

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402123
Course Title	Digital Communications & Modulation Techniques
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short 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:

By the end of this course students are expected to be able to:

1. Engage in conversation and understand main ideas in complex content
2. Describe basic communication systems and information theory concept.
3. Distinguish between analogue and digital communication.
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.

No.	Unit Title	Unit Content
1	Basic concepts of digital communications (Introduction to signals and systems, introduction to limitations of communication systems)	<ul style="list-style-type: none"> • Signal definition and properties. • Classification of signals (Periodic and non-periodic, analog, discrete and digital signals). (Definitions) • Time domain and frequency domain, frequency spectrum, data rate, band width, random signals. (Definitions) • System definition. • Advantages and disadvantages of digital communications. • Classification of digital modulation techniques. • Noise, distortion, attenuation, interference, Shannon channel capacity. (Definitions)
2	Analog to Digital conversion, Pulse Code Modulation and Delta Modulation	<ul style="list-style-type: none"> • Sampling theorem, an idea about PAM and PTM (PWM, PPM), Nyquist theory, and aliasing distortion. • Pulse Code Modulation (PCM). • Quantization (linear and nonlinear), and quantization noise. • Linear and Logarithmic Signal compression, A-Law compression • Source Coding. • Differential PCM (DPCM). • Delta Modulation (DM), Linear DM, adaptive DM.
3	Line Coding Schemes and Transmission Codes	<ul style="list-style-type: none"> • Serial Transmission, Parallel Transmission, Asynchronous Transmission, Synchronous Transmission, Line code types. (Definitions) • Non-Return to Zero (NRZ) coding (properties and Frequency Spectrum).

No.	Unit Title	Unit Content
		<ul style="list-style-type: none"> • Return to Zero (RZ) coding (properties and Frequency Spectrum). • Bipolar RZ (AMI) code (properties and Frequency Spectrum). • High density bipolar of degree-3 (HDB-3) code. • Manchester code (properties and Frequency Spectrum). • Coded Mark Inversion (CMI) code (properties and Frequency Spectrum). • Channel Coding (ARQ, FEC (block codes and tree codes)) with coding rate K/N.(Definitions)
4	Digital Multiplexing based on Time Division Multiplexing (TDM)	<ul style="list-style-type: none"> • Definitions of FDM, TDM, CDM, WDM and SDM. • Time Division Multiplexing (TDM). • Principles of multiplexing, time slots and their contents. • First degree multiplexing, (E1), frame construction • Second degree multiplexing (E2), frame construction • Third degree multiplexing (E3), frame construction • Fourth degree multiplexing (E4), frame construction
5	Base band Transmission and Processing	<ul style="list-style-type: none"> • Introduction to Baseband Transmission and ISI. • Methods to control ISI. <ul style="list-style-type: none"> ▪ Nyquist first method (Zero ISI). ▪ Nyquist Second and Third method. • Baseband Systems, Formatting Textual Data (Character Coding), Messages, Characters, and Symbols, Formatting Analog Information, Sources of Corruption.

No.	Unit Title	Unit Content
6	Digital Modulators and demodulators (Bandpass Modulation)	<ul style="list-style-type: none">• Principles of digital modulation• Shift Keying Modulations (ASK, FSK, PSK, MSK).• Coherent detection of ASK, FSK, PSK.• Noncoherent detection of ASK, FSK.• Phase Shift Keying (2PSK, 4-PSK and 8-PSK)• Quadrature Amplitude Modulation QAM.• DPSK, GMSK. (Definitions)

References:

1. Bernard Sklar, Digital Communication Fundamentals and Applications, 2nd edition, Prentice- Hall, 2001.
2. Ziemer, Rodger, Introduction to Digital Communication, Prentice- Hall, 2001.
3. Lean W. Couch, Digital Communication Systems, sixth edition, Macmillan, 2001.

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402124
Course Title	Digital comm.&mod Techniques Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short Description:

This 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:

By the end of this course students are expected to be able to:

1. use Digital Communication Modulation Kit.
2. use FSK/ PSK generator and detection circuit.
3. use clock generator and filter circuit.
4. monitor the PAM and PPM
5. calculate modulation index and deviation of FM signal.
6. distinguish between types of modulations.
7. troubleshoot digital communication systems.

Detailed Description:

No.	Experiment Title	Experiment Content	Hours
1	Familiarization with digital communication kit.		3
2	Coder & Decoder		3
3	Noise in digital system		3
4	Data Signaling and clock generator		3
5	Filters circuits		3
6	Modulation and demodulation	<ul style="list-style-type: none"> • FSK mod/ demod • PSK mod/demod • ASK mod/demod 	3
7	PAM demodulation using low pass filter	•	3
8	Multiplexer and demultiplexer	•	3
9	Pulse code modulation and demodulation	•	3
10	Delta modulation		3

Teaching Methods:

Laboratory

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Books and references:

Lab manual.

