This course supports the assessments for SJT2. The course covers 8 competencies and represents 3 competency units.

**Introduction**

**Overview**

Welcome to Advanced Networking and Technology. In this course, you will learn about advanced networking concepts, devices, and strategies in order to provide superior network solutions for organizations. You will review common, yet critical network devices and technologies. You will also be prepared to review existing network environments and provide specifications to upgrade and enhance such networks.

This course prepares you to support the ever growing interconnectivity needs of organizations through the application of networking technology.

Watch the following video for an introduction to this course:

*Note: To download this video, right-click the following link and choose "Save as...": [download video]*

**Competencies**

This course provides guidance to help you demonstrate the following 8 competencies:

- **Competency 434.1.1: Networking Fundamentals**
  The graduate selects appropriate protocols, topologies, architectures, and devices to facilitate growth within existing networks.

- **Competency 434.1.2: Routing and Switching**
  The graduate designs appropriate local area network (LAN) configurations to meet projected organizational networking needs.

- **Competency 434.1.3: Wireless Networking**
  The graduate designs appropriate wireless networks to meet projected organizational networking needs.

- **Competency 434.1.4: External Connectivity**
  The graduate designs appropriate wide area network (WAN) configurations and connections to external networks to meet projected organizational networking needs.

- **Competency 434.1.5: Storage Area Networks**
  The graduate designs enterprise data storage solutions to meet projected organizational data storage needs.

- **Competency 434.1.6: Network Applications and Virtualization**
  The graduate recommends appropriate network applications and virtualization technologies that support network infrastructure.

- **Competency 434.1.7: Performance and Network Management**
The graduate evaluates whether network performance meets organizational availability, stability, and speed requirements.

- **Competency 434.1.8: Network Security**
  The graduate recommends network security best practices in the design of new and existing networks.

**Course Instructor Assistance**
As you prepare to successfully demonstrate competency in this subject, remember that course instructors stand ready to help you reach your educational goals. As subject matter experts, mentors enjoy and take pride in helping students become reflective learners, problem solvers, and critical thinkers. Course instructors are excited to hear from you and eager to work with you.

Successful students report that working with a course instructor is the key to their success. Course instructors are able to share tips on approaches, tools, and skills that can help you apply the content you're studying. They also provide guidance in assessment preparation strategies and troubleshoot areas of deficiency. Even if things don't work out on your first try, course instructors act as a support system to guide you through the revision process. You should expect to work with course instructors for the duration of your coursework, and you are encouraged to contact them as soon as you begin. Course instructors are fully committed to your success!

**Getting Started**

The information in this section is provided to detail the resources available for you to use as you complete this course.

Complete all activities in this course. The activities will provide you with the foundational competencies necessary to achieve success on the final assessment. For each topic you can examine network equipment manufacturers, web site production descriptions, and technical manuals to expand your familiarity with common proprietary technologies.

**Take notes during all chapter readings, and consider broadening your understanding through the use of additional sources like internet search engines, for example. While completing your reading, you should be thinking about how you would respond to client requests in relation to the material presented.**

**Learning Resources**
The learning resources listed in this section are required to complete the activities in this course. For many resources, WGU has provided automatic access through the course. However, you may need to manually enroll in or independently acquire other resources. Read the full instructions provided to ensure that you have access to all of your resources in a timely manner.

**Automatically Enrolled Resources**

You can access the learning resources listed in this section by clicking on the links provided throughout the course. You may be prompted to log in to the WGU student portal to access the resources.
VitalSource E-Texts
The following textbooks are available to you as e-texts within this course. You will be directly linked to the specific readings required within the activities that follow.


