

**PASSAIC COUNTY TECHNICAL INSTITUTE**  
**45 Reinhardt Rd.**  
**Wayne, NJ**

**Information Technology & Network Security IV**  
**(ITNS IV)**  
**Course # 1206**  
**Developed 2018**

## I. Course Description:

This course provides a working knowledge of data communication networking devices, using routers and switches as building blocks. Emphasizes device design, functionality with different protocols and standards used network communications. Examples include Ethernet/802.3 standard, Address Resolution Protocol (ARP), Internet Protocol (IP), Transport Control Protocol (TCP), User Datagram Protocol (UDP), and others. Informational Technology and Network Security focuses on Cisco network devices and implementing “Cisco Network Academy Routing and Switching” course fundamentals. This course will also cover emerging technologies in the fields of networking and security.

## II. Units:

<b>Content Area:</b>	<b>Informational Technology &amp; Network Security IV</b>	<b>Grade(s)</b>	<b>12</b>
<b>Unit Plan Title:</b>	<b>Unit 1 – Ip Networks and ISO</b>  <i>Unit 1 will introduce students to cisco devices, Ipv4 and Ipv6 addressing and cover networking models they will be exposed to throughout the school year</i>  I.Introduction (Week 1) A. Cisco Device Identification B. Cable Identification C. Cisco Device Icons  II.Networking Concepts (Week 2 - 3) A. Networking Fundamentals (Week 2) B. Network Devices (Week 2) C. TCP/IP Networking Model (Week 2)		

- D. Data Encapsulation (Week 2)
- E. OSI Networking Model (Week 3)
- F. Data Communications (Week 3)
- G. Ethernet Networking (Week 3)
- H. WAN Fundamentals (Week 3)

### III. IPv4 Addressing (Week 4- 6)

- A. IPv4 Overview (Week 4)
- B. IPv4 Address Classes (Week 4)
- C. Subnetting (Week 5)
- D. Variable Length Subnet Masking (VLSM) (Week 6)
- E. Subnet Planning and Design (Week 6)

### IV. IPv6 Addressing (Week 7)

- A. IPv6 Addressing Overview
- B. IPv6 Host Configuration
- C. IPv6 Routing

#### **NJSLS/CCTC Standard(s) Addressed**

CRP4. Communicate clearly and effectively and with reason.

CRP5. Consider the environmental, social and economic impacts of decisions.

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

CRP11. Use technology to enhance productivity.

CRP12. Work productively in teams while using cultural global competence.

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

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

#### **Essential Questions (3-5)**

1. What functions do network access technologies provide?
2. What are the three most common topology types used by Ethernet?
3. What are the components of a chassis-based switch? What function does each component perform?
4. What is switch layering? How does it work?

#### **Anchor Text(s)**

Routing and Switching Essential v6 ISBN:978-1-58713-428-9  
TestOut LabSim Routing and Switching v6 ISBN:978-1-935080-55-8  
Connecting Networks v6 ISBN: 978-1-58713-432-6  
Cisco Networking Academy Courseware

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

#### ARTICLES

##### Web Articles

- [The Osi model why it still matters](#)
- [Cisco - Routing Protocols - Cisco Systems, Inc](#)
- [Ip Addressing and subnetting for new users](#)

### **Expected Proficiencies/Career and Life Skills**

- Describe the impact of infrastructure components in an enterprise network
- Interpret Ethernet frame format
- Compare OSI and TCP/IP models
- Describe the need for private IPv4 addressing
- Configure, verify, and troubleshoot IPv4 addressing and subnetting
- Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment

### **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
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Wikis
- Infographics ([www.piktochart.com](http://www.piktochart.com))
- Review Game websites (i.e. [www.classtools.net](http://www.classtools.net))
- Google Drive/Docs/Slides
- Career search engines (i.e. Careerbuilder, Indeed)
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

