Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407211
Course Title	**Digital Comm &Modulation Techniques**
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

Basic communication systems, Introduction to information theory, Digital radio, FSK,PSK, QAM, Digital transmission, Pulse Code Modulation, Error detection and correction, Digital encoding, Multiplexing, communication over AWGN, Modulation Demodulation, channel coding.

Course Objectives:

After studying this course the student should
1. Describe basic communication systems and information theory concept.
2. Distinguish between analogue and digital communications.
3. Understand digital radio systems and digital modulation techniques.
4. Understand Digital transmission concept and Pulse Code Modulation.
5. Explain the concepts of error detection and correction and digital encoding.
6. Describe the communication over AWGN channels.
7. Describe source and channel coding.
8. Explain network receiver synchronization.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Signal and systems**	▪ Digital communication signal Processing. ▪ Signal classification and Properties. ▪ Spectral Density ▪ Auto Correlation ▪ Probability and Random Signals. ▪ Signal Transmission through Linear systems. ▪ Gaussian Processes ▪ Bandwidth of Digital Data.	
2.	**Base-Band Transmission system**	▪ Base-Band systems. ▪ Messages Characters and symbols. ▪ Formatting analog information. ▪ Sources of Corruption. ▪ Pulse code Modulation. ▪ Base-Band Transmission ▪ Multi Level Base Band Transmission. ▪ Inter Symbol Interference**.**	

3.	**Communication over AWGN Channels**	▪ Digital communication systems.
		▪ Communication channels.
		  - Additive white Gaussian Noise Channel.
		  - Band Limited Channel.
		  - Fading Channel.
		▪ Data transmission and Reception.
		▪ Geometric Representation of Modulation signal.
		▪ Demodulation and Detection.
		▪ Detection of Binary signals in Gaussian Noise.	

		▪ Performance Analysis of Binary Orthogonal Signal. ▪ Adaptive Equalization
4.	**Modulation and Demodulation.**	▪ Digital Band pass Modulation Techniques (PSK, FSK, ASK, APK). ▪ Detection of signals in Gaussian Noise. ▪ Coherent detection of PSK and MPSK. ▪ No coherent Detection of PSK and FSK. ▪ Error performance for Binary system. ▪ M-array signaling and performance
5	**Channel Coding**	▪ Waveform coding. ▪ Channel capacity. ▪ Mutual Information. ▪ Typical sequences (Structured sequences). ▪ Shannon's Noisy channel coding Theorem. ▪ Convolutional codes. ▪ Convolutional Encoding. ▪ Coding and Interleaving
6	**Source Coding.**	▪ Sources. ▪ Amplitude Quantizing ▪ Differential Pulse code Modulation. ▪ Block coding ▪ Synthesis/Analysis coding. ▪ Redundancy-Reducing Coding.
7	**Multiplexing And Multiple access.**	▪ Allocation of the communication Resource. ▪ Multiple Access communication system.

		▪ Multiple Access Techniques with Intelsat. ▪ Multiple Access Techniques for LAN. ▪ Code division multiple access. ▪ SPADE Operation	

8	**Synchronization**	▪ Synchronization in context of Digital Communication.
		▪ Costs versus Benefits of synchronization levels.
		▪ Receiver synchronization
		   - schematic of basic phase locked loop
		   - schematic of the linearized PLL.
		   - Non linearized PLL
		▪ Basic suppressed carrier Loop.
		▪ Acquisition
		▪ Open Loop & closed Loop symbol synchronization.
		▪ Phase tracking Errors and Link performance.
		▪ Network synchronization.	

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

Teaching Methodology:

❖ Lecture

Text Books & References:

References:

1. " Digital communications, Fundamentals and applications, Bernard Sklar, Prentice Hall 2001, California USA

1. Digital Modulation Techniques/ Fuqin Xiong, Artch House Publistors/ Boston, London, 2000.

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	**20407212**
Course Title	**Digital comm.&mod Techniques Lab**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**3**

Brief Course Description:

Introduction to Digital Communications, Pulse Code Modulation, Delta Modulation, Digital encoding and decoding, Time Division Multiplexing, Phase Shift keying, Frequency Shift Keying, Pulse amplitude modulation, Clock generator and filters.

Course Objectives:

Upon the completion of the course, the student will be able to :
1. use Digital Communication Modulation Kit.
2. use FSK/ PSK generator and detection circuit.
4. use clock generator and filter circuit.
5. monitor the PAM and PPM
6. calculate modulation index and deviation of FM signal.
7. distinguish between types of modulations.
8. troubleshoot digital communication systems.