*Note: These e-texts are available to you as a part of your program tuition and fees, but you may purchase a hard copy at your own expense through VitalSource or a retailer of your choice. If you choose to do so, please use the ISBN listed to ensure that you receive the correct edition. The following sites provide instruction on how to create a VitalSource account, use features such as downloading your e-texts for offline use, and purchase a print-on-demand option, if available.*

- VitalSource Navigational Video
- Print-On-Demand Option

Microsoft Imagine
This resource provides student in IT courses with software design and development tools such as Visio or SQL Server. Please use the link below to access. Important: Software from Imagine and VMware are temporary downloads for academic studies only and should not be used to build or upgrade a computer. Licenses last for two years.

- WGU Microsoft Imagine

Pacing Guide
The pacing guide outlines a weekly structure. Following the weekly structure and completing the topics and activities for each week will keep you in the suggested course completion timeframe.

Week 1
Read the course introduction and review the learning resources. You are automatically enrolled.

- Network Fundamentals
- Routing and Switching
- Create Proposal 1

Week 2
Wireless Networking
Create Proposal 2

Week 3

External Connectivity
Create Proposal 3

Week 4

Storage Area Networks
Create Proposal 4
Network Applications and Visualization
Create Proposal 5

Week 5

Performance and Network Management
Create Proposal 6

Week 6

Network Security
Create Proposal 7

Week 7 and 8

Complete Performance Assessment

Note: This pacing guide does not replace the course. Please continue to refer to the course for a comprehensive list of the resources and activities.

Coursework

Begin learning! Complete all readings and activities in this course to provide you with the foundation to successfully complete the final assessment. Keep in mind how you will use this content in the workplace.

Lock in Your Progress
Once you are ready to start or are actively working with your learning resources, lock in your progress. You only need to complete this step once.

**Mark this Activity Complete to Lock In Your Progress**

Click the check mark above or below if you are actively engaged in this course.

**Networking Fundamentals**
This section reviews the following networking topics:

- Networking Devices and Protocols
- Network Communications and Topologies
- Network Characteristics and Performance
- End-to-End Network Topologies

This course assumes you have a basic understanding of these fundamental networking topics. If you need to review, please complete the following Building a Solid Foundation activity.

This topic addresses the following competencies:

- 434.1.1 - Networking Fundamentals
  The graduate selects appropriate protocols, topologies, architectures, and devices to facilitate growth within existing networks.

**Building a Solid Foundation**

Read the following text in *Computer Networks*:

- pages 3-16 of *chapter 1 (“Introduction”)*

While reading, begin thinking about how important it is to have a solid foundation in fundamental networking principles. You will be required to evaluate business technological scenarios and provide recommendations and proposals. Without a solid foundation in networking principles and protocols, your ability to respond accordingly will be diminished.

**Routing and Switching**
Layer 2 and 3 technologies are often the basis for designing networks. This section explores how to craft a client proposal based on their networking needs.

This topic addresses the following competencies:

- Competency 434.1.2: Routing and Switching
  The graduate designs appropriate local area network (LAN) configurations to meet projected organizational networking needs.

**Justifying Recommendations**

Read the following text in *Computer Networks*:

- pages 17-29 of *chapter 1 (“Introduction”)*
Complete the following activities at the end of chapter 1 in Computer Networks:

- problem 5
- problem 8
- problem 9
- problem 34

If it were your task to deploy networking technology that needed to be integrated into an older legacy environment, how would you do it and how would you justify your recommendation?

**Proposal 1**

Throughout this course, you will be asked to create several proposals. This process will develop your ability to prepare and communicate advanced networking solutions.

Create your first proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. When using two independent internet service providers to establish a higher level of business continuity, why are routing protocols important for real time fail-over scenarios?
2. When you have multiple business locations physically separated, what local area networking considerations will be important to maintain connectivity between all locations in a way that is seamless to your users?
3. What types of network connectivity can be utilized to connect physically separated business locations?
4. Understand the IT acronyms, ARIN, DMZ, WAN and QoS. Why are they important?

Depending on each individual situation, a proposal response can take on a different direction. When putting together your responses, you should always take into consideration all of the client’s business objectives. Considering how you are going to get to the end of your business proposal is also important because it drives your migration plan and affects the operational stability of your client’s business.