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402131
Course Title	Transmission Media and Antennas
Credit Hours	3
Theoretical Hours	3
Practical Hours	0

Short Description:

This 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:

By the end of this course students are expected to be able to:

1. Describe the basic principles, characteristics and analysis of RF transmission lines
2. Explain the operation of impedance matching and impedance transformation devices
3. Describe the operation of power dividers, and transmission line Bridges
4. Describe the basic concepts of light theorems.
5. Describe the fiber optics modes and types.
6. Describe fiber optical sources.
7. Describe the fiber optics components.
8. Describe the fiber optics applications.
9. List the wave guide.
10. Describe the antennas.
11. Explain the propagation characteristics of radio waves
12. Study and analyze the electromagnetic wave propagation.
13. Identify different types of antennas.
14. Analyze and measure Antennas coefficients and constants.
15. Become familiar with the radiation patterns.
16. Calculate the parameters of the transmission lines.

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Transmission Line Theory	<ul style="list-style-type: none"> • Non-mathematical description of Transmission line behavior • The general equations • standing wave pattern • Impedance and admittance • Losses • Transmission Line components (stub, directional coupler, slotted) 	6
2	Transmission Line Applications	<ul style="list-style-type: none"> • Quarter wave transformers • Stub impedance matching • Balance to unbalance transformations • Transmission Line Bridges 	6
3	wave guide	<ul style="list-style-type: none"> • Advantages and disadvantages of W/G • Shapes of W/G • W/G transmission (rectangular modes, and circular modes). • Phase and group velocities 	6
4	Light theory	<ul style="list-style-type: none"> • the nature of light. • Refraction and reflection . • Snell's law . • critical angle. 	3
5	Fiber optic theory	<ul style="list-style-type: none"> • 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. 	9

No.	Unit Title	Unit Content	Hours
6	optical source	<ul style="list-style-type: none"> • types of optical sources. • operation principle in LED and Laser. • LED modulation bandwidth. • coupling of LEDs with fiber. • Lasers for Coherent communication. • 	9
7	fiber optical communication system	<ul style="list-style-type: none"> • coupler, connectors, and splices. • modulation methods and modulators. • switches. • transmitters. • receivers. • Repeaters. • Optical amplifiers 	9
8	antenna theory	<ul style="list-style-type: none"> • 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
9	Electromagnetic waves	<ul style="list-style-type: none"> • 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 	9

Teaching Methods:

Lectures.

Books and references:

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

Course Book:

**Digital communications, Fundamentals and applications, Bernard Sklar,
Prentice Hall 2001, California USA**

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402132
Course Title	Transmission Media and Antennas Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short 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 software program.

Course Objectives:

By the end of this course students are expected to be able to:

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

Detailed Description:

No.	Experiment Title	Experiment Content	Hours
1	Introduction to the transmission lines circuit board and cables		
2	Electromagnetic Field For Propagated Waves		
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 and matching		
7	Antenna Paramters		
8	polar diagram plotting for rombic antenna		
9	plotting diagram for yogi and horn antennas		
10	Measuring Dispersion ,and bandwidth of optical fiber.		
11	Optical sources characteristics		
12	Mono mode fiber characteristics		
13	Polarization measurements single mode fiber.		

Teaching Methods:

Laboratory

Books and references:

1. manuals of test equipment and measuring equipment used in lab.
2. manuals of T L circuit board
3. John D. Kraus, antennas for all Applications, 3rd edition, 2001.

Course Book:

Lab Manual

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402141
Course Title	Network Essentials
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Short Description:

This 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:

By the end of this course students are expected to 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 Description:

No.	Unit Title	Unit Content	Hours
1	Personal Computer Hardware	<ul style="list-style-type: none"> Personal Computers and Applications Types of Computers Binary Representation of Data Computer Components and Peripherals 	6
2	Operating Systems	<ul style="list-style-type: none"> Choosing the Operating System Installing the Operating System Maintaining the Operating System 	6
3	Networking Fundamentals	<ul style="list-style-type: none"> Introduction to Networking Principals of Communication Communicating on a Local Wired Network Plan and Connect a Local Network The Internet Internet Service Providers (ISPs) 	9
4	Ethernet	<ul style="list-style-type: none"> Ethernet overview Ethernet frame Media Access Control Physical Layer CSMA/CD 	6
5	Networking Media and Devices	<ul style="list-style-type: none"> Types of networking media Cables and connectors Twisted-Pair Cables Network devices 	9
6	Network Addressing	<ul style="list-style-type: none"> 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 	9

No.	Unit Title	Unit Content	Hours
7	Network Services	<ul style="list-style-type: none"> • Client/ Server interaction • Client/Servers and Their Interaction • Layered Model and Protocols • OSI and TCP/IP Models 	6
8	Wireless Technologies	<ul style="list-style-type: none"> • Wireless Technology • Wireless LANs • Security Considerations on a Wireless LAN • Design Considerations 	6
9	Basic Security	<ul style="list-style-type: none"> • Networking Threats • Methods of Attack • Security Policy • Using Firewalls 	9

Teaching Methods:

Lectures.

