

Florida International University
Department of Electrical and Computer Engineering

TCN 4211 – Telecommunication Networks
Fall 2022

Instructor : Dr. Yu Du
Office Hours : by appointment
Monday 9:30-11:00 am
Tuesday & Thursday 3:30 – 5:00 pm

Office : EC – 3105
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Class : available through FIU Canvas
Web Page : <https://ece.fiu.edu/resources/course-description/index.html>

Catalog Description:

The goal of the course is to teach the introductory concepts and principles in telecommunication networks, especially Internet, and how to apply those concepts in network system engineering synthesis, analysis, and evaluation of computer communication networks. (3 Credits)

Reference Textbook:

Anthony J. Sequeira and Michael D. Taylor, CompTIA Network+N10-007 Cert Guide, Deluxe Edition, ISBN-10: 0-7897-5982-9

Course Prerequisites:

EEL 3514 Basic knowledge about computer networks or permission of instructor. Review the Course Catalog (<https://onlineapps.fiu.edu/coursecatalog/>) webpage for prerequisites information.

Technical Requirements and Skills:

One of the greatest barriers to taking an online course is a lack of basic computer literacy. By computer literacy we mean being able to manage and organize computer files efficiently, and learning to use your computer's operating system and software quickly and easily. Keep in mind that this is not a computer literacy course; but students enrolled in online courses are expected to have moderate proficiency using a computer. Please go to the "What's Required (<https://fiuonline.fiu.edu/experience/what-is-required.php>)" webpage to find out more information on this subject.

This course utilizes the following tools:

Lab simulations from textbook

Network Analyzer - WireShark

Please visit our Technical Requirements

(<https://online.fiu.edu/html/canvas/mastertemplate/technical-requirements/>) webpage for additional information.

Course Objectives:

- Describe the basics of computer networking and the components that comprise them.
- Describe and identify the concepts related to Telecommunication and Networks.
- Evaluate the composition and functionality of the OSI layers and TCP/IP models.

- Analyze the different networking topologies and technologies to use in different scenarios.
- Synthesize network subnetting with IP Addresses schemes and their management.
- Apply the best practices and guidelines for developing and verifying effective security policies and procedures, security goals, threats and vulnerabilities, standards and security policy development.
- Apply networking management and utilizes in configuration and deployment.
- Apply routing protocols in LANs.
- Identify the techniques to improve network performance.
- Identify and describe the basic concepts in deploying a wireless network and its vulnerabilities.

ABET Relationship of course to program outcomes:

(Select corresponding boxes below to applicable program outcomes for the course.)

- 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- 3. an ability to communicate effectively with a range of audiences.
- 4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- 5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Grading Scale:	the University's Code of Academic Integrity http://academic.fiu.edu/academic_misconduct.html	
A	92-100	"Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly to demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook."
A-	90-92	
B+	88-90	
B	82-88	
B-	80-82	
C+	78-80	
C	70-78	
D	60-69	
F	< 60	

Department Regulations Concerning Incomplete Grades

To qualify for an Incomplete, a student:

1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course

Must see the Instructor. All missed work must be finished before last two weeks of the following term.

University policies: on sexual harassment, and religious holidays, and information on services for students with disabilities

<http://academic.fiu.edu/>

<http://drc.fiu.edu>

Policies:

- **Academic Misconduct:** For work submitted, it is expected that each student will submit their own original work. Any evidence of duplication, cheating or plagiarism will result in at least a failing grade for the course.
- **Deadlines: Work is due before midnight on the date specified.** Late submissions within one week will receive up to half credit. After one week, **late work will not be accepted.**
- Participation deadlines are absolute – no late completions or makeups
- Submissions: This class is paperless. Submissions are made using Canvas.
- DO NOT submit work by email.
- Assignments/Discussions/Quizzes/Projects/Exams grades are located at Canvas.
- Instructor reserves right to change course materials or dates as necessary.

Grading Scale: NOTE: There are *no makeup exams* offered

Course Requirements	Weight
Quizzes	10%
Assignment/Lab (Simulator)	10%
Discussion and Participation	15%
Group Research Paper / Project	15%
Final Exam	50%
Total	100%

Weekly Teaching Plan

Module 1 - Network Basics

Dates / Weeks	Tasks
Week 1	<p>Supports Course Learning Objective(s)</p> <p>1. Describe the basics of computer networking and the components that comprise them.</p> <p>3. Evaluate the composition and functionality of the OSI layers and TCP/IP models.</p> <p>Module Learning Objective(s)</p>