Detailed Course Description:

Lab Number	Lab Name	Lab Content	Time Needed
1.	Familiarization with digital communication kit.		
2.	Coder & Decoder		
3.	Noise in digital system		
4.	Data Signaling and clock generator		
5.	Filters circuits		
6.	Modulation and demodulation	▪ FSK mod/ demod ▪ PSK mod/demod ▪ ASK mod/demod	
7.	PAM demodulation using low pass filter		
8	Multplexer and demultiplexer		
9	Pulse code modulation and demodulation		
10	Delta modulation		

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Med – term Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects			
Discussions and lecture Presentations			

Teaching Methodology:
- ❖ Laboratory

Text Books & References:

1. Lab manual.

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	**20407121**
Course Title	**Networking transmission Media**
Credit Hours	**1**
Theoretical Hours	**1**
Practical Hours	**0**

Brief Course Description:
❖ Types and characteristics of transmission lines , transmission line theory and application, resonant and non- resonant transmission lines , optical fiber theory and application, wave guide theory , antenna theory, antenna terminology, electromagnetic waves .

Course Objectives:
After the competition of this course, the student can be able to:

- Describe the basic principles, characteristics and analysis of RF transmission lines
- Explain the operation of impedance matching and impedance transformation devices
- Describe the operation of power dividers, and transmission line Bridges
- Describe the basic concepts of light theorems.
- Describe the fiber optics modes and types.
- Describe fiber optical sources.
- Describe the fiber optics components.
- Describe the fiber optics applications.
- List the wave guide.
- Describe the antennas.
- Explain the propagation characteristics of radio waves

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	**Transmission Line Theory**	• Non-mathematical description of Transmission line behavior • The general equations • standing wave pattern • Impedance and admittance • Losses • Transmission Line components (stub, directional coupler, slotted line)	
2	**Transmission Line Applications**	• Quarter wave transformers • Stub impedance matching • Balance to unbalance transformations • Transmission Line Bridges	
3	**wave guide**	• Advantages and disadvantages of W/G • Shapes of W/G • W/G transmission (rectangular modes, and circular modes). • Phase and group velocities	
4	**Light theory**	• the nature of light. • Refraction and reflection . • Snell's law . • critical angle.	
5	**Fiber optic theory**	• -Fiber construction and characteristics • fiber optic communication system • numerical aperture. • pulse dispersion. • attenuation • step index single mode fiber • multimode fiber • graded index fiber. • W Type fibers. • Elliptical fiber.	

6	**optical source**	• types of optical sources. • operation principle in LED and Laser. • LED modulation bandwidth. • coupling of LEDs with fiber. • Lasers for Coherent communication.	
7	**fiber optical communication system**	• coupler, connectors, and splices. • modulation methods and modulators. • switches. • transmitters. • receivers. • Repeaters. • Optical amplifiers	
8	**antenna theory**	• Electromagnetic radiation • Hertzian dipole • Current and voltage distribution , and radiation pattern . • Resonant and non resonant antenna . • Effects of antenna height • Antenna gain and effective radiated power • Antenna Resistance • Bandwidth, beam width, and polarization • parabolic reflector antenna .	
9	**Electromagnetic waves**	• The electromagnetic spectrum . • Radiation of electromagnetic waves • Waves in free space • Effects of the environment • Reflection, Refraction, Diffraction, and interference. • Linear and nonlinear polarization • Attenuation and absorption • electromagnetic waves calculations • space wave	

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Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	--/--/----
	Second Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects		10%	
Discussions and lecture Presentations			

Teaching Methodology:
❖ Lecture

Text Books & References:
References:

1-Electronic communication system	KENNEDY	1996
2-Modern electronic communication	GARY	2001
3-Introduction to Radio propagation	JOHN	1996
4-Fiber optic communication	D C Agarwal	2001

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	**20407122**
Course Title	**Networking Transmission Media lab**
Credit Hours	**1**
Theoretical Hours	**0**
Practical Hours	**3**

Brief Course Description:

❖ Introduction to the transmission lines kit, primary and secondary factors measurement Behavior of T.L under various load, optical fiber measurements, line measuring set, polar diagram of radiation pattern for different antennas types by using soft wave program.