Books and references:

2. Mark Dye - Network Fundamentals, CCNA Exploration Companion Guide – Cisco press – 2007

Course Book:

Mark Dye - Network Fundamentals, CCNA Exploration Companion Guide – Cisco press – 2007

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402142
Course Title	Network Essentials lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short 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, Network troubleshooting.

Course Objectives:

By the end of this course students are expected to 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)
8. Category 5/5e according to TIA/EIA-568 cabling standards in an Ethernet network.
9. Observe the conversion of a URL to an IP address and DNS Lookup
10. Demonstrate how to use FTP from the command prompt and GUI.
11. Learn how to set up an email client to send and receive mail.
12. Configure the wireless access point (AP) portion of a multi-function device to allow access to a wireless client.
13. Configure the wireless access point (AP) portion of a multi-function device using security best practices.
14. Select the appropriate network utilities to help troubleshoot connectivity problems.
15. Diagnose accessibility problems with Web, FTP, Telnet, and DNS servers.

Detailed Description:

No.	Experiment Title	Experiment Content	Hours
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- Part1		
12	Troubleshooting Using Network Utilities- Part 2		

Teaching Methods:

Laboratory

Books and references:

Lab Manual

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402251
Course Title	Routing and Switching
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Short Description:

This 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:

By the end of this course students are expected to 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 Description:

No.	Unit Title	Unit Content	Hours
1	Introduction to Routing and Packet Forwarding	<ul style="list-style-type: none"> • 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 	6
2	Static Routing	<ul style="list-style-type: none"> • 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. 	6
3	Introduction to Dynamic Routing Protocols.	<ul style="list-style-type: none"> • 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. 	6

No.	Unit Title	Unit Content	Hours
4	Distance Vector Routing Protocols	<ul style="list-style-type: none"> • The meaning of Distance Vector. • Operation of Distance Vector Routing Protocols. • Routing Protocol Algorithm. • Routing Protocol Characteristics. • Network discovery. • Routing Table maintenance. • Routing Loops 	6
5	RIP v1 and RIP v2 Routing Protocols.	<ul style="list-style-type: none"> • 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
6	VLSM and CIDR	<ul style="list-style-type: none"> • Classful and Classless addressing. • VLSM • CIDR and Route Summarization. 	6
7	EIGRP Protocol	<ul style="list-style-type: none"> • EIGRP packet types. • Hello Protocol. • EIGRP configuration • Metric calculation • Diffusing Update Algorithm. 	6
8	Link-State Routing Protocols and OSPF.	<ul style="list-style-type: none"> • Link-state routing concepts and operation. • Advantages. • Introduction to OSPF protocols. • OSPF configuration. • OSPF Routing Metric. • OSPF and multi-access networks. 	6
9	Link-State Routing Protocols and OSPF.	<ul style="list-style-type: none"> • Introduction to Ethernet 802.3 LANs. • Frame forwarding. 	6

No.	Unit Title	Unit Content	Hours
		<ul style="list-style-type: none"> • Switch configuration. • Configuring Switch security. 	
10	VLANs	<ul style="list-style-type: none"> • Concepts and overview. • Benefits. • Types of VLANs. • Port membership modes • VLAN Trunking. • Configuring VLANs and Trunks. • Troubleshooting VLANs. • Inter-VLAN routing. 	6
11	Spanning Tree Protocol (STP)	<ul style="list-style-type: none"> • Layer 2 Loops and broadcast storms. • STP algorithm. • STP convergence. • RSTP protocol. 	6

Teaching Methods:

Lectures.

Books and 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

Course Book:

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

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402223
Course Title	Special communication Systems
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Short Description:

Telephone systems, Digital subscriber lines, Satellite communication systems, Link budget analysis, Television, noise sources, Fiber Optical Communication system, Microwave communication development and links. Frequency modulation microwave technique, parameters affect to microwaves systems. System protection and equipment. wave guide components, Microwave Diodes, introduction to radar.

Course Objectives:

By the end of this course students are expected to be able to:

1. Analyze the microwave links.
2. Investigate microwave technique and microwave security.
3. Identify the elements of microwave transmission systems.
4. Study the telephones systems.
5. Become familiar with satellite communication systems.
6. study the television systems
7. Distinguish fiber cables.
8. Analyze optical communication systems.
9. Become familiar with the basic concepts of radar.

