

PASSAIC COUNTY TECHNICAL INSTITUTE
45 Reinhardt Rd.
Wayne, NJ

Information Technology & Network Security II
(ITNS II)
Course # 1024
Credits 12.5
2018

I. Course Description

ITNS II is a full year study designed as a course to prepare the student TestOut's Network Pro certification—a comprehensive, real-world exam consisting of all concepts of wired and wireless network implementation, Ethernet standards, network hardware and cabling, network management and troubleshooting, network security, routing, and WAN technologies. Moreover, students will learn how to spec and budget for a network based on customer needs. Acquiring the Network Pro certification will qualify and allow students, should they choose, to pursue CompTIA's Network+ certification.

Students will study and gain a complete understanding of a network's necessary components, installation, maintenance, security, IP configuration, routing, and troubleshooting skills. They will design and implement a small enterprise network along with security measures.

II. Curriculum Unit Planner

Unit 1

Content Area:	Informational Technology & Network Security II	Grade(s)	10
Unit Plan Title:	Unit 1 – Networking Essentials <i>Unit 1 will reinforce and delve further into the basic networking concepts students learned in ITNS 1. This unit will cover basic communication, cables and connectors, networking devices, and Ethernet.</i> I. Networking Basics (6 days) a. Overview of networking b. Topologies		

- c. OSI Model
- d. Network signaling
- e. Protocols
- II. Numbering Systems (2 days)
 - a. Binary
 - b. Hexadecimal
- III. Cables and Connectors (6 days)
 - a. Coaxial
 - b. Twisted Pair
 - c. Fiber optic
 - d. Wiring implementation
 - i. Structured cabling
 - ii. Demarcation point
 - iii. Telecom room
 - iv. IDFs and MDFs
 - e. Troubleshooting network media
- IV. Network devices (3 days)
 - a. Network Adapters
 - b. Hubs and switches
 - c. Routers
- V. Ethernet (4 days)
 - a. Standards and specifications
 - b. Connecting Ethernet devices
 - c. Troubleshooting connectivity

NJSLS/CCTC Standard(s) Addressed

- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP11. Use technology to enhance productivity.
- 9.3. IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3. IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3. IT-NET.1 Analyze customer or organizational network system needs and requirements.

9.3. IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
9.3. IT-NET.4 Perform network system installation and configuration.

Essential Questions (3-5)

1. What are the essential components in a network?
2. What is the OSI model and how is it used for troubleshooting a network?
3. What are the most common types of transmission media used in networks?
4. How do you properly implement structured cabling?
5. What are some steps to take to troubleshoot the fault domain?

Anchor Text(s)

Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, 5th Edition – McGraw Hill 2018
ISBN-10: 1260128504
ISBN-13: 978-1260128505

Short & Informational Texts (3-5)

ARTICLES

“Are fiber optics the future of digital communication?”

<http://www.peakoptical.com/2017/07/fiber-optics-digital-communication/>

OSI Model Reference Chart

<https://learningnetwork.cisco.com/docs/DOC-30382>

How data travels across the Internet

<https://www.washingtonpost.com/graphics/national/security-of-the-internet/bgp/>

Expected Proficiencies/Career and Life Skills

- Describe the components of a network.
- Demonstrate how a network transmits data.
- Design logical topologies in Visio.
- Communicate how network signaling affects communication.
- Differentiate among different TCP/IP protocols.
- Convert decimal to binary.
- Convert binary to hexadecimal.

- Construct a UTP straight through cable.
- Construct a UTP crossover cable.
- Connect cables to patch panels.
- Demonstrate how structured cabling is implemented.
- Troubleshoot network cables.
- Select and install a Network Interface Card (NIC).
- Select and install a router based on requirements.
- Connect patch cables to switch ports.
- Communicate Ethernet specifications.
- Connect devices to an Ethernet network.
- Troubleshoot link status.
- Troubleshoot the fault domain.

Formative & Summative Assessments

- TestOut Module quizzes (Formative)
- TestOut lab simulations (Formative)
- Section assignments/activities (Formative)
- Module review packets (Summative)
- Comprehensive module tests (Summative)
- Practical scenario assessments (Real world labs) (Summative)
- Trimester projects (Summative)
- Trimester exam (Summative)

Resources (Websites, LMS, Google Classroom, documents, etc.)

