



# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405241</b>
<b>Course Title</b>	<b>Digital Communications</b>
<b>Credit Hours</b>	<b>(3)</b>
<b>Theoretical Hours</b>	<b>(3)</b>
<b>Practical Hours</b>	<b>(0)</b>



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



### Brief Course Description:

- ❖ Sampling Theorem, Analog to Digital conversion, Time Division Multiplexing (TDM), Pulse Code Modulation, Delta Modulation, Coding and Transmitting Codes, Digital Multiplexing, based on TDM, Digital Transmission, Digital Modulators and Demodulators.

### Course Objectives:

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

1. Convert analog signals to digital.
2. Analyze pulse code modulation.
3. Become familiar with delta modulation concepts.
4. Explain digital multiplexing technique.
5. Design the coders and decoders for digital transmission.
6. Investigate the operation of digital modulators and demodulators.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	<b>Analog to Digital conversion, Pulse Code Modulation and Delta Modulation</b>	<ul style="list-style-type: none"> <li>▪ Sampling an Time Division Multiplexing (TDM)</li> <li>▪ Analog to Digital conversion: Nyquist theory, Quantization and quantization noise</li> <li>▪ Linear and Logarithmic Signal compression, A-Low compression</li> <li>▪ Coding of quantized samples</li> <li>▪ Pulse Code Modulation</li> <li>▪ Delta Modulation</li> </ul>	
2.	<b>Coding and Transmission Codes</b>	<ul style="list-style-type: none"> <li>▪ Non Return to Zero (NRZ) code (properties and Frequency Spectrum )</li> <li>▪ High density bipolar of degree-3 ( HDB-3 ) code</li> <li>▪ Coded Mark Inversion (CMI ) code</li> <li>▪ Codes for data transmission with coding rate K/N</li> </ul>	
3.	<b>Digital Multiplexing based on Time Division Multiplexing ( TDM)</b>	<ul style="list-style-type: none"> <li>▪ Principles of multiplexing, time slots and their contents.</li> <li>▪ First degree multiplexing</li> </ul>	

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		<ul style="list-style-type: none"> <li>(2.048Mbps), frame construction</li> <li>▪ Second degree multiplexing (8MbpsKbps), frame construction</li> <li>▪ Third degree multiplexing (34 Mbps), frame construction</li> <li>▪ Fourth degree multiplexing (140Mbps), frame construction</li> </ul>
4.	<b>Base band Transmission and Processing</b>	<ul style="list-style-type: none"> <li>▪ Eye diagram, Filter</li> <li>▪ Bit error Probability</li> <li>▪ Optimal Signal Receiver</li> <li>▪ Forward error correction</li> </ul>
5.	<b>Digital Modulators and demodulators</b>	<ul style="list-style-type: none"> <li>▪ Principles of digital modulation</li> <li>▪ Shift Keying Modulations (SK, FSK, PSK, MSK )</li> <li>▪ Coherent and non-coherent demodulation</li> <li>▪ Phase Shift Keying ( 2-PSK, 4-PSK and 8-PSK)</li> <li>▪ Quadrature Amplitude Modulation</li> </ul>





**Evaluation Strategies:**

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



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

**Teaching Methodology:**

- ❖ Lectures

**Text Books & References:**

**Text Books:**

1. Lean W. Couch, Digital Communication Systems, sixth edition, Macmillan, 2001.

**References:**

1. Bernard Sklar, Digital Communication Fundamentals and Applications, 2nd edition, Prentice- Hall, 2001.
2. Ziemer, Rodger, Introduction to Digital Communication, Prentice- Hall, 2001.





# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405242</b>
<b>Course Title</b>	<b>Digital Communications Lab</b>
<b>Credit Hours</b>	<b>(1)</b>
<b>Theoretical Hours</b>	<b>(0)</b>
<b>Practical Hours</b>	<b>(3)</b>



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### Brief Course Description:

- ❖ Analog to digital converting, pulse modulation, delta Modulation, coding and transmission codes, digital multiplexing Baseboard transmission, digital modulators and demodulators.