**Wireless Networking**

Two considerations when setting up wireless networks are Wireless Protocols and Wireless Security. Part of a formal network proposal requires the inclusion of wireless network capabilities for all a client’s business locations. You will not always be provided with specific information about building size and office locations. Take this limited information into consideration when crafting network solutions.

This topic addresses the following competency:

- Competency 434.1.3: Wireless Networking
  The graduate designs appropriate wireless networks to meet projected organizational
networking needs.

**Wireless Transmissions**

Read the following text in *Computer Networks*:

- pages 54-73 of chapter 1 ("Introduction")
- pages 105-135 of chapter 3 ("The Data Link Layer")
- pages 299-331 of chapter 4 ("The Medium Access Control Sublayer")

Complete the following activity at the end of chapter 1 in *Computer Networks*:

- problem 24

**Proposition 2**

Write a proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. When installing wireless access points, Ethernet network connections may be installed almost anywhere. Where should the most secure network connections be installed? Why?
2. When enabling wireless technology, is there any importance to using connection encryption? Would using WEP encryption be better, the same, or worse than using WPA2 encryption?
3. When considering the installation of wireless access points in an office facility, what physical properties of a building should be considered?
4. Understand the IT acronyms, 802.11, WEP, WPA, WPA2, VLAN, and WAP. Why are they important?

**External Connectivity**

External connectivity can be explored by means of the following three concepts:

- Internet Connectivity
- Remote Access
- Wide Area Network (WAN)

Internet connectivity involves understanding common protocols and technologies used to connect networks to the Internet, including routing techniques for redundant access to the Internet.

Understanding the benefits and challenges associated with remote access will position you to create more robust solutions.

Understanding some common characteristics of WANs, including common service provider topologies used in wide area networks (WANs) such as Frame Relay, ATM, MPLS, is important.

Part of your task when recommending solutions to a client’s RFP includes suggestions for
connecting various business locations and third party services to satisfy the business objectives.

This topic addresses the following competency:

- Competency 434.1.4: External Connectivity
  The graduate designs appropriate wide area network (WAN) configurations and connections to external networks to meet projected organizational networking needs.

**Activity**

Read the following text in *Computer Networks*:

- pages 30 - 35 of chapter 1 ("Introduction")
- pages 465 - 488 of chapter 5 ("The Network Layer")

Complete the following activities at the end of chapter 1 in *Computer Networks*:

- problem 30
- problem 33

If it were your task to deploy connectivity to external Internet based technology companies or create disaster resistant networking at your place of work, how would you do it and how would you justify your recommendation?

**Proposal 3**

Write a proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. When installing a wide area network, why it is important to implement redundant WAN circuits?
2. For business continuity and disaster recovery, should you use the same internet service provider or utilize different companies? Why?
3. Why are routing protocols important for real-time WAN fail-over scenarios?
4. Understand the IT related acronyms, WAN, QoS, LOM, and LACP. Why are they important?

**Storage Area Networks**

There are many ways to implement a Storage Area Network; this is largely dependent on the manufacturer’s interpretation. You should, however, be able to identify and discuss from a conceptual standpoint the basic components included in a SAN implementation, why SAN protocols compatible with IP based networks are important, and which disaster recovery considerations are needed to keep a business operating.

This topic addresses the following competency:

- Competency 434.1.5: Storage Area Networks
  The graduate designs enterprise data storage solutions to meet projected organizational
data storage needs.

**Deploying Storage Area Technology**

Read the following text on SANs:

- [Storage area network](#)
- chapters 1 through 5 in *Introduction to Storage Area Networks*

If it were your task to deploy storage area network technology at your place of work, how would you do it and how would you justify your recommendation?

**Proposal 4**

Write a proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. What types of network protocols can be utilized to connect the new fiber channel FC hardware to the IP based Ethernet networked datacenter?
2. Why is it important to be able to route FC data over an IP based network?
3. Understand the IT related acronyms, IP, GB, FC, and FCoE. Why are they important?