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Wire and Wireless Communication Systems	<ul style="list-style-type: none"> Meet people for the first time and introduce yourself The Explosive growth of telecommunications. Telephone systems[historical basis,modern telephone systems and remote terminals] Digital subscriber lines (DSL) Capacities of public switched telephone networks Satellite communication systems[digital and analog television transmission, data and telephone signal multiple access,personal. communication via satellite] Link budget analysis[signal power received, thermal noise sources, characterization of noise sources] Television[black-and- white television ,MTS stereo sound, color television, digital TV(DTV)] 	9
2	Fiber Optical Communication System	<ul style="list-style-type: none"> Introduction Advantages of Fiber Optics Block Diagram of Fiber Optical System Types of Fiber Optic, Transmission Properties Optical Fiber Components Light Propagation in Optical Fiber Optical Fiber Calculation Type of Modulation used in Optical Fiber Optical Sources and Detectors Losses in Optical Fiber 	9
3	Microwave Principles and	<ul style="list-style-type: none"> Microwave Systems, Properties and Development 	

No.	Unit Title	Unit Content	Hours
	Spectrum	<ul style="list-style-type: none"> • Microwave Spectrum, Microwave modulation Techniques • Microwave Propagation Properties, Factors affected on antennas altitude 	
4	Microwave Technique and Microwave Communication security	<ul style="list-style-type: none"> • FM Microwave Technique • Factors affected on Microwave systems, types of noise, Microwave troubleshooting and maintenance • Digital Microwave technique • Analog and Digital Microwave communication security □ 	9
5	Microwave Transmission Systems Elements	<ul style="list-style-type: none"> • Crystal, Mechanical and Active Filters • Active and Passive Equalizers, Amplitude and Delay Equalizers • Attenuators and Pads • Pre-emphasis and De-emphasis Circuits 	9
6	Radar	<ul style="list-style-type: none"> • Rader, Principles and Block Diagram • Basic Equation of radar, factors affected on the range of the radar • Doppler system • Primary and secondary radar • Pulse radar, continues radar (Properties and Block diagram 	9

Teaching Methods:

Lectures.

Books and references:

1. LEON W. COUCH,II, digital and analog communication systems, sixth edition 2004.

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2. The Satellite Communication Applications Handbook - Second Edition, Artech House, 2004
 3. G. Miller, Modern Electronic Communication, Prentice-Hall, 1999.
 4. M. I.Skolnik, Introduction To Radar System, 3rd Edition, McGraw-Hill,2001.
 5. Mike Golio, The RF And Microwave, CRC Press, 2000.
 6. R. ALLEN SHOTWELL, An Introduction to Fiber Optics, Prentice-Hall, 1997.

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402243
Course Title	Network Operating Systems
Credit Hours	2
Theoretical Hours	0
Practical Hours	6

Short 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:

By the end of this course students are expected to be able to:

1. Navigate through Red Hat and Unix like operating systems.
2. Install Red Hat and Unix like operating systems.
3. Manage Red Hat and Unix Like file systems.
4. Add and remove users and groups in Red Hat and Unix like OS.
5. Assign users to groups in Red Hat and Unix like OS.
6. Backup and restore files and directories in Red Hat and Unix like OS.
7. Troubleshoot problems and rescue the system
8. Configure Red Hat, Unix like OS servers and workstations on networks.
9. Create and populate organizational units with user and computers accounts.
10. Manage user and computer accounts.
11. Create, and manage groups and resources.
12. Implement and manage group policy for user and computer environment.
13. Configure and monitor server resources and system performance.

14. Manage hard disk drives and data storage for disaster recovery.
15. Configure, manage and monitor DHCP service.
16. Configure manage and monitor name resolution using DNS service.
17. Configure routing by using Routing and Remote Access service.
18. Configure manage and monitor network access.
19. Maintain windows 2003 security

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Introduction to Linux Operating System	<ul style="list-style-type: none"> Meet people for the first time and introduce yourself Recommended hardware. Local logins. Types of users. Commands syntaxes. Basic commands. Getting help: man pages. Changing passwords. Virtual consoles. 	3
2	Working with Files and Directories	<ul style="list-style-type: none"> 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 	
3	Users and Groups	<ul style="list-style-type: none"> Normal Users: Groups Root User System Users User Information Commands 	
4	File Access Permissions	<ul style="list-style-type: none"> Linux File Security Examining Permissions File Permission Types Examining User permissions Examine Group Permissions 	

No.	Unit Title	Unit Content	Hours
		<ul style="list-style-type: none"> • Examine Other Permissions • Changing Permissions • Default File Permissions 	
5	The Red Hat File System	<ul style="list-style-type: none"> • File Concepts (Inodes, Data Blocks) • Directories. • Hard Links • Soft Links • Mounting File System • Mounting Removable media • Locating Files • File Compression • File Archiving 	
6	Working With Bash Shell	<ul style="list-style-type: none"> • Bash concepts • Shell Variables • Shell Customization • Aliases • Login Shells • /etc/profile file • Bashrc file 	
7	standard Input/ Output and Pipes	<ul style="list-style-type: none"> • Standard Input and Output • Redirecting Output • Appending Output • Redirecting errors • Redirecting Input • Connect Processes 	
8	String Processing	<ul style="list-style-type: none"> • Pattern Matching • Wildcard characters • Finding text with grep command • sorting records • remove duplicate lines • paste command 	
9	Basic Networking	<ul style="list-style-type: none"> • testing connectivity with ping command • troubleshoot each hop across the path with traceroute • testing the DNS service with host command 	