### Course Objectives:

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

1. Convert analog signals to digital
2. Analyze the operation of PCM ( pulse code modulation).
3. Construct delta modulators and demodulators.
4. Become familiar with transmission codes.
5. Investigate the operation of digital modulators and demodulators.





**Detailed Course Description:**

Lab Number	Lab Name	Lab Content	Time Needed
1.	Sampling Theorem		
2.	PAM		
3.	PTM		
4.	Reconstruction of PPM and PWM		
5.	TDM		
6.	2-channel TDM		
7.	PCM		
8.	Decoding (PCM)		
9.	Multiplexing, time slots & Frame		
10.	Channel Encoding		
11.	ASK		
12.	FSK		
13.	PSK		
14.	Coherent and non-coherent demodulation		

**Evaluation Strategies:**

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

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**Teaching Methodology:**

- ❖ Laboratory

**Text Books & References:**

**References:**

1. Bernard Sklar, Digital communication Fundamental and applications, 2<sup>nd</sup> edition, Prentice – Hall, 2001.
2. Laboratory manuals.





# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405223</b>
<b>Course Title</b>	<b>Antennas and Wave Propagation</b>
<b>Credit Hours</b>	<b>(3)</b>
<b>Theoretical Hours</b>	<b>(3)</b>
<b>Practical Hours</b>	<b>(0)</b>



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### 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.



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

**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	<b>Spectrum and Electromagnetic waves Properties</b>	<ul style="list-style-type: none"> <li>▪ Spectrum Concept</li> <li>▪ Electromagnetic waves Properties, direction, Phase</li> <li>▪ Field intensity and Power, Relationship between the Power and Distance and Logarithmic Signal compression, A-Low compression</li> <li>▪ Free Space Loss</li> <li>▪ Free Space Impedance</li> </ul>	
2.	<b>Electromagnetic Waves Propagation</b>	<ul style="list-style-type: none"> <li>▪ Phenomena affect on electromagnetic wave propagation (Reflection, Refraction, Diffraction, interference )</li> <li>▪ Propagation of ground, sky and space waves</li> <li>▪ Properties of low frequencies propagation</li> <li>▪ Properties of high frequencies propagation</li> <li>▪ Sky wave propagation, ionosphere layers and their properties</li> <li>▪ Critical frequency, Maximum Usable Frequency, Skip Distance</li> </ul>	

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		<ul style="list-style-type: none"> <li>▪ Space wave propagation, used frequency</li> <li>▪ Troposphere Scatter, Scatter Volume</li> <li>▪ Properties of troposphere scatter communication</li> <li>▪ Microwaves propagation, relationship between frequency and absorption, relationship between frequency and refraction</li> </ul>	
3.	<b>Transmission Lines</b>	<ul style="list-style-type: none"> <li>▪ Types of Transmission Lines</li> <li>▪ The equivalent circuit of transmission line</li> <li>▪ Primary and secondary coefficients of transmission lines</li> <li>▪ Losses in Transmission lines</li> <li>▪ Reflection, Standing Wave Ratio (SWR), return loss, matching, loading</li> </ul>	
4.	<b>Antennas and Electromagnetic Radiation</b>	<ul style="list-style-type: none"> <li>▪ Basic elements for wireless communication</li> <li>▪ Equivalent circuit for antenna</li> <li>▪ Electromagnetic wave components, electrical field E, magnetic field H</li> <li>▪ Induced field, radiation field</li> </ul>	