Course Objectives:

At the end of this course, the student can be able to:

1. Analyze the behavior of transmission line.
2. Use the T .L measuring instruments.
3. Distinguish between T .L and fiber optic types.
4. Measure different factors of fiber optic.
5. Distinguish between antennas types.
6. Draw the radiation patterns of antennas.
7. Calculate the approximate gain ,measure beam width of different antennas

❖ Detailed Course Description:

Experiment Number	Experiment Title	Time Needed
1	**Introduction to the transmission lines circuit board and cables**	
2	**Velocity of propagation**	
3	**Behavior of transmission line under various load**	
4	**Attenuation and distortion**	
5	**Reflection coefficient at the load and generator**	
6	**standing waves and standing wave ratio**	
7	**polar diagram plotting for rombic antenna**	
8	**plotting diagram for yogi and horn antennas**	
9.	**Measuring Dispersion ,and bandwidth of optical fiber.**	
10.	**Optical sources characteristics**	
11.	**Mono mode fiber characteristics**	
12.	**Polarization measurements single mode fiber.**	
13.	**Characterization on special fibers and fiber devices.**	

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Med- term Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects			
Discussions and lecture Presentations			

Teaching Methodology:

❖ laboratory

Text Books & References:

References:

1. manuals of test equipment and measuring equipment used in lab.
1. manuals of T L circuit board

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407131
Course Title	**Network Essentials**
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

❖ Personal Computer hardware, Operating systems, introduction to networking, Principles of communications, Ethernet, Internet service providers, Internet, Network cables and connectors, Network Devices, Network addressing, Network services, Layered model and protocols, Wireless LANs, Networking security.

Course Objectives:

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

1. Explain the importance of data networks and the internet in everyday activity.
2. Explain how communication works in data networks and the internet.
3. Recognize networking devices and services that are used to support communications across an internetwork.
4. Use OSI and TCP/IP models to explain the layers communications in various data networks.
5. Distinguish networking devices and their operation.
6. Design, calculate, and apply addressing and subnetting schemes to fulfill network requirements.
7. Explain fundamental Ethernet concepts such as media, services, and operation.
8. Employ basic cabling and network design to connect devices.
9. Identify networking threats and methods of attack.

❖ Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Personal Computer Hardware**	• Personal Computers and Applications • Types of Computers • Binary Representation of Data • Computer Components and Peripherals	
2.	**Operating Systems**	• Choosing the Operating System • Installing the Operating System • Maintaining the Operating System	
3.	**Networking Fundamentals**	• Introduction to Networking • Principals of Communication • Communicating on a Local Wired Network • Plan and Connect a Local Network • The Internet • Internet Service Providers (ISPs)	
4.	**Ethernet**	• Ethernet overview • Ethernet frame • Media Access Control • Physical Layer • CSMA/CD	
5.	**Networking Media and Devices**	• Types of networking media • Cables and connectors • Twisted-Pair Cables • Network devices	
6.	**Network Addressing**	• IP Addresses and Subnet Masks • Types of IP Addresses • How IP Addresses are Obtained • Address Management • Address Resolution Protocol (ARP) • Subnetting and introduction to VLSM	
7.	**Network Services**	• Client/ Server interaction • Client/Servers and Their Interaction • Layered Model and Protocols • OSI and TCP/IP Models	
8.	**Wireless Technologies**	• Wireless Technology • Wireless LANs • Security Considerations on a	

		Wireless LAN • Design Considerations	
9	**Basic Security**	• Networking Threats • Methods of Attack • Security Policy • Using Firewalls	

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	-- / -- / --
	Second Exam	20%	-- / -- / --
	Final Exam	50%	-- / -- / --
Homework and Projects		10%	
Discussions and Presentations			

Teaching Methodology:
- ❖ Lecture

Text Books &References:
- Mark Dye - Network Fundamentals, CCNA Exploration Companion Guide – Cisco press - 2007

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407132
Course Title	**Network Essentials lab**
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

❖ Personal Computer hardware (H.D, RAM, OS), Building Peer-to-Peer networks, Determine MAC, Using ARP, IP address and ipconfig., Sharing resources, Internet connectivity, Construct cables (Straight, crossover, rollover), Network services (DNS, FTP, Email), Configure wireless client/AP, WLAN Security, Netwok troubleshooting.

Course Objectives:

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

1. Determine the size of the hard disk drive, RAM, and OS of a personal computer.
2. Design and build a simple peer-to-peer network.
3. Determine the MAC address/IP address of a host on an Ethernet network.
4. Learn how to share files and folders and map network drives.
5. Build and test straight-through and crossover Unshielded Twisted Pair (UTP) Ethernet network cables
6. Use a punch down tool to terminate a UTP cable at a patch panel
7. Use a cable tester to check for the proper installation of unshielded twisted-pair (UTP) Category 5/5e according to TIA/EIA-568 cabling standards in an Ethernet network.
8. Observe the conversion of a URL to an IP address and DNS Lookup
9. Demonstrate how to use FTP from the command prompt and GUI.
10. Learn how to set up an email client to send and receive mail.
11. Configure the wireless access point (AP) portion of a multi-function device to allow access to a wireless client.
12. Configure the wireless access point (AP) portion of a multi-function device using security best practices.
13. Select the appropriate network utilities to help troubleshoot connectivity problems.
14. Diagnose accessibility problems with Web, FTP, Telnet, and DNS servers..