No.	Unit Title	Unit Content	Hours
		<ul style="list-style-type: none"> display open ports and routing tables with netstat get interfaces information with ifconfig command secure shell ssh. 	
10	Manage Processes	<ul style="list-style-type: none"> What is a Process Process States Viewing Processes Terminate Processes Running the Process the Foreground/ Background Suspending a process Resuming Suspending Processes 	
11	Using vi Editor	<ul style="list-style-type: none"> Starting vi Insert Mode Leaving Insert Mode Delete and Paste. Searching for Text Saving and Exit Exit without Saving 	
12	Linux Red Hat Installation	<ul style="list-style-type: none"> Installation Methods Installer Boot Options Create Bootable CD Installation Over network 	
13	File System Management	<ul style="list-style-type: none"> 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 	
14	system Initialization	<ul style="list-style-type: none"> Boot sequence Boot Loader 	

No.	Unit Title	Unit Content	Hours
		<ul style="list-style-type: none"> • init initialization • Run levels • Controlling Services • System Reboot and Shutdown 	
15	User and Group Administration	<ul style="list-style-type: none"> • Adding New User Account • Modifying and Deleting Accounts • Password management • Group Administration • File Ownership • SUID/ SGID and sticky bit • Linux Quota 	
16	Network Configuration	<ul style="list-style-type: none"> • 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 	
17	System Administration Tools	<ul style="list-style-type: none"> • Task Automation (at Utility) • crontab Utility • crontab Format • System Logging Files • System Monitoring and Process Control • Backup To Tape • Using dump/restore ommands 	
18	RPM and Boot Loader	<ul style="list-style-type: none"> • Installing and Removing Software • Updating the Kernel • RPM Queries • Dependency Resolution • GRUB Boot Loader and grub.conf 	

No.	Unit Title	Unit Content	Hours
		File	
19	The X Window System	<ul style="list-style-type: none"> • X Window Concept • XFree86 Configuration File • Installing X Window • Installing GNOME Display Manager • Using The Desktop Manager 	
20	Sharing Files	<ul style="list-style-type: none"> • Install samba RPM packages. • Configure smb.conf file • Add users to samba share • create group sharing • assign permissions to shared directories • configure exports file. 	
21	System Rescue and Troubleshooting	<ul style="list-style-type: none"> • Identify problems • Rescue Environment • Troubleshooting Practice 	
22	Administering Accounts and Resources.	<ul style="list-style-type: none"> • Introduction to Windows 2003 server. • Installing administrative tools. □ • 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 • Creating Organizational Unit (OU) • Creating user and computer account. • Modifying accounts Creating Groups • Strategies for using and managing groups. • Modifying accounts 	

No.	Unit Title	Unit Content	Hours
		<ul style="list-style-type: none"> • Creating Groups. • Strategies for using and managing groups. • Access to resources and shared folders. Delegating control of OU 	
23	Manage Group and Audit Policy.	<ul style="list-style-type: none"> • 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 	
24	Mange Data Storage and Monitor server Performance	<ul style="list-style-type: none"> • 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 	
25	Manage & Monitoring dynamic Host Configuration Protocol & Domain Name Service	<ul style="list-style-type: none"> • 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 	
26	Configure Routing and Securing Network Traffic	<ul style="list-style-type: none"> • The role of Routing in Network Infrastructure. • Enabling and configuring the Routing and Remote Access Service. 	

No.	Unit Title	Unit Content	Hours
		<ul style="list-style-type: none"> • Understanding Securing Network Traffic. • Implementing and monitoring IPSec. 	
27	Configure Routing and Securing Network Traffic	<ul style="list-style-type: none"> • 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. 	

Teaching Methods:

Laboratory.

Books and references:

3. Lab manual
4. Microsoft Official Course 2277B Windows 2003 Environment.
5. Microsoft Official Course 2277C Network Infrastructure.

Course Book:

Richard Petersen, (2008), **The Complete Reference, Sixth Edition 6th Edition, McGraw-Hill.**

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402221
Course Title	Wireless Communication
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Short Description:

This Introduction to Wireless LANs and Wireless Communication Systems, Satellite Communication, Mobile Communications (GSM, AMPS, UMTS), Radio Frequency (RF) Fundamentals, Spread Spectrum Technology, Wireless LAN Infrastructure Devices, Wireless LAN Organizations and Standards, 802.11, Network Architecture, Wireless LAN Security, Site Survey Fundamentals.