- TestOut's LabSim Network Pro Course (Modules 1-4)
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos

- Wikis
- Infographics (www.piktochart.com)
- Review Game websites (i.e. www.classtools.net)
- Google Drive/Docs/Slides
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Suggested Time Frame:

3 Weeks

Unit 2

Content Area:	Informational Technology & Network Security II	Grade(s)	10
Unit Plan Title:	<p>Unit 2 – IP Addresses</p> <p><i>Unit 2 will cover all of the logical IP addressing. This includes configurations in both Windows and Linux, as well as logically breakup a network into subnets. In order to achieve this, students will first learn about the structure of an IP address and subnet mask, and then learn how to find different subnet ranges.</i></p> <p>I. IP Addressing Theories (7 days)</p> <ol style="list-style-type: none"> a. Structure and classes b. Binary to decimal/decimal to binary c. Network and Host Identification d. Default subnet masks e. ANDing f. Custom subnet masks g. Subnetting h. Practical subnetting <p>II. IP Configuration (10 days)</p>		

- a. Configuring IP addresses in the operating system
- b. Alternate IP configuration
- c. DHCP configuration
- d. DNS Name resolution
- e. IPv6
- f. Troubleshooting IP configuration and communication
- g. Troubleshooting DNS issues

NJSLS/CCTC Standard(s) Addressed

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

9.3. IT-SUP.1 Provide technology support to maintain service.

9.3. IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software, and configuration problems.

9.3. IT-SUP.6 Evaluate the effectiveness of an information system.

9.3. IT-SUP.9 Employ technical writing and documentation skills to monitor the performance of an information system.

9.3. IT-NET.4 Perform network system installation and configuration.

9.3. IT-NET.5 Perform network administration, monitoring and support to maintain a network system.

Essential Questions (3-5)

1. How are IP addresses used to communicate?
2. What is the structure of an IP address?
3. What is the purpose of a subnet mask?
4. How is DHCP used to effectively assign IP addresses?
5. How is an IP address used for logical subnets?

Anchor Text(s)

Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, 5th Edition – McGraw Hill 2018

ISBN-10: 1260128504

ISBN-13: 978-1260128505

Short & Informational Texts (3-5)

Supplemental e-Book

IP Addressing and Subnetting Workbook – Student Version, v1.5, Cisco Networking Academy

ARTICLES

“IPv4 Subnetting”

https://www.tutorialspoint.com/ipv4/ipv4_subnetting.htm

“IPv6 Predictions for 2017”

<https://community.infoblox.com/t5/IPv6-CoE-Blog/IPv6-Predictions-for-2017/ba-p/8842>

Expected Proficiencies/Career and Life Skills

- Convert binary to decimal and vice versa
- Use ANDing operations to determine if a host is within a subnet
- Define IP address classes
- Configure IPv4 settings in Windows
- Demonstrate how to use IPCONFIG
- Demonstrate how to use IFCONFIG
- Demonstrate how to use network utilities (ping, tracert, nslookup, netstat)
- Configure IPv6 settings
- Logically break a network address down into subnets (by borrowing bits)
- Configure DHCP Options and exclusions
- Configure DHCP Relay
- Configure DNS
- Troubleshoot IP configuration issues
- Troubleshoot IP communication issues

Formative & Summative Assessments

- TestOut Module quizzes (Formative)

- TestOut lab simulations (Formative)
- Section assignments/activities (Formative)
- Module review packets (Summative)
- Comprehensive module tests (Summative)
- Practical scenario assessments (Real world labs) (Summative)
- Trimester projects (Summative)
- Trimester exam (Summative)

Resources (Websites, LMS, Google Classroom, documents, etc.)

- Testout’s LabSim Network Pro (Module 5)
- IP Addressing and Subnetting Workbook – Instructor Version
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Wikis
- Infographics (www.piktochart.com)
- Review Game websites (i.e. www.classtools.net)
- Google Drive/Docs/Slides
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Suggested Time Frame:

3 Weeks

Unit 3

Content Area:	Informational Technology & Network Security II	Grade(s)	10
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Unit Plan Title:**Unit 3 – Network Configuration & Customization**

Unit 3 will cover configuring switches, routers, firewalls, proxy servers, network-based storage, voice-over IP (VoIP), virtualization, and cloud computing. All of these components can be found within an enterprise network.