<b>Content Area:</b>	<b>Informational Technology &amp; Network Security IV</b>	<b>Grade(s)</b>	<b>12</b>
<b>Unit Plan Title:</b>	<p><b>Unit 2 – Lan Switching</b></p> <p><i>Unit 2 will cover Layer 2 switching and teach students the basics of the cisco device cli.</i></p> <p><b>I. Cisco Device Basics (Week 8 - 10)</b></p> <p>A. Cisco Device Access (Week 8)</p> <p>B. System Startup (Week 8)</p> <p>C. Command Line Interface (CLI) (Week 9)</p>		

- D. Command Line Help (Week 9)
- E. Basic Device Settings (Week 10)
- F. Device Passwords (Week 10)

**II. LAN Switching (Week 10 - 12)**

- A. Layer 2 Switching Overview (Week 10)
- B. Spanning Tree Overview (Week 10)
- C. Switch Interface Configuration (Week 11)
- D. Switch IP Configuration (Week 11)
- E. Virtual LANs (VLANs) (Week 11)
- F. Trunking (Week 11)
- G. Switch Security (Week 12)
- H. Remote Switch Access (Week 12)
- I. Cisco Discovery Protocol (CDP) (Week 12)

**NJSLS/CCTC Standard(s) Addressed**

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- 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.

**Essential Questions (3-5)**

1. What is the purpose of PPP communication?
2. What are the advantages of VLANs?
3. What is spanning tree?

**Anchor Text(s)**

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Cisco Networking Academy Courseware

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

#### **Web Articles**

- [Understanding Basic VLAN Configuration](#)
- [Understanding and Configuring Spanning Tree Protocol](#)

#### **LabSim**

- **Wireless Networks (1 article)**
- **Subnetting (3 articles)**
- **Wan Implementation (1 article)**

### **Expected Proficiencies/Career and Life Skills**

- Configure and verify initial device configuration
- Configure and verify device management
- Configure and verify initial device configuration
- Configure and verify device-monitoring protocols
- Troubleshoot network connectivity issues using ICMP echo-based IP SLA
- Use Cisco IOS tools to troubleshoot and resolve problems
- Describe and verify switching concepts (Mac, Frame switching, Frame flooding)
- Configure, verify, and troubleshoot VLANs (normal/extended range) spanning multiple switches
- Customize and view CDP information

### **Formative & Summative Assessments**

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- 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.)**

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

<b>Content Area:</b>	<b>Informational Technology &amp; Network Security IV</b>	<b>Grade(s)</b>	<b>12</b>
<b>Unit Plan Title:</b>	<b>Unit 3 – IP Routing and services</b> <i>Unit 3 will cover the basics of routing including ACL and NAT setup and configuration</i>		

- I. IP Routing Technologies (Week 13 - 15)
  - A. IP Routing (Week 13)
  - B. Routing Implementations (Week 13)
  - C. Static Routing (Week 14)
  - D. Dynamic Routing (Week 14)
  - E. Route Summarization (Week 14)
  - F. OSPF Configuration (Week 15)
  - G. InterVLAN Routing Configuration (Week 15)
  
- III. IP Services (Week 16 - 18)
  - A. Dynamic Host Configuration Protocol (DHCP) (Week 16)
  - B. Access Control Lists (ACLs) (Week 16)
  - C. ACL Commands (Week 17)
  - D. ACL Configuration (Week 17)
  - E. Extended ACL Configuration (Week 17)
  - F. Network Address Translation (NAT) Overview (Week 18)
  - G. NAT Configuration (Week 18)
  - H. Network Time Protocol (NTP) (Week 18)

**NJSLS/CCTC Standard(s) Addressed**

CRP2. Apply appropriate academic and technical skills.  
 CRP4. Communicate clearly and effectively and with reason.  
 CRP5. Consider the environmental, social and economic impacts of decisions.  
 CRP7. Employ valid and reliable research strategies.  
 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.

**Essential Questions (3-5)**

1. What are access list and how are they used?
2. What are the difference between a routing protocol and a routed protocol?
3. How do routers calculate distances between each other?
4. Why are static routes important?