Detailed Course Description:

Lab	Lab Description	
1.	PC Hardware Essentials	
2.	Building a Peer-to-Peer Network	
3.	Sharing Resources	
4.	Tracing Internet Connectivity	
5.	Building Straight-Through and Crossover UTP Cables	
6.	Terminating UTP Cables	
7.	UTP Testing	
8.	Network Services	
9	Configuring a Wireless Access Point	
10.	Configuring Wireless Security	
11.	Troubleshooting Using Network Utilities- Part 1	
12.	Troubleshooting Using Network Utilities- Part 1	

Evaluation Strategies:

Exams			Percentage	Date
Exams		First Exam	20%	-- / -- / --
		Second Exam	20%	-- / -- / --
		Final Exam	50%	-- / -- / --
Homework and Projects			10%	
Discussions and Presentations				

Teaching Methodology:
 - Labs

Text Books &References:
 - lab manual

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407233
Course Title	**Routing and Switching**
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Brief Course Description:

❖ Introduction to Routing and Packet forwarding, Static Routing, Dynamic Routing Protocols, Distance Vector Routing Protocols, RIP v1 and RIP v2 Routing Protocols, VLSM and CIDR, EIGRP Routing protocol, Link-State Routing Protocols and OSPF, Switch concepts and configuration, VLANs, Spanning Tree Protocol.

Course Objectives:

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

1. Explain the main functions of the Router in the networks.
2. List the main components of the Router and their functions.
3. Analyze and read the routing table entries.
4. List the difference between Routing Protocols and select the most appropriate protocol for a given topology.
5. Configure the Router with different Routing Protocols.
6. Troubleshoot the connectivity between connected to the Router networks.
7. Troubleshoot the Router configuration.
8. Describe the switching functions and frame forwarding..
9. Configure the layer 2 switch.
10. Describe the importance of VLANs.
11. Configure VLANs.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to Routing and Packet Forwarding**	• Role of the Router in networks • Packet forwarding concept. • Router components and their functions. • Router Boot-up process. • Router interfaces. • Routers and the network layer. • Basic router configuration. • Building the routing table. • Path determination and switching functions	
2.	**Static Routing**	• Router configuration review. • Exploring directly connected networks. • Configure static routes with Next Hop addresses. • Configure Static routes with exit interface. • Summary static routes. • Default static routes. • Managing and troubleshooting static routes.	
3.	**Introduction to Dynamic Routing Protocols.**	• The evolution of Dynamic Routing Protocols. • Role of Dynamic Routing Protocols. • Network Discovery and routing table maintenance. • Advantages. • Classification of Dynamic Routing Protocols. • Routing metrics. • Administrative distances.	
4.	**Distance Vector Routing Protocols**	• The meaning of Distance Vector. • Operation of Distance Vector Routing Porotocols. • Routing Protocol Algorithm. • Routing Protocol Characteristics. • Network discovery. • Routing Table maintenance. • Routing Loops.	

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5.	**RIP v1 and RIP v2 Routing Protocols..**	- RIP operation. - Basic RIP v1 configuration. - Verification and troubleshooting. - Automatic summarization. - Default route and RIP v1. - RIP v1 limitations. - RIP v2 configuration and troubleshooting.	
6.	**VLSM and CIDR**	- Classful and Classless addressing. - VLSM - CIDR and Route Summarization.	
7.	**EIGRP Protocol**	- EIGRP packet types. - Hello Protocol. - EIGRP configuration - Metric calculation - Diffusing Update Algorithm.	
8.	**Link-State Routing Protocols and OSPF.**	- Link-state routing concepts and operation. - Advantages. - Introduction to OSPF protocols. - OSPF configuration. - OSPF Routing Metric. - OSPF and multi-access networks.	
9	**Switch concepts and configuration**	- Introduction to Ethernet 802.3 LANs. - Frame forwarding. - Switch configuration. - Configuring Switch security.	
10.	**VLANs**	- Concepts and overview. - Benefits. - Types of VLANs. - Port membership modes - VLAN Trunking. - Configuring VLANs and Trunks. - Troubleshooting VLANs. - Inter-VLAN routing.	
11	**Spanning Tree Protocol (STP)**	- Layer 2 Loops and broadcast storms. - STP algorithm. - STP convergence. - RSTP protocol.	