- I. Switch Management (10 days)
 - a. Accessing switches and managing passwords
 - b. Configure IP addresses on switches
 - c. Configuring interfaces and ports
 - d. Virtual LANs (vLANs)
 - e. Trunking
 - f. Spanning tree
 - g. Troubleshooting switches
- II. Routing (7 days)
 - a. Routing basics
 - b. Routing protocols
 - c. Network Address Translation (NAT)
 - d. Route optimization
 - e. Troubleshooting routers
- III. Firewalls (5 days)
 - a. Host firewalls
 - b. All-in-one security solutions
 - c. Perimeter firewalls and DMZs
 - d. Access Control Lists (ACLs)
- IV. Customizing the Network (8 days)
 - a. Network-based storage (iSCSI, SANs, and NAS)
 - b. Voice-over IP (VoIP)
 - c. Virtualization
 - d. Cloud computing
 - e. Exploring SCADA systems

NJSLS/CCTC Standard(s) Addressed

CRP2. Apply appropriate academic and technical skills.

CRP7. Employ valid and reliable research strategies.

CRP11. Use technology to enhance productivity.

9.3. IT.12 Demonstrate knowledge of the hardware components associated with information systems.

9.3. IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.

9.3. IT-NET.1 Analyze customer or organizational network system needs and requirements.

9.3. IT-NET.4 Perform network system installation and configuration.

9.3. IT-NET.5 Perform network administration, monitoring and support to maintain a network system.

9.3. IT-SUP.1 Provide technology support to maintain service.

9.3. IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.

9.3. IT-SUP.7 Employ system installation and maintenance skills to setup and maintain an information system.

9.3. IT-SUP.9 Employ technical writing and documentation skills in support of an information system.

9.3. IT-SUP.10 Apply quality assurance processes to maximize information system operation.

Essential Questions (3-5)

1. What are the main purposes for vLANs?
2. What are some of the common commands used for switches?
3. What is Network Address Translation and how is it implemented?
4. What are some things to consider when selecting a network-security appliance?
5. Why are more networks using virtualization?

Anchor Text(s)

Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, 5th Edition – McGraw Hill 2018

ISBN-10: 1260128504

ISBN-13: 978-1260128505

Short & Informational Texts (3-5)**ARTICLES**

“VLANs: 5 Types and Benefits”

<https://www.summitir.com/2017/08/30/vlans-types-benefits/>

“Serverless: The future of cloud computing?”

<https://www.cio.com/article/3244644/cloud-computing/serverless-the-future-of-cloud-computing.html>

“What is NAS (Network Attached Storage) and Why is NAS Important for Small Business”

<https://www.seagate.com/tech-insights/what-is-nas-master-ti/>

Expected Proficiencies/Career and Life Skills

- Master CLI commands for switches
- Configure switch passwords
- Configure vLANs
- Configure switch IP settings
- Configure switch ports
- Configure trunking
- Manage multiple vLANs
- Configure spanning tree protocol
- Configure static routes on a router
- Configure static Network Address Translation (NAT)
- Troubleshoot routers using the TRACERT command
- Configure a host firewall
- Configure a network security appliance
- Configure a perimeter firewall
- Configure a DMZ
- Create ACLs
- Configure a proxy server
- Configure iSCSI targets and initiators
- Configure a NAS device
- Configure VoIP
- Create a virtual machine

- Configure virtual network devices

Formative & Summative Assessments

- TestOut Module quizzes (Formative)
- TestOut lab simulations (Formative)
- Section assignments/activities (Formative)
- Module review packets (Summative)
- Comprehensive module tests (Summative)
- Practical scenario assessments (Real world labs) (Summative)
- Trimester projects (Summative)
- Trimester exam (Summative)

Resources (Websites, LMS, Google Classroom, documents, etc.)

- TestOut's LabSim (Modules 6 – 9)
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Wikis
- Infographics (www.piktochart.com)
- Review Game websites (i.e. www.classtools.net)
- Google Drive/Docs/Slides
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Suggested Time Frame:

4 Weeks

Unit 4

Content Area:	Informational Technology & Network Security II	Grade(s)	10
Unit Plan Title:	Unit 4 – Wireless and WANs <i>Unit 4 will cover all concepts of wireless networking, developing on the material learned from ITNS I. Students will dig deeper into wireless networking by understanding standards, antenna placement, design, implementation, and security. The unit will also cover Wide Area Networks (WANs) and how private networks connect to the public Internet.</i> <ul style="list-style-type: none">I. Wireless Networking (15 days)<ul style="list-style-type: none">a. Concepts<ul style="list-style-type: none">i. Radio frequenciesii. Architectureb. Standards<ul style="list-style-type: none">i. Infraredii. Bluetoothiii. 802.11c. Configuration<ul style="list-style-type: none">i. Configuring wireless devicesii. Securing a wireless networkiii. Configuring wireless profilesd. Wireless design<ul style="list-style-type: none">i. Antenna typesii. Wireless surveysiii. Indoor wireless network designiv. Outdoor wireless network designe. Wireless network implementationf. Wireless security<ul style="list-style-type: none">i. Attack typesii. Securing the network		