### **Anchor Text(s)**

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Connecting Networks v6 ISBN: 978-1-58713-432-6  
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### **Short & Informational Texts (3-5)**

#### ARTICLES

##### Web Articles

- [Rings of Saturn](#)
- [Static vs. Dynamic Routing - Router Alley](#)

##### LabSim

- IP Services ( 1 article)

### **Expected Proficiencies/Career and Life Skills**

- Configure, verify, and troubleshoot IPv4 and IPv6 static routing
- Configure, verify, and troubleshoot IPv4 addressing and subnetting
- Configure, verify, and troubleshoot RIPv2 for IPv4
- Configure, verify, and troubleshoot VLANs (normal/extended range) spanning multiple switches
- Configure and verify DHCP on a router
- Configure, verify, and troubleshoot IPv4 and IPv6 access list for traffic filtering
- Configure, verify, and troubleshoot inside source NAT

### **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
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Wikis
- Infographics ([www.piktochart.com](http://www.piktochart.com))
- Review Game websites (i.e. [www.classtools.net](http://www.classtools.net))
- Google Drive/Docs/Slides
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

<b>Content Area:</b>	<b>Informational Technology &amp; Network Security IV</b>	<b>Grade(s)</b>	<b>12</b>
<b>Unit Plan Title:</b>	<b>Unit 4 – Advanced Switching</b> <i>Unit 4 will cover advanced switching techniques (Spanning Tree) and troubleshooting common network problems related to switches.</i>		

- I. Advanced Switching (Week 19)
  - A. Spanning Tree Overview
  - B. Spanning Tree Protocol Configuration
  - C.
  - C. Switch Troubleshooting
- II. Troubleshooting (Week 20)
  - A. Network Communications Troubleshooting
  - B. Switch Troubleshooting
  - C. ACL Troubleshooting

**NJSLS/CCTC Standard(s) Addressed**

- CRP2. Apply appropriate academic and technical skills.  
 CRP4. Communicate clearly and effectively and with reason.  
 CRP5. Consider the environmental, social and economic impacts of decisions.  
 CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.  
 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. Why is trunking important to VLAN configuration?
2. Which trunking protocols are supported on a Cisco 2960 switch? Which protocol is an industry standard?
3. By default, traffic from which VLANs are allowed on trunk ports?
4. What is the purpose of the VLAN Trunk Protocol (VTP)?

**Anchor Text(s)**

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 TestOut LabSim Routing and Switching v6 ISBN:978-1-935080-55-8  
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 Cisco Networking Academy Courseware

## Short & Informational Texts (3-5)

### ARTICLES

#### Web Articles

- [IPv6 Security Issues – Concerns for Transition](#)
- [IT Consulting in a Wireless World](#)

#### LabSim

- [Network Security \(3 articles\)](#)

## Expected Proficiencies/Career and Life Skills

- Configure, verify, and troubleshoot VLANs
- Configure, verify, and troubleshoot STP protocols
- Configure, verify, and troubleshoot (Layer 2/Layer 3) EtherChannel
- Troubleshoot basic Layer 3 end-to-end connectivity 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
- Canvas LMS
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Google Drive/Docs/Slides
- Wikis

- Infographics ([www.piktochart.com](http://www.piktochart.com))
- Review Game websites (i.e. [www.classtools.net](http://www.classtools.net))
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

Content Area:	Informational Technology & Network Security IV	Grade(s)	12
Unit Plan Title:	<p><b>Unit 5 – Advanced Routing</b></p> <p><i>Unit 5 will cover advanced routing techniques including Frame Relay, InterVlan Routing and PPPoE configuration.</i></p> <ul style="list-style-type: none"> <li>I. Advanced IPv4 Routing (Week 21- 22) <ul style="list-style-type: none"> <li>A. IPv4 Routing Troubleshooting (Week 21)</li> <li>B. InterVLAN Routing Troubleshooting (Week 22)</li> <li>C. Default Gateway Redundancy (Week 22)</li> </ul> </li> <li>II. Wide Area Networks (Week 23 - 25) <ul style="list-style-type: none"> <li>A. WAN Types (Week 23)</li> <li>B. Leased Line WAN Links (Week 23)</li> <li>C. PPP WAN Links (Week 23)</li> <li>D. Frame Relay WAN Concepts (Week 24)</li> <li>E. Frame Relay Configuration (Week 24)</li> <li>F. PPPoE Configuration (Week 25)</li> <li>G. Virtual Private Networks (Week 25)</li> <li>H. WAN Troubleshooting (Week 25)</li> </ul> </li> </ul>		
<b>NJSLS/CCTC Standard(s) Addressed</b>			