	<ul style="list-style-type: none"> • Describe different network topologies. • Describe the layers of the OSI and TCP/IP models. • Identify common TCP and UDP default ports. • Explain the function of common network protocols. <p>Content</p> <p>Reading(s):</p> <ul style="list-style-type: none"> • Chapter 1 - Introducing Computer Networks • Chapter 2 - Dissecting the OSI Model <p>Presentation(s):</p> <ul style="list-style-type: none"> • Chapter 1 - Introducing Computer Networks • Chapter 2 - Dissecting the OSI Model <p>Assignment(s)</p> <ul style="list-style-type: none"> • Assignment 1 • Group Project group formation (self-enroll in a group) <p>Discussion(s)</p> <ul style="list-style-type: none"> • Discussion 1 <p>Assessment(s)</p> <ul style="list-style-type: none"> • Quiz 1 (Chapter 1 and Chapter 2) <p>Tasks</p> <ol style="list-style-type: none"> 1. Install the software that comes with your CD from the book 2. Review all content 3. Complete Assignment 1 4. Post for Discussion 1 5. Submit Quiz 1 (Chapter 1 and Chapter 2) 6. Form group for Group Research Project. You will be placed in a group and self-enrollment will not be possible after the due date.
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Module 2 - Network Components and Ethernet

Dates / Weeks	Tasks
Week 2	<p>Supports Course Learning Objective(s)</p> <ol style="list-style-type: none"> 1. Describe the basics of computer networking and the components that comprise them.

2. Describe and identify the concepts related to Telecommunication and Networks.

Module Learning Objective(s)

- Evaluate standard media types and associated properties.
- Identify standard connector types based on network media.
- Identify components of wiring distribution.
- Describe the purpose and features of various network appliances.
- Determine the purpose of routing and switching.
- Compare and contrast different LAN technologies.

Content

Hubs, Switches, Router, ARP, RARP, PAT, NAT

Layer 1, 2 and 3 appliances

Name Server, Common Ports, DNS and Reverse DNS

Reading(s):

- Chapter 3 - Identifying Network Components
- Chapter 4 - Understanding Ethernet

Presentation(s):

- Chapter 3 - Identifying Network Components
- Chapter 4 - Understanding Ethernet

Assignment(s)

- Assignment 2

Discussion(s)

- Discussion 2

Assessment(s)

- Quiz 2 (Chapter 3 and Chapter 4)

Tasks

1. Review all content
2. Complete Assignment 2
3. Post for Discussion 2
4. Submit Quiz 2 (Chapter 3 and Chapter 4)

Module 3 - Network Addressing and Subnetting

Dates / Weeks	Tasks
Week 3	<p>Supports Course Learning Objective(s)</p> <p>5. Synthesize network subnetting with IP Addresses schemes and their management.</p> <p>Module Learning Objective(s)</p> <ul style="list-style-type: none"> • Identify the purpose and properties of IP addressing • Apply network segmentation • Apply network subnetting • Determine a network addressing scheme <p>Content</p> <p>Reading(s):</p> <ul style="list-style-type: none"> • Chapter 5 - Working with IP Addresses <p>Presentation(s):</p> <ul style="list-style-type: none"> • Chapter 5 - Working with IP Addresses <p>Assignment(s)</p> <ul style="list-style-type: none"> • Assignment 3 • Group Research Project Proposal due <p>Discussion(s)</p> <ul style="list-style-type: none"> • Discussion 3 <p>Assessment(s)</p> <ul style="list-style-type: none"> • Quiz 3 (Chapter 5) <p>Tasks</p> <ol style="list-style-type: none"> 1. Review all content 2. Complete Assignment 3 3. Post for Discussion 3 4. Group Research Project Proposal 5. Submit Quiz 3 (Chapter 5)