- g. Troubleshooting
- II. Wide Area Networks (WANs) (8 days)
 - a. WAN Concepts
 - i. Structure
 - ii. Technologies
 - iii. Media
 - iv. Services
 - b. WAN Connections
 - c. Internet Connectivity
 - d. Remote Access
 - e. Troubleshooting

NJSLS/CCTC Standard(s) Addressed

- CRP2. Apply appropriate academic and technical skills.
- CRP7. Employ valid and reliable research strategies.
- CRP11. Use technology to enhance productivity.
- 9.3. IT.12 Demonstrate knowledge of the hardware components associated with information systems.
- 9.3. IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.3. IT-NET.1 Analyze customer or organizational network system needs and requirements.
- 9.3. IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security)
- 9.3. IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3. IT-NET.4 Perform network system installation and configuration.
- 9.3. IT-NET.5 Perform network administration, monitoring and support to maintain a network system.
- 9.3. IT-SUP.1 Provide technology support to maintain service.
- 9.3. IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
- 9.3. IT-SUP.7 Employ system installation and maintenance skills to setup and maintain an information system.
- 9.3. IT-SUP.9 Employ technical writing and documentation skills in support of an information system.
- 9.3. IT-SUP.10 Apply quality assurance processes to maximize information system operation.

Essential Questions (3-5)

1. What are the steps for designing a wireless network?
2. How do you secure a wireless network?
3. What are the various types of wireless attacks than can harm the network?
4. Which types of Internet services are available?
5. What are some types of WAN media?

Anchor Text(s)

Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, 5th Edition – McGraw Hill 2018
ISBN-10: 1260128504
ISBN-13: 978-1260128505

Short & Informational Texts (3-5)

ARTICLES

“A brief history of wireless technology”

<https://www.itworld.com/article/2802953/mobile/a-brief-history-of-wireless-technology.html>

“8 ways the Internet of things will change the way we live and work”

<https://www.theglobeandmail.com/report-on-business/rob-magazine/the-future-is-smart/article24586994/>

“Enterprise wireless security threats and responses”

<https://searchsecurity.techtarget.com/feature/Enterprise-wireless-security-threats-and-responses>

Expected Proficiencies/Career and Life Skills

- Differentiate among various wireless standards
- Configure Bluetooth connections
- Configure a home wireless network
- Secure a home wireless network
- Configure wireless profiles
- Demonstrate how to conduct a wireless survey
- Design an indoor wireless network
- Design an outdoor wireless network
- Implement and configure a enterprise wireless network

- Identify wireless security attacks
- Secure an enterprise wireless network
- Optimize a wireless network
- Troubleshoot a wireless network
- Differentiate among different WAN media types
- Configure a WAN link
- Connect to a DSL network
- Demonstrate how to configure a Remote Access Server
- Demonstrate how to configure a RADIUS solution
- Troubleshoot WAN issues

Formative & Summative Assessments

- TestOut Module quizzes (Formative)
- TestOut lab simulations (Formative)
- Section assignments/activities (Formative)
- Module review packets (Summative)
- Comprehensive module tests (Summative)
- Practical scenario assessments (Real world labs) (Summative)
- Trimester projects (Summative)
- Trimester exam (Summative)

Resources (Websites, LMS, Google Classroom, documents, etc.)

- TestOut's LabSim (Modules 10 & 11)
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Google Drive/Docs/Slides
- Wikis
- Infographics (www.piktochart.com)

- Review Game websites (i.e. www.classtools.net)
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Suggested Time Frame:

3 Weeks

Unit 5

Content Area:	Informational Technology & Network Security II	Grade(s)	10
Unit Plan Title:	<p>Unit 5 – Network Security</p> <p><i>Unit 5 will cover how to protect a network against malicious threats, social engineering, physical threats, and many types of intrusions.</i></p> <p>I. Network Security (20 days)</p> <ol style="list-style-type: none"> a. Physical security b. Social engineering c. Network vulnerabilities and threats <ol style="list-style-type: none"> i. Malware ii. Distributed Denial of Service (DDos) iii. Flood attacks iv. Spoofing v. ARP Poisoning vi. Switch attacks vii. Password cracking viii. Web attacks 		

- d. Authentication
 - i. Protocols
 - ii. Digital certificates
- e. Secure protocols
- f. Remote access security
- g. Troubleshooting network security issues
- II. Network Hardening (10 days)
 - a. Detection and prevention
 - i. Intrusion Detection/Prevention
 - ii. Configuring an IPS
 - iii. Vulnerability assessment
 - b. Penetration testing
 - c. Port Security
 - d. Network access control
 - e. Incident response and forensics