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Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	-- / -- / --
	Second Exam	20%	-- / -- / --
	Final Exam	50%	-- / -- / --
Homework and Projects		10%	
Discussions and Presentations			

Teaching Methodology:

❖ Lecture

Text Books &References:

1. Rick Graziani, Allan Johnson - Routing Protocols and Concepts, CCNA Exploration Companion Guide – Cisco press – 2007
2. Wayne Lewis - LAN Switching and Wireless, CCNA Exploration Companion Guide – Cisco press - 2008

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407233
Course Title	**Routing and Switching lab**
Credit Hours	3
Theoretical Hours	0
Practical Hours	9

Brief Course Description:

❖ Router configuration, Static Route Configuration, Routing Protocols and Subnetting, routing tables interpretation, RIP v1 and RIP v2Configuration, Basic VLSM calculation and addressing design, EIGRP configuration, OSPF configuration, Switch configuration, VLAN configuration, Inter-VLAN routing.

Course Objectives:

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

12. Interconnect network devices.
13. Connect to Routers through console cable.
14. Configure Routers.
15. Troubleshoot network connectivity problems.
16. Backup and restore Router and Switch configurations files and IOS
17. Configure layer 2 Switches.
18. Troubleshoot layer 2 Switch problems.
19. Calculate and apply different network addressing schemes.
20. Verify routing tables.
21. Isolate down links between networks.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Router Configuration**	• Cable Ethernet links of the networks • Connect Routers to Switch. • Connect PCs to Routers • Cable the serial links between Routers. • Establish a console connection to the router. • Basic Router Configuration	
2.	**Static Route Configuration**	• Perform basic router configuration • Interpret debug output. • Configure static route using next hop address. • Configure static route usning exit interface. • Configure a default static route. • Configure summary static route	
3.	**Routing Protocols and Subnetting**	• Design an IP addressing scheme. • Assign IP addresses to the network devices. • Test the network devices.	
4.	**Routing Table interpretation**	• Examine the router outputs. • Create a diagram of the network based on the Router outputs. • Configure the routing protocol for each Router.	
5.	**RIP v1 and RIP v2Configuration**	• Perform basic router configuration • Configure and activate interfaces • Configure RIP v1 with different scenarios. • Configure RIP v2. • Examine the automatic summarization routes. • Disable automatic summarization	
6.	**Basic VLSM calculation and addressing design**	• Design an IP addressing scheme. • Assign IP addresses to the network devices.	
7.	**EIGRP configuration**	• Perform basic router configuration. • Configure and activate interfaces. • Configure EIGRP • Verify EIGRP operation. • Examine EIGRP routes. • Configure EIGRP metrics. • Examine successors and feasible distances. • Configure manual summarization.	

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8.	**OSPF configuration**	- Perform basic router configuration. - Configure OSPF. - Configure OSPF router IDs. - Verify OSPF operation - Examine OSPF routes in the routing table. - Configure OSPF cost. - Configure OSPF on a multi-access network. - Use the OSPF priority to determine the DR and BDR.	
9.	**Switch configuration**	- Cable the switch - Create a basic switch configuration. - Managing MAC address table. - Configure port security. - Configure tftp server. - Save IOS to tftp server. - Restore IOS from a tftp server. - Backup and restore a configuration file fro a tftp server.	
10.	**VLAN configuration**	- Perform basic switch configuration - Configure VLANs on the switch - Configure VTP on the switches.. - Configure VTP pruning on the switches.	
11.	**Inter-VLAN routing**	- Perform basic switch configuration. - Configure VTP on the switches. - Configure VLANS. - Configure the router and remote server LAN	

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Med – term Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects			
Discussions and lecture Presentations			

Teaching Methodology:
❖ Laboratory

Text Books &References:
Lab manual.

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407235
Course Title	**Wireless LAN**
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Brief Course Description:

❖ Introduction to 802.11 Wireless LANs, Radio Frequency (RF) Fundamentals, Spread Spectrum Technology, Wireless LAN Infrastructure Devices, Wireless LAN Infrastructure Devices, Wireless LAN Organizations and Standards, 802.11 Network Architecture, Wireless LAN Security, Site Survey Fundamentals.

Course Objectives:

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

..1-Identify the technology roles for which wireless LAN technology is an appropriate application.

2-Define and apply the basic concepts of RF behavior and mathematics.