Course Objectives:

By the end of this course students are expected to 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. Investigate the wireless communication systems.
4. Become familiar with satellite communication systems.
5. Study and analyze the public mobile networks.
6. Identify some of the different uses for spread spectrum technologies
7. Comprehend the differences between, and apply the different types of spread spectrum technologies
8. Specify the modes of operation involved in the movement of data traffic across wireless LANs
9. Identify the purpose of the infrastructure devices/ clients and explain how to install, configure, and manage them
10. Identify the basic attributes, purpose, and function of the different types of antennas
11. Explain the concepts of polarization, gain, beamwidth, and free-space path loss as they apply to implementing solutions that require antenna
12. Identify, apply, and comprehend the differences between wireless LAN standards

- 13.** Identify and apply the processes involved in authentication and association
- 14.** Identify the strengths, weaknesses and appropriate uses of wireless LAN security techniques
- 15.** Describe types of wireless LAN security attacks, and explain how to identify and prevent them.
- 16.** Understand the importance of and processes involved in conducting an RF site survey
- 17.** Identify the necessary equipment and procedures involved in performing a site survey

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Wireless Communication Systems	<ul style="list-style-type: none"> • Introduction • HF Wireless Communication Systems, Transmitters and receivers • VHF Wireless Communication Systems, Transmitters and receivers • UHF Wireless Communication Systems, Transmitters and receivers 	5
2	Satellite Communication Systems	<ul style="list-style-type: none"> • Introduction to Satellite Communication Systems • Satellite Orbits and Types • Satellite Networks, FM Technique • Access Technique in Satellite 	5
3	Introduction to Wireless LANs	<ul style="list-style-type: none"> • History of Wireless Comm. • The Wireless LAN Market • Applications of Wireless LANs 	3
4	Radio Frequency (RF) Fundamentals	<ul style="list-style-type: none"> • RF Behaviors (Gain, Loss, Reflection, Refraction ...). • Voltage Standing Wave Ratio (VSWR) • Principles of Antennas • Radio Frequency Mathematics • 	6
5	Spread Spectrum Technology	<ul style="list-style-type: none"> • Introducing Spread Spectrum • Frequency Hopping Spread Spectrum (FHSS) • Direct Sequence Spread Spectrum (DSSS) • Comparing FHSS and DSSS • 	6
6	Antennas and Accessories	<ul style="list-style-type: none"> • RF Antennas • Power over Ethernet (PoE) Devices • Wireless LAN Accessories (Amplifiers, Attenuators, Lightning 	6

No.	Unit Title	Unit Content	Hours
		Arrestors ...)	
7	Wireless LAN Organizations and Standards	<ul style="list-style-type: none"> • Federal Communications Commission (FCC) • Industrial Scientific Medical (ISM) Bands • Institute of Electrical and Electronics Engineers • 802.11a,b,g Standards • 	6
8	802.11 Network Architecture	<ul style="list-style-type: none"> • Locating a Wireless LAN • Authentication & Association • Service Sets • Power Management Features • 	6
9	MAC and Physical Layers	<ul style="list-style-type: none"> • How Wireless LANs Communicate • Interframe Spacing • Request to Send/Clear to Send (RTS/CTS) • Modulation 	6
10	Wireless LAN Security	<ul style="list-style-type: none"> • Wired Equivalent Privacy (WEP Keys) • Attacks on Wireless LANs • Emerging Security Solutions • Corporate Security Policy • Security Recommendations • 	6
11	Site Survey Fundamentals	<ul style="list-style-type: none"> • Preparing for a Site Survey • Site Survey Equipment • Conducting a Site Survey • Site Survey Reporting • 	3
12	Mobile Communications	<ul style="list-style-type: none"> • Analog Mobile Communication System (First Generation) • Digital Mobile Communication 	6

No.	Unit Title	Unit Content	Hours
		<p>Systems- Second Generation (GSM, PCS, DAMPS, PDC), Techniques and Properties</p> <ul style="list-style-type: none">• GSM Structure, Principles, Geographical Areas• Multiple Access in GSM• Modulation in GSM• Digital Mobile Communication Systems- Third Generation, (IMT200,UMTS), Technique and Properties	

Teaching Methods:

Lectures

Books and references:

1. Jochen Schiller, Mobile Communication, Addison Wesley , Second Edition,2004.
2. Cisco Systems, Inc - Fundamentals of Wireless LANs Companion Guide –Cisco press – 2004
3. Andrea Goldsmith, Wireless Communications, Cambridge University Press 2005

Course Book:

David Tse, (2005), Fundamentals of wireless communication, Cambridge University Press.