NJSLS/CCTC Standard(s) Addressed

- CRP2. Apply appropriate academic and technical skills.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.
- 9.3. IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.
- 9.3. IT.13 Compare key functions and applications of software and determine maintenance strategies for computer systems.
- 9.3. IT-SUP.1 Provide technology support to maintain service.
- 9.3. IT-SUP.3 Apply appropriate troubleshooting techniques in resolving computer hardware, software and configuration problems.
- 9.3. IT-SUP.5 Demonstrate the use of networking concepts to develop a network.
- 9.3. IT-NET.1 Analyze customer or organizational network system needs and requirements.
- 9.3. IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).
- 9.3. IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3. IT-NET.4 Perform network system installation and configuration.
- 9.3. IT-NET.5 Perform network administration, monitoring and support to maintain a network system.

Essential Questions (3-5)

1. What are some ways to prevent access to unauthorized areas?
2. What are the various types of social engineering and how can they be prevented?
3. What are some of the most dangerous threats to a network?
4. Which methods of authentication are the strongest?
5. What are the steps to take during a forensics investigation?

Anchor Text(s)

Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, 5th Edition – McGraw Hill 2018
ISBN-10: 1260128504
ISBN-13: 978-1260128505

Short & Informational Texts (3-5)

ARTICLES

“How to Identify and Stop Social Engineering Attacks”

<http://www.workplaceanswers.com/resources/blog/how-to-identify-and-stop-social-engineering-attacks/>

“33% of businesses hit by DDos attack in 2017, double that of 2016”

<https://www.techrepublic.com/article/33-of-businesses-hit-by-ddos-attack-in-2017-double-that-of-2016/>

“5 penetration test tools to secure your network”

<https://www.computerweekly.com/tip/5-penetration-test-tools-to-secure-your-network>

“How to implement basic forensic procedures”

<https://www.examcollection.com/certification-training/security-plus-how-to-implement-basic-forensic-procedures.html>

Expected Proficiencies/Career and Life Skills

- Identify physical security threats to an organization
- Implement physical security
- Identify social engineering exploits
- Properly respond to a social engineering attack
- Demonstrate how DDos attacks work
- Demonstrate how flood attacks work
- Demonstrate how ARP poisoning works

- Recognize attacks on switches
- Demonstrate how to create and enforce password policies
- Demonstrate how passwords are cracked
- Differentiate among various authentication protocols
- Configure a VPN connection
- Troubleshoot common network security issues
- Configure an Intrusion Prevention System (IPS)
- Enable wireless intrusion prevention
- Perform penetration testing on a network
- Configure port security
- Demonstrate how to configure Network Access Control (NAC)
- Demonstrate how to perform basic forensic procedures
- Demonstrate how to respond to a security incident

Formative & Summative Assessments

- TestOut Module quizzes (Formative)
- TestOut lab simulations (Formative)
- Section assignments/activities (Formative)
- Module review packets (Summative)
- Comprehensive module tests (Summative)
- Practical scenario assessments (Real world labs) (Summative)
- Trimester projects (Summative)
- Trimester exam (Summative)

Resources (Websites, LMS, Google Classroom, documents, etc.)

- TestOut's LabSim (Modules 13 & 14)
- Canvas LMS
- Cisco Packet Tracer
- Microsoft PowerPoint

- Microsoft Word
- Instructional Videos
- Wikis
- Infographics (www.piktochart.com)
- Review Game websites (i.e. www.classtools.net)
- Google Drive/Docs/Slides
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Suggested Time Frame:

4-5 Weeks

Unit 6

Content Area:	Informational Technology & Network Security II	Grade(s)	10
Unit Plan Title:	<p>Unit 6 – Network Design, Implementation, and Management</p> <p><i>Unit 6 will cover how to plan, design, and manage an enterprise network from start to finish, including policies and documentation. In this unit, students will complete a comprehensive e network which will include all diagrams, presentations, documentation, proposals, and budgets.</i></p> <p><i>*Students will also take their certification during this unit.</i></p> <p><i>**Students will also be designing their enterprise network during this unit.</i></p> <p>I. Policies and Procedures (12 days)</p> <p style="padding-left: 20px;">a. Network design, documentation, and policies</p> <p style="padding-left: 40px;">i. Network documentation (diagrams, policies, logs, etc.)</p>		

