Electronics Engineering

Specialization	Communications Technology
Course Number	20410211
Course Title	Antennas and Wave Propagation And Transmission Lines
Credit Hours	(2)
Theoretical Hours	(2)
Practical Hours	(0)

Brief Course Description:

❖ Electromagnetic waves characteristics, ground sky waves propagation, the effect of the Ionosphere layers, space and microwaves propagation, antennas fundamentals, polar diagram of antennas, types of antennas, Transmission Line.

Course Objectives:

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

1. Become familiar with electromagnetic waves properties.
2. Study and analyze the electromagnetic wave propagation.
3. Identify different types of antennas.
4. Analyze and measure Antennas coefficients and constants.
5. Become familiar with the radiation patterns.
6. Calculate the parameters of the transmission lines.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Spectrum and Electromagnetic waves Properties**	▪ Spectrum Concept ▪ Electromagnetic waves Properties, direction, Phase ▪ Field intensity and Power, Relationship between the Power and Distance and Logarithmic Signal compression, A-Low compression ▪ Free Space Loss ▪ Free Space Impedance	
2.	**Electromagnetic Waves Propagation**	▪ Phenomena affect on electromagnetic wave propagation (Reflection, Refraction, Diffraction, interference) ▪ Propagation of ground, sky and space waves ▪ Properties of low frequencies propagation ▪ Properties of high frequencies propagation ▪ Sky wave propagation, ionosphere layers and their properties ▪ Critical frequency, Maximum Usable Frequency, Skip Distance ▪ Space wave propagation, used frequency ▪ Troposphere Scatter, Scatter Volume ▪ Properties of troposphere scatter communication ▪ Microwaves propagation, relationship between	

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		frequency and absorption, relationship between frequency and refraction
3.	**Transmission Lines**	- Types of Transmission Lines - The equivalent circuit of transmission line - Primary and secondary coefficients of transmission lines - Losses in Transmission lines - Reflection, Standing Wave Ratio (SWR), return loss, matching, loading
4.	**Antennas and Electromagnetic Radiation**	- Basic elements for wireless communication - Equivalent circuit for antenna - Electromagnetic wave components, electrical field E, magnetic field H - Induced field, radiation field
5.	**Antennas Coefficients and constants**	- Polarization - Antennas tuning - Antennas impedance (ohmic and radiation) - Antennas effeminacy - Reciprocity - Beam width - Band width - Antennas Gain - Directivity
6.	**Antennas Types and Radiation Pattern**	- Radiation Pattern - Polar Plot - Rectangular Plot - Isotropic Antenna (construction, properties, radiation pattern, frequency, feeding) - Ferrite Antenna (construction, properties, radiation pattern,

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		frequency, feeding)	
		▪ Rhombic Antenna (construction, properties, radiation pattern, frequency, feeding)	
		▪ Yagi Antenna (construction, properties, radiation pattern, frequency, feeding)	
		▪ Slot Antenna (construction, properties, radiation pattern, frequency, feeding)	
		▪ Parabolic Antenna (construction, properties, radiation pattern, frequency, feeding)	

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:
❖ Lectures

Text Books & References:

Text Books:
1. John D. Kraus, Antennas For All Applications, 3rd Edition, 2001.

References:
1. John D. Kraus, Antennas, 3rd Edition, McGraw Hill, 2001.
2. Leo Setian, Practical Communication Antennas with Wireless applications, Prentice Hall, 1997.

Electronics Engineering

Specialization	Communications Technology
Course Number	20410212
Course Title	Antennas and Wave Propagation And Transmission Lines lab
Credit Hours	(1)
Theoretical Hours	(0)
Practical Hours	(3)

Brief Course Description:

❖ Electromagnetic waves characteristics, ground sky waves Propagation, the effect of the Ionosphere layers, space and microwaves propagation, Antennas fundamentals, polar diagram of antennas, types of antennas.