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402222
Course Title	Wireless Communication Lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short Description:

This 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:

By the end of this course students are expected to be able to:

1. Investigate why one wireless client type does not suit all applications.
2. Distinguish appropriate use of PCMCIA, MiniPCI, PCI adapters in wireless connectivity.
3. Configure wireless client for 802.11 compliant Ad hoc networks.
4. Test successful connectivity between peer devices within IBSS.
5. Utilize tools to verify available system bandwidth.
6. Configure wireless access point and repeater
7. Distinguish the difference between single-port and multi-port PoE devices.
8. Configure an infrastructure wireless network for open system authentication and appropriate channel selection.
9. Calculate available throughput in infrastructure wireless networks.
10. Determine the appropriate Ethernet port settings on an access point.
11. Monitoring signal strength and connection speed in an access point.
12. Configure output power on the clients and access points.
13. Determine cell size based on output power levels.
14. Implement MAC filters across the ESS.

15. Implement shared WEP Key on an access point
16. Implement WEP-enabled profiles.
17. Assign the proper channels to DSSS system in co-located DSSS environment for best throughput and less interference.
18. Configure root and non-root bridges to extends the network
19. Configure wireless bridges for using TKMP.
20. Conduct a site survey

Detailed Description:

No.	Experiment Title	Experiment Content	Hours
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		

Teaching Methods:

Laboratory.

Books and references:

1. David Tse, (2005), Fundamentals of wireless communication, Cambridge University Press.

Course Book:

Lab manual

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402241
Course Title	Information & Network Security
Credit Hours	2
Theoretical Hours	2
Practical Hours	0

Short Description:

This course provides mechanisms for protecting the exchange of information on networks, including: encryption, the basics of cryptography, encryption using private and public keys, firewall usage, use of hash and certificate of authority, security practices, email security, malware, intrusion systems. Define security threats, vulnerabilities and protection methods

Course Objectives:

By the end of this course students are expected to be able to:

1. be able to understand what are the common threats faced today
2. what are the foundational theory behind information security
3. what are the basic principles and techniques when designing a secure system
4. how to think adversarially
5. how today's attacks and defenses work in practice
6. how to assess threats for their significance
7. and how to gauge the protections and limitations provided by today's technology

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	overview of information security	<ul style="list-style-type: none"> Confidentiality Integrity availability 	3
2	Threats	<ul style="list-style-type: none"> Software vulnerability and memory exploits Malicious and unwanted software Network attacks, protocol vulnerabilities, Denial-of-service 	6
3	Cryptography	<ul style="list-style-type: none"> Block and stream ciphers Cryptographic hash functions, Message Authentication Codes (MAC) Public and private key systems Message digests. Approximate strength of ciphers Authentication Password system 	6
4	Systems	<ul style="list-style-type: none"> Secure design principles (Least-privilege, fail-safe defaults, complete mediation, separation of privilege) TCB and security kernel construction System defense against memory exploits UNIX security and Security-Enhanced Linux (SELinux) Windows security 	5
5	Network Security	<ul style="list-style-type: none"> TCP/IP security issues DNS security issues and defenses TLS/SSL Network Intrusion detection and prevention systems Firewalls 	5

No.	Unit Title	Unit Content	Hours
6	Software Security	<ul style="list-style-type: none"> • Vulnerability auditing, penetration testing • Sandboxing • Control flow integrity 	4
7	Web Security	<ul style="list-style-type: none"> • User authentication, authentication-via-secret and session management • Cross Site Scripting, Cross Site Request Forgery, SQL Injection 	4
8	Legal and Ethical Issues	<ul style="list-style-type: none"> • Cybercrime and computer crime • Intellectual property, copyright, patent, trade secret • Hacking and intrusion • Privacy, identity theft 	5

Teaching Methods:

Lectures.

Books and references:

1. Computer Security: Art and Science (2nd version), Matt Bishop, Addison-Wesley 2002
2. Cryptography and Network Security Principles and Practices, Fourth Edition , By William Stallings, Publisher: Prentice Hall Pub Date: November 16, 2005 .

Course Book:

1. BarrallComputer Security: Art and Science (2nd version), Matt Bishop, Addison-Wesley 2002
2. Cryptography and Network Security Principles and Practices, Fourth Edition , By William Stallings, Publisher: Prentice Hall Pub Date: November 16, 2005 .

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402242
Course Title	Information & Network Security lab
Credit Hours	1
Theoretical Hours	0
Practical Hours	3

Short Description:

This course aims at using the laboratory to conduct experiments using the available technology. Topics covered include: intercepting, implementing and executing attacks against the following protocols: ARP, IP, ICMP, TCP, UDP, exploiting DNS vulnerabilities for address spoofing attacks, exploiting common site scripting vulnerabilities and buffer overflow, Students will prepare network servers, various interconnects, firewalls and intrusion detection devices to detect the impact of each device on the overall security of the system

Course Objectives:

By the end of this course students are expected to be able to:

1. Carry out a detailed analysis of enterprise security by performing various types of analysis such as vulnerability analysis, penetration testing, audit trail analysis, system and network monitoring, and configuration management.
2. Carry out detailed risk analysis and assessment of enterprise systems using various practical and theoretical tools.
3. Design detailed enterprise wide security plans and policies, and deploy appropriate safeguards (models, mechanisms and tools) at all the levels by providing due consideration to the life-cycle of the enterprise information systems and networks, as well as its legal and social environment