3-Identify some of the different uses for spread spectrum technologies

4-Comprehend the differences between, and apply the different types of spread spectrum technologies

5-Specify the modes of operation involved in the movement of data traffic across wireless LANs

6-Identify the purpose of the infrastructure devices/ clients and explain how to install, configure, and manage them

7-Identify the basic attributes, purpose, and function of the different types of antennas

8-Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antenna

9-Identify, apply, and comprehend the differences between wireless LAN standards

10-Identify and apply the processes involved in authentication and association

11-Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques

12-Describe types of wireless LAN security attacks, and explain how to identify and prevent them.

13-Understand the importance of and processes involved in conducting an RF site survey

14-Identify the necessary equipment and procedures involved in performing a site survey

Detailed Course Description

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to Wireless LANs**	• History of Wireless Comm. • The Wireless LAN Market • Applications of Wireless LANs	
2.	**Radio Frequency (RF) Fundamentals**	• RF Behaviors (Gain, Loss, Reflection, Refraction …). • Voltage Standing Wave Ratio (VSWR) • Principles of Antennas • Radio Frequency Mathematics	
3.	**Spread Spectrum Technology**	• Introducing Spread Spectrum • Frequency Hopping Spread Spectrum (FHSS) • Direct Sequence Spread Spectrum (DSSS) • Comparing FHSS and DSSS	
4.	**Wireless LAN Infrastructure Devices**	• Access Points • Wireless Bridges • Wireless Workgroup Bridges • Wireless LAN Client Devices • Wireless Gateways	
5.	**Antennas and Accessories**	• RF Antennas • Power over Ethernet (PoE) Devices • Wireless LAN Accessories (Amplifiers, Attenuators, Lightning Arrestors …)	
6.	**Wireless LAN Organizations and Standards**	• Federal Communications Commission (FCC) • Industrial Scientific Medical (ISM) Bands • Institute of Electrical and Electronics Engineers • 802.11a,b,g Standards	
7.	**802.11 Network Architecture**	• Locating a Wireless LAN • Authentication & Association • Service Sets • Power Management Features	

8.	**MAC and Physical Layers**	• How Wireless LANs Communicate • Interframe Spacing • Request to Send/Clear to Send (RTS/CTS) • Modulation	
9	**Wireless LAN Security**	• Wired Equivalent Privacy (WEP Keys) • Attacks on Wireless LANs • Emerging Security Solutions • Corporate Security Policy • Security Recommendations	
10.	**Site Survey Fundamentals**	• Preparing for a Site Survey • Site Survey Equipment • Conducting a Site Survey • Site Survey Reporting	

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Med – term Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects			
Discussions and lecture Presentations			

Teaching Methodology:
❖ Lectures

Text Books &References:
1. Cisco Systems, Inc - Fundamentals of Wireless LANs Companion Guide – Cisco press - 2004

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	20407236
Course Title	**Wireless LAN lab**
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Brief Course Description:

❖ Hardware, firmware and configuration of wireless clients, Build an Ad Hoc WLAN, Ad Hoc throughput analysis, Configuring , managing and power distribution of access points and bridges, Build infrastructure wireless network, Infrastructure throughput analysis, Cell sizing and ARS, Basic 802.11 wireless security, Co-channel and adjacent channel interference, Wireless bridging and repeaters APs, Site survey.

Course Objectives:

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

10. Investigate why one wireless client type does not suit all applications.
11. Distinguish appropriate use of PCMCIA, MiniPCI, PCI adapters in wireless connectivity.
12. Configure wireless client for 802.11 compliant Ad hoc networks.
13. Test successful connectivity between peer devices within IBSS.
14. Utilize tools to verify available system bandwidth.
15. Configure wireless access point and repeater
16. Distinguish the difference between single-port and multi-port PoE devices.
17. Configure an infrastructure wireless network for open system authentication and appropriate channel selection.
18. Calculate available throughput in infrastructure wireless networks.
19. Determine the appropriate Ethernet port settings on an access point.
20. Monitoring signal strength and connection speed in an access point.
21. Configure output power on the clients and access points.
22. Determine cell size based on output power levels.
23. Implement MAC filters across the ESS.
24. Implement shared WEP Key on an access point
25. Implement WEP-enabled profiles.
26. Assign the proper channels to DSSS system in co-located DSSS environment for best throughput and less interference.
27. Configure root and non-root bridges to extends the network
28. Configure wireless bridges for using TKMP.
29. Conduct a site survey.