- ii. Network design
 - iii. Asset management
- b. Safety
 - i. Fire safety
 - ii. ESD
 - iii. Emergencies
- c. Risk management & Business continuity
- d. Security policies and assessments
 - i. Acceptable use
 - ii. Authorization
 - iii. Code of ethics
 - iv. Password policies
 - v. Change and configuration management
 - vi. Human resource policy
 - vii. Privacy
 - viii. Education and awareness training
 - ix. Third-party integration (on-boarding, off-boarding)
 - x. Security assessments

II. Network Management (15 days)

- a. Configuring updates
- b. Data protection
 - i. Workstation backups
 - ii. Server backups
- c. Remote management
- d. Mobile Device management
 - i. Enrolling mobile devices
 - ii. Configuring mobile device policies
 - iii. Working with BYOD
- e. Data Center (Telecom room) management
 - i. Installing network hardware
 - 1. Rack equipment
 - 2. Blade devices
 - 3. Organization

- 4. Naming conventions
 - ii. UPS settings
 - iii. Airflow management
 - iv. Environmental monitoring
- f. Monitoring
 - i. Protocol analyzers
 - ii. Event logs
 - iii. Packet sniffers
 - iv. Interface statistics
- g. Log Management
- h. SNMP

III. Network Optimization (4 days)

- a. NIC Teaming
- b. Troubleshooting methodologies

IV. Practice Exams and Certification

NJSLS/CCTC Standard(s) Addressed

CRP1. Act as a responsible and contributing citizen and employee.

CRP2. Apply appropriate academic and technical skills.

CRP6. Demonstrate creativity and innovation.

CRP7. Employ valid and reliable research strategies.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

9.3. IT.3 Demonstrate the use of cross-functional teams in achieving IT project goals.

9.3. IT.4 Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.

9.3. IT.6 Describe trends in emerging and evolving computer technologies and their influence on IT practices.

9.3. IT.7 Perform standard computer backup and restore procedures to protect IT information.

9.3. IT.8 Recognize and analyze potential IT security threats to develop and maintain security requirements.

9.3. IT.10 Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.

9.3. IT-NET.1 Analyze customer or organizational network system needs and requirements.

9.3. IT-NET.2 Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).

- 9.3. IT-NET.3 Design a network system using technologies, tools and standards.
- 9.3. IT-NET.4 Perform network system installation and configuration.
- 9.3. IT-NET.5 Perform network administration, monitoring and support to maintain a network system.
- 9.3. IT-SUP.4 Perform installation, configuration, and maintenance of operating systems.
- 9.3. IT-SUP.5 Demonstrate the use of networking concepts to develop a network.
- 9.3. IT-SUP.8 Employ system administration and control skills to monitor the performance on an information system.
- 9.3. IT-SUP.9 Employ technical writing and documentation skills in support of an information system.

Essential Questions (3-5)

1. What are some things that can be found in network documentation?
2. What are three examples of security policies and what are their purposes?
3. What are the methods used to protect data?
4. How do you configure a BYOD policy?
5. What are the components of data center management?

Anchor Text(s)

Mike Meyers' CompTIA Network+ Guide to Managing and Troubleshooting Networks, 5th Edition – McGraw Hill 2018
ISBN-10: 1260128504
ISBN-13: 978-1260128505

Short & Informational Texts (3-5)

ARTICLES

“Five Considerations for Planning a Server Room”

<https://www.tsachoice.com/tech-talk/5-considerations-planning-a-server-room/>

“How to Develop an Acceptable Use Policy”

<https://www.webwise.ie/teachers/acceptable-use-policy/how-to-develop-an-acceptable-use-policy-2/>

“What is a Network Diagram”

<https://www.lucidchart.com/pages/network-diagram>

Expected Proficiencies/Career and Life Skills

- Design an enterprise network
- Develop network documentation
- Develop network diagrams

- Perform assess management
- Demonstrate proper safety measures
- Demonstrate proper risk management
- Develop a network security policy
- Configure an update server
- Configure a data backup
- Configure a server backup
- Configure Remote Desktop connections
- Create a guest network for BYOD
- Demonstrate how to install rack-mounted equipment
- Perform network monitoring
- Configure a syslog server
- Manage a network with SNMP
- Configure NIC teaming

Formative & Summative Assessments

- TestOut Module quizzes (Formative)
- TestOut lab simulations (Formative)
- Section assignments/activities (Formative)
- Module review packets (Summative)
- Comprehensive module tests (Summative)
- Practical scenario assessments (Real world labs) (Summative)
- Trimester projects (Summative)
- Trimester exam (Summative)

Resources (Websites, LMS, Google Classroom, documents, etc.)