CRP1. Act as a responsible and contributing citizen and employee.  
CRP2. Apply appropriate academic and technical skills.  
CRP4. Communicate clearly and effectively and with reason.  
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.  
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 is the function of a BGP protocol?
2. How does split horizon reduce network traffic?
3. What effect does poison reverse have on convergence? Network traffic?
4. How is the shortest path first (SPF) algorithm used?
5. What is a potential problem when using LSPs on a large network?

#### **Anchor Text(s)**

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

##### ARTICLES

Types of Wans

<https://ciscoskills.net/2011/10/19/types-of-wan-links/>

Where are wans heading in the future?

<https://www.networkworld.com/article/3248989/lan-wan/wide-area-networks-what-wans-are-and-where-theyre-headed.html>

Troubleshooting Wan links

<http://penta2.ufrgs.br/trouble/trwan.htm>

#### **Expected Proficiencies/Career and Life Skills**

- Troubleshoot client connectivity issues involving DNS
- Troubleshoot client- and router-based DHCP connectivity issues
- Configure, verify, and troubleshoot basic HSRP
- Configure and implement a leased line WAN link.
- Identify WAN technologies available for leased line WAN links.
- Configure and verify PPP and MLPPP on WAN interfaces using local
- Configure, verify, and troubleshoot GRE tunnel connectivity
- Configure, verify, and troubleshoot PPPoE client-side interfaces

### **Formative & Summative Assessments**

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

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

- Testout's LabSim
- Canvas LMS
- Cisco Packet Tracer
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Wikis
- Infographics ([www.piktochart.com](http://www.piktochart.com))
- Review Game websites (i.e. [www.classtools.net](http://www.classtools.net))
- Google Drive/Docs/Slides
- Knowledgebase
- Technical forums

- Microsoft Visio
- YouTube videos

<b>Content Area:</b>	<b>Informational Technology &amp; Network Security IV</b>	<b>Grade(s)</b>	<b>12</b>
<b>Unit Plan Title:</b>	<b>Unit 6 – Routing Protocols</b>  <i>Unit 6 will cover the various types of routing protocols used in IPv4 and IPv6 networks</i> <ol style="list-style-type: none"> <li>I. IPv4 Routing Protocols (Week 26 - 28) <ol style="list-style-type: none"> <li>A. OSPF for IPv4 Review (Week 26)</li> <li>B. OSPF Areas and LSA Types (Week 26)</li> <li>C. EIGRP for IPv4 Routing (Week 27)</li> <li>D. EIGRP for IPv4 Configuration (Week 27)</li> <li>E. IPv4 Routing Protocol Troubleshooting (Week 28)</li> </ol> </li>   <li>2. 16.0 IPv6 Routing Protocols (Week 28 - 30) <ol style="list-style-type: none"> <li>A. IPv6 Protocol Overview (Week 28)</li> <li>B. OSPF for IPv6 (Week 29)</li> <li>C. EIGRP for IPv6 (Week 30)</li> </ol> </li> </ol>		
<b>NJSLS/CCTC Standard(s) Addressed</b>			
CRP1. Act as a responsible and contributing citizen and employee.			

CRP2. Apply appropriate academic and technical skills.  
CRP4. Communicate clearly and effectively and with reason..  
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.  
9.3. IT- NET.4 Perform network system installation and configuration.  
9.3. IT.8 -Recognize and analyze potential IT security threats to develop and maintain security requirements  
9.3. IT.13 - Compare key functions and applications of software and determine maintenance strategies for computer systems.

### **Essential Questions (3-5)**

1. How do the DR and the BDR reduce network traffic?
2. How is the DR elected? How can you ensure that a specific device becomes the DR?
3. What conditions must be met before two routers running OSPF will share information?