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5.	<b>Antennas Coefficients and constants</b>	<ul style="list-style-type: none"> <li>▪ Polarization</li> <li>▪ Antennas tuning</li> <li>▪ Antennas impedance (ohmic and radiation )</li> <li>▪ Antennas effeminacy</li> <li>▪ Reciprocity</li> <li>▪ Beam width</li> <li>▪ Band width</li> <li>▪ Antennas Gain</li> <li>▪ Directivity</li> </ul>
6.	<b>Antennas Types and Radiation Pattern</b>	<ul style="list-style-type: none"> <li>▪ Radiation Pattern</li> <li>▪ Polar Plot</li> <li>▪ Rectangular Plot</li> <li>▪ Isotropic Antenna (construction, properties, radiation pattern, frequency, feeding)</li> <li>▪ Ferrite Antenna (construction, properties, radiation pattern, frequency, feeding)</li> <li>▪ Rhombic Antenna (construction, properties, radiation pattern, frequency, feeding)</li> <li>▪ Yagi Antenna (construction, properties, radiation pattern, frequency, feeding)</li> <li>▪ Slot Antenna (construction, properties, radiation pattern, frequency, feeding)</li> </ul>

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		▪ Parabolic Antenna (construction, properties, radiation pattern, frequency, feeding)	
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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. John D. Kraus, Antennas For All Applications, 3<sup>rd</sup> Edition, 2001.

#### References:

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



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# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405224</b>
<b>Course Title</b>	<b>Antennas and Wave Propagation lab</b>
<b>Credit Hours</b>	<b>(1)</b>
<b>Theoretical Hours</b>	<b>(0)</b>
<b>Practical Hours</b>	<b>(3)</b>



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

**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			

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**Teaching Methodology:**

- ❖ Laboratory

**Text Books & References:**

**References:**

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





# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405233</b>
<b>Course Title</b>	<b>Microwave and Rader Systems</b>
<b>Credit Hours</b>	<b>(3)</b>
<b>Theoretical Hours</b>	<b>(3)</b>
<b>Practical Hours</b>	<b>(0)</b>



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

### Brief Course Description:

- ❖ Microwave communication development and links. Frequency modulation microwave technique, parameters affect to microwaves systems. System protection and equipment.  
Digital microwave systems techniques, Microwave Amplifiers and Generators, 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 transmission lines.
5. Investigate microwave generators and amplifiers.
6. Become familiar with the basic concepts of radar.



## Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Microwave Principles and Spectrum	<ul style="list-style-type: none"> <li>▪ Microwave Systems, Properties and Development</li> <li>▪ Microwave Spectrum, Modulation Techniques</li> <li>▪ Microwave Propagation Properties, Factors affected on antennas altitude</li> </ul>	
2.	Microwave Technique and Microwave communication security	<ul style="list-style-type: none"> <li>▪ FM Microwave Technique</li> <li>▪ Factors affected on Microwave systems, types of noise, Microwave troubleshooting and maintenance</li> <li>▪ Digital Microwave technique</li> <li>▪ Analog and Digital Microwave communication security</li> </ul>	
3.	Microwave Transmission Systems Elements	<ul style="list-style-type: none"> <li>▪ Crystal, Mechanical and Active Filters</li> <li>▪ Active and Passive Equalizers, Amplitude and Delay Equalizers</li> <li>▪ Attenuators and Pads</li> <li>▪ Pre-emphasis and De-emphasis Circuits</li> </ul>	
4.	Microwave Transmission Lines	<ul style="list-style-type: none"> <li>▪ Coaxial Cables, Types</li> <li>▪ Strip Lines, Principles and Properties</li> </ul>	

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		<ul style="list-style-type: none"> <li>▪ Wave guide, Principles and Properties</li> <li>▪ Loads, Directional Couplers, Transitions, Phase shifters, Hybrids, Circulators and Isolators</li> <li>▪ Crystal, Varactor, Shotky, PIN, GUN, IMPATT, Tunnel</li> </ul>
5.	<b>Microwave Generators and Amplifiers</b>	<ul style="list-style-type: none"> <li>▪ Klystron, Construction and Properties</li> <li>▪ Magnetron, Construction and Properties</li> <li>▪ TWT, Construction and Properties</li> </ul>
6.	<b>Radar</b>	<ul style="list-style-type: none"> <li>▪ Rader, Principles and Block Diagram</li> <li>▪ Basic Equation of radar, factors affected on the range of the radar</li> <li>▪ Doppler system</li> <li>▪ Primary and secondary radar</li> <li>▪ Pulse radar, continues radar (Properties and Block diagram)</li> </ul>

