

Introduction to Cybersecurity and Networking

Overview

This is a full-year course for students in 10th grade and above. It is designed to foster interest in Information Technology and networking careers. Through hands-on projects, students learn to install and administer operating systems, to have computers communicate with each other and to detect and repair vulnerabilities in systems and networks. This course also covers connections of computing and society, including ethics, security and privacy in on-line communication. Students taking this course will be expected to take the CompTIA ETF+ and CompTIA A+ certification exams.

Objectives

- To have students understand the fundamentals of computers, including system management, hardware configuration, software installation, troubleshooting of operating system issues and resolution of problems with common applications.
- To introduce students to basic cybersecurity concepts.
- To prepare students to successfully take the CompTIA ETF+ and CompTIA A+ certification exams by the end of the course.
- To help students prepare for the CompTIA Network+ certification exam, which may require some further study after completing this course.
- To prepare students for more advanced cybersecurity, digital forensics courses and networking courses.

Assessment

Formative assessment includes worksheets, several practice activities and quizzes for each lesson. Summative assessment includes a test and a project for each unit, and a final exam.

Course Essentials

Equipment and Resources	Cost/Unit
Classroom set of computers	\$0 if you already have some, \$500-600 per computer if you need to purchase them.
Network switch, cables and USB keys.	About \$50-\$100 for everything.
Set of spare used computers	Cost may vary, depending on whether they can be donated to the school, bought at surplus stores or otherwise collected from retired inventory. Budget for the whole set should not go over \$500.
Set of Raspberry Pi computer kits	Approximately \$750 for 10 kits each including a raspberry Pi, RGB LED-strip, breadboard, MOSFETs, power jack, power supply and jumper wires.

Course Outline

Unit 1: Operating Systems	Installing Linux in real and virtual hardware, managing and using Linux, automating routine tasks. Other operating systems, managing and using Windows, troubleshooting common issues
Unit 2: Hardware and software configuration	Installing and configuring hardware components, device drivers, interfacing with electronic circuits, sensors and actuators. Raspberry Pi binary clock.
Unit 3: Cybersecurity fundamentals	Authentication, access controls, vulnerabilities, attacks, defenses, secure software design, secure communication, encryption protocols, human-in-the-loop vulnerabilities, social engineering
Unit 4: Networking	OSI network model, Network protocols, wireless and wired networks, network management, analysis of network traffic, techniques for defending networks, ethics of online communication
Unit 5: Cryptology	Theoretical foundations, bitwise operations, encoding systems, cryptanalysis of classical cyphers, modern crypto, practical uses: https, block chain, drm, UEFI
Unit 6: Malware and digital forensics	Malicious software, types of malware, functionality, analysis, defense. Legal issues: evidence acquisition and preservation, digital forensic analysis, storage forensics, live forensics, memory analysis, reporting findings