Course Objectives:

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

1. Analyze and measure Antennas coefficients and constants.
2. Investigate the radiation patterns for Antennas.
3. Distinguish between directors and reflectors.
4. Measure the antennas gain.
5. Become familiar with the standing wave ratio and matching.
6. Measure the parameters of the transmission lines

Detailed Course Description:

Lab Number	Lab Name	Lab Content	Time Needed
1.	Electromagnetic Field For Propagated Waves		
2.	Attenuation		
3.	Directors and Reflectors		
4.	Radiation Pattern For Antennas		
5.	Antennas Properties and Transmission Lines		
6.	Standing wave ratio and Matching		
7.	Antennas Gain		
8.	Directivity		
9.	Beam Width		
10.	Radiation Pattern for Yagi Antenna		

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. John D. Kraus, antennas for all Applications, 3rd edition, 2001.
2. Laboratory manuals.

Electronics Engineering

Specialization	Communications Technology
Course Number	20410251
Course Title	Special communication Systems
Credit Hours	(2)
Theoretical Hours	(2)
Practical Hours	(0)

Brief Course 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.

Digital microwave systems techniques, wave guide components, Microwave Diodes, introduction to radar.

Course Objectives:

Upon the completion of the course, the student will 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 Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Wire and Wireless Communication Systems**	▪ 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)]	
2.	**Fiber Optical Communication System**	▪ 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 ▪ Osses in Optical Fiber	
3.	**Microwave Principles and Spectrum**	▪ Microwave Systems, Properties and Development ▪ Microwave Spectrum, Microwave	

		- modulation Techniques - Microwave Propagation Properties, Factors affected on antennas altitude	
4.	**Microwave Technique and Microwave communication security**	- FM Microwave Technique - Factors affected on Microwave systems, types of noise, Microwave troubleshooting and maintenance - Digital Microwave technique - Analog and Digital Microwave communication security	
5.	**Microwave Transmission Systems Elements**	- Crystal, Mechanical and Active Filters - Active and Passive Equalizers, Amplitude and Delay Equalizers - Attenuators and Pads - Pre-emphasis and De-emphasis Circuits	
6.	**Radar**	- 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	

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
- ❖ Power point

Text Books & References:
References:.
1.LEON W. COUCH,II, digital and analog communication systems, sixth edition 2004.
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.

Electronics Engineering

Specialization	**Communications Technology**
Course Number	**20410231**
Course Title	**Mobile communications**
Credit Hours	**(2)**
Theoretical Hours	**(2)**
Practical Hours	**(0)**

Brief Course Description:

**Introduction to wireless Communication Systems, Modern wireless Communication Systems, the cellular concept systems design fundamentals, mobile radio propagation large- scale path loss, Mobile Radio propagation small –scale fading and multi-path, Modulation techniques for mobile radio ,Multiple Access Techniques for wireless communications.

Course Objectives:

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

1. Investigate the wireless communication systems.
2. Study and analyze the public mobile networks.
3. Identify digital mobile communication systems.
4. To know the mobile radio propagation large- scale path loss and multi-path
5. study Modulation techniques for mobile radio and multiple access.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to wireless Communication Systems**	▪ Evolution of Mobile Wireless Communication Systems, ▪ Mobile radiotelephony in U.S ▪ Mobile radio systems around the world. ▪ Examples of wireless Communication Systems. ▪ Trend in cellular radio and Personal communications.	
2.	**Modern wireless Communication Systems**	▪ Second generation (2G) cellular network. ▪ Third generation(3G) wireless network ▪ Wireless local loop (WLL)and LMDS ▪ Wireless local area networks(WLANS) ▪ Bluetooth and personal area networks(PANS)	
3.	**The cellular concept system design sfundamantal**	▪ Introduction ▪ Frequency reuse ▪ Channel assignment strategies ▪ Handoff strategies ▪ Interference andsystem capacity ▪ Trunking and grade of	