Detailed Description:

No.	Experiment Title	Experiment Content	Hours
1		<ul style="list-style-type: none"> implementing and executing attacks against the following protocols: ARP, IP, ICMP, TCP, UDP 	
2		<ul style="list-style-type: none"> implementing and executing attacks against the following protocols: ARP, IP, ICMP, TCP, UDP 	
3		<ul style="list-style-type: none"> implementing and executing attacks against the following protocols: ARP, IP, ICMP, TCP, UDP 	
4		<ul style="list-style-type: none"> exploiting DNS vulnerabilities for address spoofing attacks 	
5		<ul style="list-style-type: none"> exploiting common site scripting vulnerabilities and buffer overflow 	
6		<ul style="list-style-type: none"> will prepare network servers 	
7		<ul style="list-style-type: none"> Installing firewalls 	
8		<ul style="list-style-type: none"> intrusion detection devices to detect the impact of each device on the overall security of the system 	

Teaching Methods:

Laboratory.

Books and references:

1. Computer Security: Art and Science (2nd version), Matt Bishop, Addison-Wesley 2002
2. Cryptography and Network Security Principles and Practices, Fourth Edition , By William Stallings, Publisher: Prentice Hall Pub Date: November 16, 2005 .

Course Book:

Lab manual.

Engineering Program

Specialization	Communications and Computer Networks
Course Number	020402251
Course Title	Microprocessors
Credit Hours	2
Theoretical Hours	1
Practical Hours	3

Short Description:

Introduction to Microprocessors, types of microprocessors 4, 8,16, 32, 64 Bit microprocessors, microprocessor architecture , 8085 microprocessor architecture, registers and their applications in microprocessors. Memory types and methods of interfacing them with 8085.serial and parallel interfacing using support chips (8255 MUART).the DMA

In the Lab, students will learn how to use 8085 microprocessor instructions and learn how to write programs contain, move instructions, add and subtraction instructions, rotate ,jump and exchange instructions in addition to logic operations in simple and advanced level programs.

Course Objectives:

By the end of this course students are expected to be able to:

1. The objective of the course is to expose to the students to the architecture and instruction set of typical 8-bit microprocessor.
2. It also deals with Assembly Language Programming using a macro-assembler.
3. Input-output techniques and important programmable support chips used in microprocessor-based systems are discussed in detail.

Detailed Description:

No.	Unit Title	Unit Content	Hours
1	Introduction to Microcomputer System	<ul style="list-style-type: none"> • CPU, • I/O devices, • clock, • memory, • bussed architecture, • tristate logic, • address bus, • data bus and control bus. 	3
2	Semiconductor Memories	<ul style="list-style-type: none"> • Development of semiconductor memory, • internal structure and decoding, • memory read and write timing diagrams, • MROM, ROM, EPROM, EEPROM, DRAM, 	3
3	Architecture of 8-bit Microprocessor	<ul style="list-style-type: none"> • Intel 8085A microprocessor, • Pin description • internal architecture. 	3
4	Operation and Control of Microprocessor	<ul style="list-style-type: none"> • Timing and control unit, • op-code fetch machine cycle, • memory read/write machine cycles, • I/O read/write machine cycles, • interrupt acknowledge machine cycle, 	4
5	Instruction Set	<ul style="list-style-type: none"> • Addressing modes; • Data transfer, • arithmetic, • logical, branch, stack and machine control groups of instruction set, • macro RTL and micro RTL flow chart of few typical instructions; • specified flags and instructions. 	4
6	Assembly Language Programming	<ul style="list-style-type: none"> • Assembler directives, • simple examples; • Subroutines, 	6

No.	Unit Title	Unit Content	Hours
7	Interfacing	<ul style="list-style-type: none"> parameter passing to subroutines. Interfacing of memory chips, address allocation technique and decoding; Interfacing of I/O devices, Input/Output techniques: device initiated interrupt I/O transfer. Give reasons and explanations Use Target Language such as “I think ... Because...” 	6
8	Interrupts	<ul style="list-style-type: none"> Interrupt structure of 8085A microprocessor, processing of vectored and nonvectored interrupts, Handling multiple interrupts 	5

Teaching Methods:

Lecture and lab experiments.

Books and references:

1. Gaonkar R.S., “Microprocessor Architecture, Programming and Applications”, 5th Ed., Penram International, 2007.
2. Stewart J, “Microprocessor Systems- Hardware, Software and Programming”, Prentice Hall International Edition, 1990
3. Short K. L., “Microprocessors and Programmed Logic”, 2nd Ed., Pearson Education, 2008.

Course Book:

Hall D.V., “Microprocessor and Interfacing-Programming and Hardware”, 2nd Ed., Tata McGraw-Hill Publishing Company Limited, 2008.