**Evaluation Strategies:**

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

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**Teaching Methodology:**

- ❖ Lectures

**Text Books & References:**

**References:**

1. G. Miller, Modern Electronic Communication, Prentice-Hall, 1999.
2. M. I. Skolnik, Introduction To Radar System, 3<sup>rd</sup> Edition, McGraw-Hill, 2001.
3. Mike Golio, The RF And Microwave, CRC Press, 2000.





# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405261</b>
<b>Course Title</b>	<b>Telecommunication Systems</b>
<b>Credit Hours</b>	<b>(3)</b>
<b>Theoretical Hours</b>	<b>(3)</b>
<b>Practical Hours</b>	<b>(0)</b>



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



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### Brief Course Description:

- ❖ Wireless Communication Systems (HF, VHF and UHF), Satellite Communication systems, Fiber Optical Communication system, Public Line Mobile Network (PLMN), Cellular Systems (GSM, AMPS, UMTS, IMT2000).

### Course Objectives:

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

1. Investigate the wireless communication systems.
2. Become familiar with satellite communication systems.
3. Distinguish fiber cables.
4. Analyze optical communication systems.
5. Study and analyze the public mobile networks.
6. Identify digital mobile communication systems.



**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	Wireless Communication Systems	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ HF Wireless Communication Systems, Transmitters and receivers</li> <li>▪ VHF Wireless Communication Systems, Transmitters and receivers</li> <li>▪ UHF Wireless Communication Systems, Transmitters and receivers</li> </ul>	
2.	Satellite Communication Systems	<ul style="list-style-type: none"> <li>▪ Introduction to Satellite Communication Systems</li> <li>▪ Satellite Orbits and Types</li> <li>▪ Satellite Networks, FM Technique</li> <li>▪ Access Technique in Satellite</li> </ul>	
3.	Fiber Optical Communication System	<ul style="list-style-type: none"> <li>▪ Introduction</li> <li>▪ Advantages of Fiber Optics</li> <li>▪ Block Diagram of Fiber Optical System</li> <li>▪ Types of Fiber Optic, Transmission Properties</li> <li>▪ Optical Fiber Components</li> </ul>	

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		<ul style="list-style-type: none"> <li>▪ Light Propagation in Optical Fiber</li> <li>▪ Optical Fiber Calculation</li> <li>▪ Type of Modulation used in Optical Fiber</li> <li>▪ Optical Sources and Detectors</li> <li>▪ Losses in Optical Fiber</li> </ul>	
4.	<b>Public Line Mobile Network ( PLMN)</b>	<ul style="list-style-type: none"> <li>▪ Cells Concept, Network Components</li> <li>▪ Operation of the Public Line Mobile Network</li> <li>▪ Small and Large Cells System, advantages and disadvantages</li> <li>▪ Spectrum, Frequency Allocation for Mobile Systems</li> <li>▪ Interference in Mobile Systems</li> <li>▪ Handover in Mobile system.</li> </ul>	
5.	<b>Mobile Communications</b>	<ul style="list-style-type: none"> <li>▪ Analog Mobile Communication System (First Generation )</li> <li>▪ Digital Mobile Communication Systems-Second Generation (GSM, PCS, D-AMPS,PDC), Techniques and Properties</li> <li>▪ GSM Structure, Principles, Geographical</li> </ul>	

		<p>Areas</p> <ul style="list-style-type: none"><li>▪ Multiple Access in GSM</li><li>▪ Modulation in GSM</li><li>▪ Digital Mobile Communication Systems-Third Generation, (IMT200,UMTS), Technique and Properties</li></ul>	
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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. Jochen Schiller, Mobile Communication, Addison Wesley , Second Edition, 2004.
2. Joseph C. Palais, Fiber Optic Communication, Fifth Edition Prentice -Hall, 2005.