		service	
		▪ Improving converge & capacity incellular systems	
4.	**Mobile Radio propagation large – scale path loss**	▪ Introduction to radio wave propagation Free space propagation model. ▪ The three basic propagation mechanisms ▪ Reflection ▪ Diffraction ▪ Scattering ▪ Outdoor propagation modals. ▪ indoor propagation modals.	
5.	**Mobile Radio propagation small – scale fading and multi-path**	▪ small-scale multipath propagation ▪ small-scale multipath measurements	
6.	**Modulation techniques for mobile radio**	▪ Frequency modulation vs. amplitude modulation ▪ Amplitude modulation ▪ Angle modulation	
7.	**Multiple Access Techniques for wireless communications**	Introduction ▪ Frequency division multiple access(FDMA). ▪ Time division multiple access(TDMA). ▪ Spread spectrum multiple access ▪ Space division multiple access(SDMA). ▪	

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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:
❖ Lectures

Text Books & References:

Text Books:
1. Theodore S Rappaport, wireless communications Principles and practice, Second Edition,2002.

References:
1. Jochen Schiller, Mobile Communication, Addison Wesly , Second Edition, 2004.

Electronics Engineering

Specialization	**Communications Technology**
Course Number	**20410232**
Course Title	**Mobile communications Lab**
Credit Hours	**(1)**
Theoretical Hours	**(0)**
Practical Hours	**(3)**

Brief Course Description:

Lab in support of the Mobile communication course, GSM, mobile networks , mobile phone assembly, mobile phone electronic circuit, hardware maintenance, mobile diagram & software maintenance(general boxes)..

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Course Objectives:

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

1. Use all mobile phone maintenance test equipments and tools.
2. Know how to differentiate between mobile phones by type and generations.
3. Assemble and disassemble all types of mobile phones.
4. Analyze mobile phones circuits and block diagrams.
5. Assemble and disassemble electronic parts of mobile phones boards.
6. Use mobile phones schematic diagrams.
7. Install and use different types of software and boxes.
8. Troubleshoot different types of mobile malfunctions.

Detailed Course Description:

Lab Number	Lab Name	Lab Content	Time Needed
1.	**Mobile phones workshop test equipments and tools**	▪ Heat gun, power supply, soldering station, preheater, magnifier, smoke absorber, ultrasonic machine, board holder, AVO meter, screwdrivers & pliers	One week
2.	**Strip connection wires and make networks**	▪ Use soldering station to strip fine wires. ▪ Make networks on the mobile phones boards.	Two weeks
3.	**Assemble and disassemble different types of mobile phones**	▪ Know all types of mobile phones. ▪ Use tools to assemble and disassemble phones	One week
4.	**Assemble and disassemble secondary parts and accessories of mobile phones**	▪ Phone covers ▪ Battery ▪ Display ▪ Mainboard ▪ Mic ▪ Speakers ▪ Vibrators ▪ Charging connector ▪ System connector	Two weeks
5.	**Remove and install component using soldering iron**	▪ Power push bottons ▪ SIM card connection ▪ Memory card connections	Two weeks

6.	**Remove and install component using heatgun**	▪ Remove and install IC's, active and passive components	Two weeks
7.	**Schematic diagrams And malfunction troubleshooting**	▪ Know block diagrams for different generations ▪ Use printed diagrams ▪ Use computer to read diagrams	Two weeks
8.	**Software maintenance**	▪ Install main programs for different kinds of mobile phones ▪ Download flashes ▪ Select the right file ▪ Connect phones to computers ▪ Make software	Two weeks

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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:
صيانة الأجهزة النقالة والتطبيق العملي، إعداد م. أحمد شاهين 1.