### **Anchor Text(s)**

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

#### ARTICLES

Routing Protocol Types

<http://freewimaxinfo.com/routing-protocol-types.html>

Top Routing Protocols

<https://www.lifewire.com/top-network-routing-protocols-explained-817965>

Studying Routing Protocols

<https://study-ccna.com/routing-protocols/>

### **Expected Proficiencies/Career and Life Skills**

- Configure, verify, and troubleshoot single area and multi-area OSPFv2 for IPv4/IPv6

- Configure, verify, and troubleshoot EIGRP for IPv4/IPv6
- Troubleshoot basic Layer 3 end-to-end connectivity issues

### **Formative & Summative Assessments**

- TestOut Module quizzes (Formative)
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- Review Game websites (i.e. [www.classtools.net](http://www.classtools.net))
- Knowledgebase
- Technical forums
- Microsoft Visio
- YouTube videos

<b>Content Area:</b>	<b>Informational Technology &amp; Network Security IV</b>	<b>Grade(s)</b>	<b>12</b>
<b>Unit Plan Title:</b>	<b>Unit 7 – Emerging Technology</b>  <i>Unit 7 will cover various topics including but not limited to drone technology, raspberry pi, 3d printing, network gaming security, virtual reality.</i>  <b>Weeks 31, 32, 33</b> <ol style="list-style-type: none"> <li>1. Basics of 3d printing (Course provided by MakerBot) (1 week)</li> <li>2. Raspberry Pi – Pi-topCEED Courseware (1 week)</li> <li>3. Virtual Reality – Intro to a Vr World (Oculus) (1 week)</li> <li>4. (Final 2 week are exams and senior practice)</li> </ol>		
<b>NJSLS/CCTC Standard(s) Addressed</b>			
CRP1. Act as a responsible and contributing citizen and employee. 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. 9.3. IT- NET.5 Perform network administration, monitoring and support to maintain a network system.			
<b>Essential Questions (3-5)</b>			
<ol style="list-style-type: none"> <li>1. How is 3d printing changing the world we live in?</li> <li>2. Why are raspberry pi micro computers important in our network environment?</li> <li>3. Where is the major focus of Vr Technology heading in the global landscape?</li> </ol>			
<b>Anchor Text(s)</b>			
<u>Routing and Switching Essential</u> v6 ISBN:978-1-58713-428-9 <u>TestOut LabSim Routing and Switching</u> v6 ISBN:978-1-935080-55-8 <u>Connecting Networks</u> v6 ISBN: 978-1-58713-432-6 Cisco Networking Academy Courseware			
<b>Short &amp; Informational Texts (3-5)</b>			

## ARTICLES

MakerBot - Thingiverse

Oculus First Contact | Oculus

Pi-top

### **Expected Proficiencies/Career and Life Skills**

- Create and build a simple 3d model
- Setup and install a raspberry pi micro pc
- Install, setup, and demonstrate VR hardware to classes

### **Formative & Summative Assessments**

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- Practical scenario assessments (Real world labs) (Summative)
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### **Resources (Websites, LMS, Google Classroom, documents, etc.)**

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- Canvas LMS
- Google Drive/Docs/Slides
- Microsoft PowerPoint
- Microsoft Word
- Instructional Videos
- Wikis
- Infographics ([www.piktochart.com](http://www.piktochart.com))
- Review Game websites (i.e. [www.classtools.net](http://www.classtools.net))
- Knowledgebase

- Technical forums
- Microsoft Visio
- YouTube videos

### **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) –**

**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 unit’s concepts.

**V. Scope and Sequence:**

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

Utilize critical thinking to make sense of problems and persevere in solving them.	R, M
Use technology to enhance productivity.	R, M
Work productively in teams while using cultural global competence.	R, M
Demonstrate effective professional communication skills and practices that enable positive customer relationships.	R, M
Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.	R, M
Describe trends in emerging and evolving computer technologies and their influence on IT practices.	R, M
Perform standard computer backup and restore procedures to protect IT information.	R, M
Recognize and analyze potential IT security threats to develop and maintain security requirements.	R, M
Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.	R, M