Detailed Course Description

Lab	Lab Description	
1.	**Wireless Client Devices**	
2.	**Ad Hoc Network Configuration**	
3.	**Ad Hoc Throughput Analysis**	
4.	**Access point, Bridges and Accessories**	
5.	**Infrastructure Network Configuration**	
6.	**Infrastructure Throughput Analysis**	
7.	**Cell Sizing and ARS/DRS**	
8.	**Basic 802.11 Wireless Security – Part 1**	
9	**Basic 802.11 Wireless Security – Part 2**	
10.	**Co-channel and Adjacent Channel Interference**	
11.	**Wireless Bridging and Repeaters APs**	
12.	**Site Survey**	

Evaluation Strategies:

Exams		Percentage	Date
Exams	First Exam	20%	-- / -- / --
	Second Exam	20%	-- / -- / --
	Final Exam	50%	-- / -- / --
Homework and Projects		10%	
Discussions and Presentations			

Teaching Methodology:
❖ Labs

Text Books &References:

Electronic Engineering

Specialty	**Communications and Computer Networks**
Course Number	**20407242**
Course Title	**Network Operating Systems**
Credit Hours	**2**
Theoretical Hours	**0**
Practical Hours	**6**

Brief Course Description:

Introduction Linux Operating System, working with Linux File System, Users and Groups, access permissions, Linux File system, Bash Shell, standard input/output and pipes, Networking, string processing, manage processes, vi editor, Linux Red Hat installation, file system management, system initialization, user and group administration, network configuration, system administration tools, RPM and boot loader, X window system, sharing directories, system rescue and troubleshooting.

Course Objectives:

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

- Navigate through Red Hat and Unix like operating systems.
- Install Red Hat and Unix like operating systems.
- Mange Red Hat and Unix Like file systems.
- Add and remove users and groups in Red Hat and Unix like OS.
- Assign users to groups in Red Hat and Unix like OS.
- Backup and restore files and directories in Red Hat and Unix like OS.
- Troubleshoot problems and rescue the system
- Configure Red Hat, Unix like OS servers and workstations on networks.
- Create and populate organizational units with user and computers accounts.
- Manage user and computer accounts.
- Create, and manage groups and resources.
- Implement and manage group policy for user and computer environment.
- Configure and monitor server resources and system performance.
- Manage hard disk drives and data storage for disaster recovery.
- Configure, manage and monitor DHCP service.
- Configure manage and monitor name resolution using DNS service.
- Configure routing by using Routing and Remote Access service.
- Configure manage and monitor network access.
- Maintain windows 2003 security.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to Linux Operating System**	• Recommended hardware. • Local logins. • Types of users. • Commands syntaxes. • Basic commands. • Getting help: man pages. • Changing passwords. • Virtual consoles.	3h
2.	**Working with Files and Directories**	• Standard Red Hat directory structure. • Current Working Directory • Absolute And Relative Path Names • The Home Directory • Changing Directories • Listing Directory Contents • File Names • Copying Files and Directories • Moving and Renaming Files and Directories • Removing and Creating Files and Directories • View Files • File Globbing	6h
3.	**Users and Groups**	• Normal Users: • Groups • Root User • System Users • User Information Commands	1:30
4.	**File Access Permissions**	• Linux File Security • Examining Permissions • File Permission Types • Examining User permissions • Examine Group Permissions • Examine Other Permissions • Changing Permissions • Default File Permissions	1:30h

5.	**The Red Hat File System**	• File Concepts (Inodes, Data Blocks) • Directories. • Hard Links • Soft Links • Mounting File System • Mounting Removable media • Locating Files • File Compression • File Archiving	**4h**
6.	**Working With Bash Shell**	• Bash concepts • Shell Variables • Shell Customization • Aliases • Login Shells • /etc/profile file • Bashrc file	**2h**
7.	**standard Input/ Output and Pipes**	• Standard Input and Output • Redirecting Output • Appending Output • Redirecting errors • Redirecting Input • Connect Processes	**3**
8.	**String Processing**	• Pattern Matching • Wildcard characters • Finding text with ***grep*** command • sorting records • remove duplicate lines • ***paste*** command	**3**
9	**Basic Networking**	• testing connectivity with ***ping*** command • troubleshoot each hop across the path with ***traceroute*** • testing the DNS service with ***host*** command • display open ports and routing tables with ***netstat*** • get interfaces information with ***ifconfig*** command • secure shell ***ssh***.	**3**

