core State Standards (RSIT 11-12.3, 11-12.7. WS 11-12.4, 11-12.6)

A. The topics covered in this unit include remote connectivity of networked systems, setup, configuration, maintenance and troubleshooting of Wireless and Mobile Networks. Also covered will be a practical foundations of Cloud Computing setups on AWS and private cloud. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Network+ or the TestOut Network Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of implementing Networked Systems in the Cloud. Students will write a research paper on the various Cloud Design and Implementation failures and provide recommendations to fix these failures based on referenced best practices. The students will update their advanced network installation from the previous unit and implement this installation on a Cloud Computing Platform such as AWS with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 5: **Building Real World Networks, Managing Risk, Protecting and Monitoring your Network, and Network Troubleshooting**
(7 weeks)

STANDARDS
Information and Communication Technologies Pathway Standards Networking Pathway: B4.1, B4.2, B4.3, B4.5, B4.6, B4.9, B5.1, B7.1, B7.2, B7.3, B8.1, B8.2, B8.3, B8.4, B8.5
Common Core State Standards (RSIT 11-12.3, 11-12.7. WS 11-12.4, 11-12.6)

A. The topics covered in this unit include building real world networks, best practices for managing risk for those networks, using best practices to protect and monitor the networks. Cloud computing will be used to demonstrate more complex industry configurations. The students will have projects on the topic and will learn the components

in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Network+ or the TestOut Network Pro Exam. The students will be able to describe and apply the topics covered in this unit. A comprehensive final exam will be required incorporating all aspect of the course to determine mastery and multiple culminating Lab projects will be assigned and assessed for mastery.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of protecting and monitoring networked systems on premise, hybrid and Cloud based. Students will write a research paper on the various Network Monitoring failures and provide recommendations to fix these failures based on referenced best practices. The students will update their advanced network installation from the previous unit and implement network protection and network monitoring best practices with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Course Content-Second Semester

Unit 1: **Security Vulnerabilities, Threats, and Attacks**   *(3 weeks)*

STANDARDS
Information Support and Services Pathway Standards
Common Core State Standards (RSIT 12.3, WS 11-12.2,3,4,5,6,7,8)

A. The topics covered in this unit include Malware fundamentals, various attacks and threat Actors, methods of Scanning and Testing Security and negative impacts for a business that gets hacked. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Security+ or the TestOut Security Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices for testing for security vulnerabilities and threats. Students will write a research paper on the various Security attacks failures and provide recommendations to fix these failures based on referenced best practices. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 2: **Security Tools and Technologies** *(3 weeks)*

STANDARDS
Information Support and Services Pathway Standards B8.1, B8.2, B8.3, B8.4, B8.5.
Common Core State Standards (RSIT 12.3, WS 11-12.2,3,4,5,6,7,8)

A. The topics covered in this unit include Security tools and techniques that are available to monitor and troubleshoot networks, best practices to deal with common security issues and vulnerabilities, deployment of secured equipment and implementation of secured protocols. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Security+ or the TestOut Security Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. The students will have projects on the topic and will learn the components in a hands-on way. Students will research regarding the best practices of utilizing security tools to manage security more efficiently. Students will write a research paper on the various security tool failures and provide recommendations to fix these failures based on referenced best practices. The students will update their advanced network installation from the previous unit to include security tool best practices with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 3: **Security Design and Architecture** *(4 weeks)*

STANDARDS
Information Support and Services Pathway Standards B8.1, B8.2, B8.3, B8.4, B8.5.
Common Core State Standards (RSIT 12.3, WS 11-12.2,3,4,5,6,7,8)

A. The topics covered in this unit will include security frameworks such as NIST, ISO, and PCI DSS, Secure design of systems and deployment of secure systems including embedded and IoT. Also included is topics regarding development of scripts for deployment, secure cloud computing, virtualization, automation of security and physical controls of hardware and deployed technologies. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Security+ or the TestOut Security Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of Security Design and Architecture. Students will write a research paper on the various Security Design failures and provide recommendations to fix these failures based

on referenced best practices. The students will update their advanced network installation from the previous unit and implement Secure Design best practices with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 4: **Access and Identity Management** *(2 weeks)*

STANDARDS
Information Support and Services Pathway Standards B8.1, B8.2, B8.3, B8.4, B8.5, C4.9, C5.4.
Common Core State Standards (RSIT 12.3, WS 11-12.2,3,4,5,6,7,8)

A. The topics covered in this unit include secure access to system and network resources, best practices for secure identity and account management and controls. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Security+ or the TestOut Security Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of protecting and monitoring Access and Identity Management systems. Students will write a research paper on the various Identity Management failures and provide recommendations to fix these failures based on referenced best practices. The students will update their advanced network installation from the previous unit and implement Identity Management best practices with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 5: **Risk Management, PKI, and Cryptography** *(5 weeks)*

STANDARDS
Information Support and Services Pathway Standards A1.1, A1.2, B8.1, B8.2, B8.3, B8.4, B8.5.
Common Core State Standards (RSIT 12.3, WS 11-12.2,3,4,5,6,7,8)

A. The topics covered in this unit include Risk Management policies, procedures, and plans and how an attack can negatively impact a business. Also covered are business continuity and incident response best practices, digital forensics after an incident occurs, general best practices for data security and privacy including applications and best practices use of encryption for data, wired and wireless systems. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Security+ or the TestOut Security Pro Exam. The students will be able to describe and apply the topics covered in this unit.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices of regarding Cryptography. Students will write a research paper on the various Cryptography failures and provide recommendations to fix these failures based on referenced best practices. The students will update their advanced network installation from the previous unit and implement business continuity and incident response best practices with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Unit 6: **Cyber Security**   *(3 weeks)*

STANDARDS
Information Support and Services Pathway Standards B8.1, B8.2, B8.3, B8.4, B8.5.
Common Core State Standards (RSIT 12.3, WS 11-12.2,3,4,5,6,7,8)

A. This unit's topics includes coverage of best practice and implementation of Cyber Security for a modern organization. There will be examples of recent Cyber Security incidents and how breaches or damages could have been stopped and attempts at penetration testing in a live network environment. The students will have projects on the topic and will learn the components in a hands-on way. Students will be accessed on the topics via a quiz and exam. The standards for these assessments will be based on industry standards and the CompTIA Security+ or the TestOut Security Pro Exam. The students will be able to describe and apply the topics covered in this unit. A comprehensive final exam will be required incorporating all aspect of the course to determine mastery and multiple culminating Lab projects will be assigned and assessed for mastery.

B. Each unit will have a respective lab that will test students' knowledge on the topics and where each student will produce a report. Students will research regarding the best practices for Cyber Security in a Modern Enterprise. Students will write a research paper on the various Cyber Security failures and provide recommendations to fix these failures based on referenced best practices. The students will update their advanced network security installation from the previous unit and implement Cyber Security best practices with their lab team. Each unit will also have a quiz and will be covered in the exams that will assess the student's retention of the topics covered in the lecture and discussions.

Final Exam / Project
Student will design, implement, test and validate an enterprise business environment on the production server rack. Students will be grouped into four teams including Help Desk Operations, System Administration, Network Administration and Cyber Operations. Student will be expected to maintain a 99.99% uptime and maintain a secure, safe, and practical environment as a work-based learning team experience.

The final exams for the courses will be the TestOut Network Pro and the TestOut Security Pro industry recognized certifications.