Compare key functions and applications of software and determine maintenance strategies for computer systems.	R, M
Provide technology support to maintain service.	R, M
Manage operating systems and software applications, including maintenance of upgrades, patches and service packs.	R, M
Apply appropriate troubleshooting techniques in resolving computer hardware, software, and configuration problems.	R, M
Perform installation, configuration and maintenance of operating systems.	R, M
Demonstrate the use of networking concepts to develop a network.	R, M
Evaluate the effectiveness of an information system.	R, M
Employ system installation and maintenance skills to setup and maintain an information system.	R, M
Employ system administration and control skills to monitor the performance of an information system.	R, M
Employ technical writing and documentation skills in support of an information system.	R, M

Apply quality assurance processes to maximize information system operation.	R, M
Analyze customer software needs and requirements.	R, M
Program a computer application using the appropriate programming language.	R, M
Analyze customer or organizational network system needs and requirements.	R, M
Analyze wired and wireless network systems to determine if they meet specifications (e.g., IEEE, power and security).	R, M
Design a network system using technologies, tools and standards.	R, M
Perform network system installation and configuration.	R, M
Perform network administration, monitoring and support to maintain a network system.	R, M

## VI. Course Textbooks, Instructional Resources & Software Student Resources:

TestOut's LabSim Routing and Switching: <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

- PCAP – Programming Essentials in Python
- CCNA Routing and Switching Essentials
- CCNA Routing and Switching “Intro to networks”
- Cybersecurity Essentials
- Mobility Fundamentals
- Entrepreneurship

#### **VII. Student Handout:**

This course provides a working knowledge of data communication networking devices, using routers and switches as building blocks. Emphasizes device design, functionality with different protocols and standards used network communications. Examples include Ethernet/802.3 standard, Address Resolution Protocol (ARP), Internet Protocol (IP), Transport Control Protocol (TCP), User Datagram Protocol (UDP), and others. Informational Technology and Network Security focuses on Cisco network devices and implementing “*Cisco Network Academy Routing and Switching*” course fundamentals. This course will also cover emerging technologies in the fields of networking and security.

## **PROFICIENCIES**

**Upon successful completion of this course, the student will be able to:**

- Describe the need for private IPv4 addressing
- Configure, verify, and troubleshoot IPv4 addressing and subnetting
- Identify the appropriate IPv6 addressing scheme to satisfy addressing requirements in a LAN/WAN environment
- Configure and verify initial device configuration
- Configure and verify device management
- Configure and verify initial Cisco device configuration
- Configure and verify Cisco device-monitoring protocols
- Describe and verify switching concepts (Mac, Frame switching, Frame flooding)
- Configure, verify, and troubleshoot VLANs (normal/extended range) spanning multiple switches
- Configure, verify, and troubleshoot IPv4 and IPv6 static routing
- Configure, verify, and troubleshoot IPv4 addressing and subnetting
- Configure, verify, and troubleshoot RIPv2 for IPv4
- Configure, verify, and troubleshoot VLANs (normal/extended range) spanning multiple switches
- Configure and verify DHCP on a router
- Configure, verify, and troubleshoot IPv4 and IPv6 access list for traffic filtering
- Configure, verify, and troubleshoot inside source NAT
- Configure, verify, and troubleshoot VLANs
- Configure, verify, and troubleshoot STP protocols
- Configure, verify, and troubleshoot (Layer 2/Layer 3) EtherChannel
- Troubleshoot basic Layer 3 end-to-end connectivity issues
- Troubleshoot client connectivity issues involving DNS
- Troubleshoot client- and router-based DHCP connectivity issues
- Configure, verify, and troubleshoot basic HSRP

- Configure and implement a leased line WAN link.
- Identify WAN technologies available for leased line WAN links.
- Configure and verify PPP and MLPPP on WAN interfaces using local
- Configure, verify, and troubleshoot GRE tunnel connectivity
- Configure, verify, and troubleshoot PPPoE client-side interfaces
- Configure, verify, and troubleshoot single area and multi-area OSPFv2 for IPv4/IPv6
- Configure, verify, and troubleshoot EIGRP for IPv4/IPv6
- Troubleshoot basic Layer 3 end-to-end connectivity issues
- Create and build a simple 3d model
- Setup and install a raspberry pi micro pc
- Install, setup, and demonstrate VR hardware to classes