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي **2008/2009**

10.	**Manage Processes**	- What is a Process - Process States - Viewing Processes - Terminate Processes - Running the Process the Foreground/ Background - Suspending a process - Resuming Suspending Processes	3
11	**Using vi Editor**	- Starting *vi* - Insert Mode - Leaving Insert Mode - Delete and Paste. - Searching for Text - Saving and Exit - Exit without Saving	3
12	**Linux Red Hat Installation**	- Installation Methods - Installer Boot Options - Create Bootable CD - Installation Over network	3
13	**File System Management**	- Disk Partitioning - Create a File System - Mounting The File System - Mounting using *fstab* - Unmounting File Systems - Create File System Label - Mount Remote File Systems - Managing Data With *autofs*	3
14	**system Initialization**	- Boot sequence - Boot Loader - init initialization - Run levels - Controlling Services - System Reboot and Shutdown	3
15	**User and Group Administration**	- Adding New User Account - Modifying and Deleting Accounts - Password management - Group Administration - File Ownership - SUID/ SGID and sticky bit - Linux Quota	4

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي 2008/2009

16	**Network Configuration**	• Network Interfaces • ifconfig . • Activate and Shutdown Interfaces • Interfaces Configuration Files • Multiple NICs • Configure Multiple ip Addresses • IP Forwarding • Configure Global Parameters • Configure Name Resolution • Network Diagnostics	4
17	**System Administration Tools**	• Task Automation (*at* Utility) • *crontab* Utility • *crontab* Format • System Logging Files • System Monitoring and Process Control • Backup To Tape • Using *dump/restore* ommands	3
18	**RPM and Boot Loader**	• Installing and Removing Software • Updating the Kernel • RPM Queries • Dependency Resolution • GRUB Boot Loader and **grub.conf** File	3
19	**The X Window System**	• **X** Window Concept • **XFree86** Configuration File • Installing **X** Window • Installing **GNOME** Display Manager • Using The Desktop Manager	1
20	**Sharing Files**	• Install samba RPM packages. • Configure smb.conf file • Add users to samba share • create group sharing • assign permissions to shared directories • configure *exports* file.	2
21	**System Rescue and Troubleshooting**	• Identify problems • Rescue Environment • Troubleshooting Practice	3
22	**Administering Accounts and Resources.**	▪ Introduction to Windows 2003 server. ▪ Installing administrative tools.	2

❖ تطبق هذه الخطة الدراسية اعتباراً من بداية العام الجامعي **2008/2009**

		▪ Creating Organizational Unit (OU) ▪ Creating user and computer account. ▪ Modifying accounts Creating Groups ▪ Strategies for using and managing groups. ▪ Modifying accounts ▪ Creating Groups. ▪ Strategies for using and managing groups. ▪ Access to resources and shared folders. Delegating control of OU	
23	**Manage Group and Audit Policy.**	▪ Group Policy and restriction of GP. ▪ Configuring and restriction of GP. ▪ Configuring folder redirection. ▪ Manage user rights. ▪ Configuring Auditing and test Security Policy. • Security setting and security logs	4
24	**Mange Data Storage and Monitor server Performance**	♦ Introduction to Server Administration and configuring remote Desktop. ♦ Monitoring server performance. ♦ Configuring & managing counter logs and Alerts. ♦ File Compression and Disk Quotas. Scheduling Data and Failure Recovery	8
25	**Manage & Monitoring dynamic Host Configuration Protocol &Domain Name Service**	♦ IP Addressing and DHCP network-Infrastructure. ♦ Configuring and Managing DHCP ♦ Configuring Hostname and NetBIOS. ♦ Installing DNS Server and Client. ♦ Configuring Active Directory. ♦ Configuring DNS.\ ♦ Managing and Monitoring DNS Server. • Managing and Configure a WINS Server	10
26	**Configure Routing and Securing Network Traffic**	♦ The role of Routing in Network Infrastructure. ♦ Enabling and configuring the Routing and Remote Access Service. ♦ Understanding Securing Network	10

| 27 | **Configure Routing and Securing Network Traffic** | Traffic.
 • Implementing and monitoring IPSec.
 ♦ Network Access Infrastructure.
 ♦ Configuring VPN Access.
 ♦ Configuring Dial-Up Access.
 ♦ Configuring Wireless Access.
 ♦ Controlling User Access to a Network.
 ♦ Authentication by using IAS.
 ♦ Protecting Remote Access by using Access Quarantine.
 ♦ Managing and Monitoring Network Access service
 ♦ Collecting and Monitoring Network Access Data.
 ♦ Managing and Monitoring Remote Access. | |

Evaluation Strategies:

Exams		Percentage	Date
Exams	Assignments	30%	--/--/----
	Med – term Exam	20%	--/--/----
	Final Exam	50%	--/--/----
Homework and Projects			
Discussions and lecture Presentations			

Teaching Methodology:
❖ laboratory

Text Books & References:
- Lab manual
- Microsoft Official Course 2277B Windows 2003 Environment.
- Microsoft Official Course 2277C Network Infrastructure**.**