- TestOut's LabSim (Modules 12, 15, and 16)
- Canvas LMS
- Google Drive/Docs/Slides
- Microsoft PowerPoint

- Microsoft Word
- Instructional Videos
- Wikis
- Infographics (www.piktochart.com)
- Review Game websites (i.e. www.classtools.net)
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Suggested Time Frame:

4-5 Weeks

III. Instructional Strategies:

- Lecture
- Instructional videos (YouTube, TestOut's LabSim)
- Instructional demos (LabSim)
- Lab simulations (LabSim)
- Class discussions
- Slide shows and other visual data
- Strategy games to enhance critical thinking
- Collaborative hands-on projects
- Researching information
- Technical writing
- Debating
- Role-playing scenarios
- Answering questions

- Extrapolating data
- Differentiated instruction
 - Students will be placed into lab groups based on a pre-assessment. Each group will be a mix of students with some/little experience to students with more experience.
 - At times, students will collaborate to solve real-world scenarios. Each student will bring his/her own strength to the group and assist others who are not as strong in a particular area. This balance will help them solve real-world problems in the IT world.
 - Through lectures, hands-on scenarios, simulations, video demos, and SMART Board interactions, the students will be exposed to a variety of teaching methods that appeal to auditory, visual, and kinesthetic learners.

IV. Methods of Student Evaluation:

Assessment in a vocational area can be divided into four general categories—formal (graded), informal (ungraded), certification, and practical application.

Formal Assessments:

- Module quizzes
- Do-Now quizzes
- Section assignments or activities
- Lab Reports
- Oral presentations
- Lab simulations
- Tests

Some of the informal assessments include, but are not limited to:

- Daily closure discussion – At the end of each day, the instructor and students discuss the day’s topic and provide insight and ask questions
- Canvas Collaborations – Students are always working in groups. At the end of lab time, students are to exchange information, project data, lab reports, et al with their group members via Canvas or Google.

Certification (Summative, counts as Exam grade) – The ultimate goal at the end of the year is to acquire certification. ITNS 1 students will be taking the Network Pro certification provided by TestOut Corporation. It qualifies the student to pursue CompTIA’s Network+ certification, the current de facto industry standard certification.

Practical application is the most important component to any vocational area. It demonstrates that a student can put the learned information into action by applying it in a real-world scenario. Some practical application assessments include, but are not limited to:

- Real world labs – Students will perform hands-on activities with the equipment based on a given set of instructions. Upon completion, they must develop a lab report summarizing their findings.
- Professional performance – While academics and discipline are separate entities, they are conjunctive in this shop because acting in a professional manner during lab is of paramount importance. Therefore, students will be assessed on their behavior in the lab.
- Projects – There will be a project each trimester. Successful completion of the project demonstrates that the students can practically apply most (or all) of the units’ concepts.

V. Scope and Sequence:

I = Introduce D = Develop R = Reinforce M = Master	
Act as a responsible and contributing citizen and employee.	R
Apply appropriate academic and technical skills.	R
Communicate clearly and effectively and with reason.	R

Demonstrate creativity and innovation.	I, D
Employ valid and reliable research strategies.	I, D
Utilize critical thinking to make sense of problems and persevere in solving them.	R
Use technology to enhance productivity.	R
Work productively in teams while using cultural global competence.	M
Demonstrate effective professional communication skills and practices that enable positive customer relationships.	R
Demonstrate the use of cross-functional teams in achieving IT project goals	I, D
Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.	R
Describe trends in emerging and evolving computer technologies and their influence on IT practices.	R
Perform standard computer backup and restore procedures to protect IT information.	M
Recognize and analyze potential IT security threats to develop and maintain security requirements.	D
Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.	D
Demonstrate knowledge of the hardware components associated with information systems.	I, D, R, M
Compare key functions and applications of software and determine maintenance strategies for computer systems.	I, D
Provide technology support to maintain service.	I, D, R
Apply appropriate troubleshooting techniques in resolving computer hardware, software, and configuration problems.	R

Perform installation, configuration and maintenance of operating systems.	M
Demonstrate the use of networking concepts to develop a network.	I, D
Evaluate the effectiveness of an information system.	R
Employ system installation and maintenance skills to setup and maintain an information system.	R
Employ system administration and control skills to monitor the performance of an information system.	R
Employ technical writing and documentation skills in support of an information system.	R
Apply quality assurance processes to maximize information system operation.	R
Analyze customer or organizational network system needs and requirements.	D, R
Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).	D, R
Design a network system using technologies, tools and standards.	D, R
Perform network system installation and configuration.	D, R
Perform network administration, monitoring and support to maintain a network system.	D, R