#### References:

1. R. ALLEN SHOTWELL, An Introduction to Fiber Optics, Prentice-Hall, 1997.

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# Electronic Engineering

<b>Specialization</b>	<b>Communication Engineering</b>
<b>Course Number</b>	<b>20405251</b>
<b>Course Title</b>	<b>Communications Technology and Computer Networks</b>
<b>Credit Hours</b>	<b>(3)</b>
<b>Theoretical Hours</b>	<b>(3)</b>
<b>Practical Hours</b>	<b>(0)</b>



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



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**Brief Course Description:**

- ❖ Transfer Modes and Signaling, Protocols, Data Signaling, Modems, Switching Boards, Access to Networks, Digital Services, Internet.

**Course Objectives:**

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

1. Distinguish transfer modes.
2. Investigate the protocol elements and organization.
3. Analyze data signaling and synchronization.
4. Become familiar with synchronous and asynchronous modems.
5. Identify the switching boards.
6. Investigate the types of access to networks.
7. Distinguish between the digital transmissions techniques.





**Detailed Course Description:**

Unit Number	Unit Name	Unit Content	Time Needed
1.	<b>Transfer Modes and Signaling</b>	<ul style="list-style-type: none"> <li>▪ Introduction to Signaling and its techniques</li> <li>▪ Transfer Modes</li> <li>▪ Circuit Mode</li> <li>▪ Packetizing Mode</li> <li>▪ Cell Mode</li> <li>▪ Frame Mode</li> </ul>	
2.	<b>Protocols</b>	<ul style="list-style-type: none"> <li>▪ Protocols Concepts</li> <li>▪ Protocols Elements</li> <li>▪ International Organization for Protocols</li> </ul>	
3.	<b>Data Signaling</b>	<ul style="list-style-type: none"> <li>▪ Communication Data Codes</li> <li>▪ Synchronization</li> <li>▪ Communication Data Components</li> <li>▪ RS-530, RS-449, RS-232</li> <li>▪ Parallel Data Transmission</li> </ul>	
4.	<b>Modems</b>	<ul style="list-style-type: none"> <li>▪ Modem Concept</li> <li>▪ Asynchronous Modems</li> <li>▪ Synchronous Modems</li> </ul>	
5.	<b>Switching Boards</b>	<ul style="list-style-type: none"> <li>▪ Switching Concepts</li> <li>▪ Automatic Switching and its Developments</li> <li>▪ Recent Telephone Networks</li> <li>▪ WB-Isdn, NB-ISDN</li> <li>▪ Computer Networks</li> </ul>	
6.	<b>Access to Networks</b>	<ul style="list-style-type: none"> <li>▪ Access to Networks Concepts</li> <li>▪ Bandwidth Required Accessing the Networks</li> <li>▪ Radio Access</li> <li>▪ Coaxial Cable Access</li> <li>▪ Tested Pair Access</li> </ul>	
7.	<b>Digital Transmission Technique</b>	<ul style="list-style-type: none"> <li>▪ DSL, SDSL, ADSL</li> <li>▪ Leased Lines</li> <li>▪ ISDN</li> <li>▪ PDH, SDH</li> </ul>	

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



8.	Internet Network	<ul style="list-style-type: none"><li>Internet Network Development Stages</li><li>User Services and World Network Software</li><li>Internet Protocols</li></ul>
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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:

#### References:

1. Telecommunication Systems and Technique, Michael Khader, Prentice-Hall, 2000.
2. MARION Cole, Introduction to Telecommunications, Voice, Data and the Internet, Prentice-Hall, 2000.



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