Module 4 - Routing and WANs

Dates / Weeks	Tasks
<p data-bbox="175 1100 350 1134">09/13 - 09/19</p> <p data-bbox="175 1163 282 1197">Week 4</p>	<p data-bbox="412 281 951 315">Supports Course Learning Objective(s)</p> <p data-bbox="412 344 1354 407">4. Analyze the different networking topologies and technologies to use in different scenarios.</p> <p data-bbox="412 415 880 449">8. Apply routing protocols in LANs.</p> <p data-bbox="412 478 828 512">Module Learning Objective(s)</p> <ul data-bbox="412 550 1341 655" style="list-style-type: none"> • Describe the purpose and properties of routing and switching. • Determine the installation and configuration of routers and switches. • Evaluate WAN technology types and properties. <p data-bbox="412 693 529 726">Content</p> <p data-bbox="412 756 565 789">Reading(s):</p> <ul data-bbox="412 827 1049 898" style="list-style-type: none"> • Chapter 6 - Routing Traffic • Chapter 7 - Introducing Wide-Area Networks <p data-bbox="412 936 617 970">Presentation(s):</p> <ul data-bbox="412 1008 1049 1079" style="list-style-type: none"> • Chapter 6 - Routing Traffic • Chapter 7 - Introducing Wide-Area Networks <p data-bbox="412 1117 649 1150">Reading Material:</p> <p data-bbox="412 1180 483 1213">VPN</p> <p data-bbox="412 1243 1438 1276">https://thebestvpn.com/what-is-vpn-beginners-guide/ (Links to an external site.)</p> <p data-bbox="412 1306 509 1339">VLAN</p> <p data-bbox="412 1369 1399 1432">https://searchnetworking.techtarget.com/definition/virtual-LAN (Links to an external site.)</p> <p data-bbox="412 1461 841 1495">Management of VLAN and VPN</p> <p data-bbox="412 1524 1432 1587">https://kb.netgear.com/000048450/What-is-a-management-VLAN (Links to an external site.)</p> <p data-bbox="412 1596 1282 1659">https://searchnetworking.techtarget.com/tip/VPN-maintenance-and-management (Links to an external site.)</p> <p data-bbox="412 1696 610 1730">Assignment(s)</p> <ul data-bbox="412 1768 646 1801" style="list-style-type: none"> • Assignment 4 <p data-bbox="412 1839 594 1873">Discussion(s)</p> <ul data-bbox="412 1911 633 1944" style="list-style-type: none"> • Discussion 4 <p data-bbox="412 1982 607 2016">Assessment(s)</p>

	<ul style="list-style-type: none"> • Quiz 4 (Chapter 6 and Chapter 7) <p>Tasks</p> <ol style="list-style-type: none"> 1. Review all content 2. Complete Assignment 4 3. Post for Discussion 4 4. Submit Quiz 4 (Chapter 6 and Chapter 7)
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Module 5 - Wireless and Configurations

Dates / Weeks	Tasks
Week 5	<p>Supports Course Learning Objective(s)</p> <ol style="list-style-type: none"> 9. Describe the techniques to improve network performance. 10. Describe the basic concepts in deploying a wireless network and its vulnerabilities. <p>Module Learning Objective(s)</p> <ul style="list-style-type: none"> • Evaluate and contrast different wireless standards. • Analyze a wireless network given a scenario, implement appropriate wireless security measures. • Explain common threats, vulnerabilities, and mitigation techniques. • Analyze a network given a set of requirements, plan and implement a basic SOHO network. • Explain different methods and rationales for network performance optimization. <p>Content</p> <p>Reading(s):</p> <ul style="list-style-type: none"> • Chapter 8 - Connecting Wirelessly • Chapter 9 - Optimizing Network Performance <p>Presentation(s):</p> <ul style="list-style-type: none"> • Chapter 8 - Connecting Wirelessly • Chapter 9 - Optimizing Network Performance <p>Assignment(s)</p> <ul style="list-style-type: none"> • Assignment 5 <p>Discussion(s)</p>

	<ul style="list-style-type: none"> • Discussion 5 <p>Assessment(s)</p> <ul style="list-style-type: none"> • Quiz 5 (Chapter 8 and Chapter 9) <p>Tasks</p> <ol style="list-style-type: none"> 1. Review all content 2. Complete Assignment 5 3. Post for Discussion 5 Submit Quiz 5 (Chapter 8 and Chapter 9)
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Module 6 - Network Management and Utilities

Dates / Weeks	Tasks
Weeks 6~7	<p>Supports Course Learning Objective(s)</p> <p>7. Apply networking management and utilizes in configuration and deployment.</p> <p>Module Learning Objective(s)</p> <ul style="list-style-type: none"> • Use appropriate software tools to troubleshoot connectivity issues. • Use the appropriate network resource to analyze traffic. • Describe the purpose of configuration management documentation. <p>Content</p> <p>Reading(s):</p> <ul style="list-style-type: none"> • Chapter 10 - Using Command-Line Utilities • Chapter 11 - Managing a Network <p>Presentation(s):</p> <ul style="list-style-type: none"> • Chapter 10 - Using Command-Line Utilities • Chapter 11 - Managing a Network <p>Assignment(s)</p> <ul style="list-style-type: none"> • Assignment 6 <p>Discussion(s)</p> <ul style="list-style-type: none"> • Discussion 6 <p>Assessment(s)</p>

- Quiz 6 (Chapter 10 and Chapter 11)

Tasks

1. Review all content
2. Complete Assignment 6
3. Post for Discussion 6
4. Submit Quiz 6 (Chapter 10 and Chapter 11)
5. Post Group Research Project/Presentation
6. Submit Final Exam