Electronics Engineering

Specialization	**Communications Technology**
Course Number	**20410221**
Course Title	**Computer Networks Technology**
Credit Hours	**(3)**
Theoretical Hours	**(2)**
Practical Hours	**(3)**

Brief Course Description:

❖ Basics of data communication, analog and digital signals and its conversion computer network and it importance LAN and WAN networks, LAN topologies, and their features network devices, network protocols ,network software , internet basics, OSI and TCP/IP models, routing fundamentals and subnets, windows server 2000, DNS server, DHCP server, WEB server

Course Objectives:

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

1.Define the hardware components of communication systems

2.List data communication protocols

3.Explain the layers of OSI and TCP/IP models and the communication devices at each layer and how to configure and test TCP/IP

4.List types of distributed systems

5.Distinguish between client –server and peer –to-peer networks

6.Utilize principle of systems analysis and design to plan a small network

7.Install and manage Windows Server 2000, DNS server, DHCP server and Web server

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	**Introduction to data communication**	▪ Definition ▪ PC basics ▪ OSI model ,layers and functions ▪ Communication media (Coaxial ,twisted pair, fiber optic ,etc) ▪ Communication devices (NIC,HUBS ,Routers, Multiplexers, etc) ▪ UTP implementation (Straight, Cross-over and roll-over ▪ Media access control (either net ,CSMA/CD, token ring) ▪ Transmission (packet switching ,parity checks etc)	Week 1
2.	**Communication protocols and standards**	▪ Overview ▪ Examples and uses (IPX/SPX,TCP/IP, APPLE TALK,NETBIOS) ▪ Multiple layer networks	Week 2
3.	**Local area networks**	▪ Nodes ▪ Types of networks	Week 3

		(Bus, Ring etc). • Planning the Ethernet (thin and thick LAN) • Layers used in LAN • Internet and firewalls	
4.	**Wide Area Networks**	• Connecting LANs, point –to- point, multipoint • Bridges, routers, gateways • Domains	Week 4
5.	**Wide Area Networks**	• Connecting LANs, point –to- point, multipoint • Bridges, routers, gateways • Domains	Week 4
6.	**Routing Fundamentals and Subnets**	• IP Address and IP address grouping • IP classes • Data encapsulation • IP packet format • Path determination • Routing Tables • Subnetting • Calculating the subnet ID	Week 5
7.	**Distributed Networks**	• Distributed systems , centralized , hierarchical • client –server (intranet) Peer –to- peer	Week 6
8.	**TCP/IP protocol suite**	• TCP/IP model & applications	Week 7

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		- TCP/IP layers - Comparing TCP/IP vs OSI models - Testing TCP/IP (IPCONFIG,PING) - TCP/IP Diagnostic utilities (PING,IPCONFIG,NS LOOKUP, HOSTNAME, TRACERT, …etc)	
9.	**DNS Server 2000 Domain Name System**	- Construction and process - Installation and configuration - DNS domain registration - Installing DNS server services - Configuring forward lookup zone - Configuration reverse lookup zone - Configuring NS record - Configuring A(host) record - Configuring MX (Mail Exchange) - Configuring zone file attributes	Week 9 + Week 10 + Week 11
10	**DHCP Server 2000 Dynamic Host Configuration Protocol**	- Installation and configuration - Management and authority allowance	Week 12 + Week 13 +

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		▪ Name and setting IP-address range ▪ Exception IP address range ▪ Setting lease period ▪ Updating and configuring lease ▪ DNS server setting ▪ WINS server setting ▪ DHCP server activity ▪ Address pool and address range ▪ Configuring another IP range ▪ Reservation an IP for a client ▪ Finding out MAC address ▪ Definition user class	Week 14
11	**WEB Server 2000 configuration**	▪ IIS web server installation ▪ IIS configuration ▪ IIS management using web browser ▪ Multi web site hosting	Week 15

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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:
- ❖ Lectures
- ❖ Labs
- ❖ PowerPoint

Text Books & References:

1. Computer networks, By: Andrew Tanenbaum , prentice hall , 2002.
2. CCNA Cisco Certified Network Association , SYBEX, 5th edition.
3. Microsoft Windows 2000 Scripting Guide, by : Microsoft corporation ,2002

References:

1. A special Textbook for diploma students will be published on March 2009 / Eng. Mohammad Al-Showbaky/ Jordan Korea Technology Institute.
2. Computer networks & internets, By: Douglas E. Comer , Ralph E. Droms Publisher :prentice hall , 2000
3. Computer Networking Essentials, 2001, by Debra Little John Shindwe