VI. Course Textbooks, Instructional Resources & Software

Student Resources	Teacher Resources
Digital	Digital

TestOut's LabSim Network Pro:

<http://www.testout.com/>

- Fact sheets (notes)
- Video lessons
- Video demonstrations
- Lab simulations
- Formative assessments
- Practice exams
- Simulated sandbox environment
- Certification program

Microsoft Visio

- Industry standard software for IT blueprints

Cisco Packet Tracer

- Industry standard software for designing mock networks
- Simulates real world packet transmissions and routing
- Simulates real world TCP/IP configuration and network management

Cisco Networking Academy

- Contains Python Academy, Cybersecurity Academy, Networking Essentials, and many other resources tied to the curriculum

Print/E-Book

TestOut's LabSim Network Pro:

<http://www.testout.com/>

- Custom exam creation
- Student progress monitoring
- Scoresheet based on criteria
- Answer keys
- Certification administration
- Teacher resources

Microsoft Visio

- Industry standard software for IT blueprints

Cisco Packet Tracer

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Print/E-Book

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Mike Meyer's Network+ Guide to Managing and Troubleshooting Networks, Lab Manual, 5th Edition

Author: Mike Meyers

Publisher: McGraw Hill 2016

ISBN-13: 978-1260121209

ISBN-10: 1260121208

Physical Parts

- Network Toolkits for creating cables
- Cable tester for testing cables, and performing tone probing
- Managed switches to be used for installation and configurations
- Patch panels to be used for cable management and switch connecting

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VII. Student Handout:

Information Technology & Network Security (ITNS) II is a full year study designed as a course to prepare the student TestOut's Network Pro certification—a comprehensive, real-world study consisting of all concepts of wired and wireless network implementation, Ethernet standards, network hardware and cabling, network management and troubleshooting, network security, routing, and WAN technologies. Acquiring the Network Pro certification will qualify and allow students, should they choose, to pursue CompTIA's Network+ certification. This course is a culmination of knowledge obtained from installation, identification, and technological theories.

Students of ITNS II will study and gain a complete understanding of a network's necessary components, installation, maintenance, security, IP configuration, routing, and troubleshooting skills. They will design and implement a small enterprise network along with security measures, as well as provide the necessary diagrams and documentation. The student will also learn how to speak the correct vernacular, as well as how to perform in a professional lab environment.

PROFICIENCIES

- A. Demonstrate how to work safely in professional environment.
- B. Identify the layers of the OSI and TCP/IP models.
- C. Logically break down a network address for “subnetting.”

- D. Convert binary to decimal and vice versa.
- E. Define subnet ranges for hosts.
- F. Identify network connectors and cables by sight, name, or capabilities.
- G. Make a patch cable.
- H. Test network connectivity using the proper tools.
- I. Select and install cables for communication between computers and networking devices.
- J. Select and install an appropriate networking device in a given scenario.
- K. Select and install an appropriate networking device for a VoIP scenario.
- L. Select and install appropriate wireless networking devices in a given scenario.
- M. Configure a wireless network connection.
- N. Configure WAN connections.
- O. Add and configure a wireless profile.
- P. Identify and select valid IP addresses and classful and classless subnet masks.
- Q. Configure IP address information on a Windows system.
- R. Use the switch CLI to make configuration changes.
- S. Identify necessary networking protocols and services given a scenario.
- T. Identify UDP and TCP ports of common network protocols.
- U. Identify public and private interfaces and addresses for NAT implementation.
- V. Identify and select the DHCP scope, reservations, and options to meet network requirements.
- W. Configure the Windows firewall.
- X. Create a virtual machine.
- Y. Recognize trends in cloud computing.
- Z. Configure security protocols
- AA. Implement physical network security.
- BB. Demonstrate how to identify and respond to social engineering threats.
- CC. Demonstrate how to identify and respond to network vulnerabilities and threats (UDP flood, Dos, etc.)
- DD. Demonstrate how to perform penetration testing.
- EE. Configure port security.
- FF. Configure a VPN connection.

- GG. Identify specific security features on network devices.
- HH. Select and install network security devices (IPS/IDS).
- II. Use TCP/IP utilities to troubleshoot network issues.
- JJ. Configure Remote Desktop.
- KK. Design network diagrams in Visio.
- LL. Develop network documentation.
- MM. Design and implement a small enterprise network.
- NN. Demonstrate how structured cabling is implemented.
- OO. Monitor network connectivity and conditions.
- PP. Optimize a network.