**Network Applications and Virtualization**

In this section you will be exposed to network applications including concepts such as core internetwork applications and cloud computing. Virtualization concepts include virtual switching, I/O, and hardware virtualization.

This topic addresses the following competency:

- Competency 434.1.6: Network Applications and Virtualization
  The graduate recommends appropriate network applications and virtualization technologies that support network infrastructure.

**Deploying Virtualization Technology**

Read the following text in *Computer Networks*:

- pages 611 - 757 of *chapter 7 ("The Application Layer")*

Complete the following activities at the end of chapter 7 in *Computer Networks*:

- problem 38
- problem 39
- problem 41

If it were your task to deploy virtualization technology at your place of work, how would you do it and how would you justify your recommendation? Are there any special considerations for networking applications in a virtualized environment to consider?

**Proposal 5**
Write a proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. What are the advantages and disadvantages of migrating to an SaaS environment from one previously hosted by the company itself?
2. For business continuity and disaster recovery purposes, what advantages does virtualization provide?
3. When transferring data from your workstation from within the corporate LAN environment to the SaaS provider’s network, what steps should you take to provide security and privacy of your connection?
4. Understand the IT related acronyms, VM, KVM, VLAN, and VPN. Why are they important?

**Performance and Network Management**

In this section you will learn about network management, which includes monitoring and logging your network. You will also learn about quality of service and network performance monitoring.

This topic addresses the following competency:

- Competency 434.1.7: Performance and Network Management
  The graduate evaluates whether network performance meets organizational availability, stability, and speed requirements.

**Monitoring Applications and Technology**

Read the following text in *Computer Networks*:

- pages 392 - 421 of chapter 5 ("The Network Layer")
- pages 552 - 605 of chapter 6 ("The Transport Layer")

Complete the following activities at the end of chapter 5 in *Computer Networks*:

- problem 9
- problem 18
- problem 28

If it were your task to deploy network monitoring applications or performance monitoring technology at your place of work, how would you do it and how would you justify your recommendation?

**Proposal 6**

Write a proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. What are the performance advantages you might expect from a cloud environment when migrating to an SaaS environment from one previously hosted by the company itself?
2. For business continuity and disaster recovery purposes, why is LOM important?
3. What are the benefits to establishing QoS on network infrastructure? What are the disadvantages?

4. Would remotely managing system logs be more advantageous than centrally logging massive amounts of log data?

5. Understand the IT related acronyms, LOM and QoS. Why are they important?

**Network Security**

Regardless of whether or not your expertise includes information security, it is an essential consideration to all information technology projects. A response to the request for proposal (RFP) should include security recommendations and information that specifically benefits all the client’s needs.

This topic addresses the following competency:

- Competency 434.1.8: Network Security
  The graduate recommends network security best practices in the design of new and existing networks.

**Information and Network Security**

Read the following text in *Computer Networks*:

- pages 769 - 869 of chapter 8 ("Network Security")

Complete the following activities at the end of chapter 8 in *Computer Networks*:

- problem 46
- problem 47

If it were your task to deploy information and network security technology at your place of work, how would you do it and how would you justify your recommendation?

Consider looking at both open source and commercial information security technologies and how business applications, networks, and organizations are protected.

**Proposal 7**

Write a proposal. Think about how you might provide examples or illustrations to describe your recommendations for the following considerations:

1. Why is VPN technology important when migrating to an SaaS environment from one previously hosted by the company itself?

2. What are the benefits or disadvantages of implementing ISP technology at ISO layer 2 rather than ISO layer 3?

3. Would remotely managing IPS and HIDS log files be more advantageous than centrally logging massive amounts of log data from these systems?

4. Understand the IT related acronyms, IPS, HIDS, Firewall, VPN, and SSL. Why are they important?
Final Steps

Congratulations on completing the activities in this course! This course has prepared you to complete the assessments associated with this course. If you have not already been directed to complete the assessments, schedule and complete your assessments now.