Course Description

Academic Study Plan Cohort entering

2016-2017

Course	**No.:**	IT 201T	**Credit hours:**	**3**	**Contact hours:**	3,1	
	Name:	Principles of Information and Technology Systems		**Instructor:**			
Text book or Reference:		1. "Foundation of computer science", by Behrouz Forouzan and Firouz Mosharraf. 2. "Fundamentals of Information Technology", Third Edition, ISBN: 978-81-7446 481-1, 2010.					
Course Description:		This course Develop an understanding of the components of computing and their relationships, significant impacts of IT disciplines on society, fundamentals of programming structures, basic modules and functions of operating system, enterprise and Internet business applications, and the basics of network architectures, protocols and security, basics on AI and expert systems.					
Prerequisites or co -requisites :		CS 110T		**required, elective, or selected elective**		Compulsory	
Outcomes:		By the completion of this course, the student will be able to: 1. Recognize the basics of the components of computing and their relationships. 2. Recognize the fundamentals of programming structures, basic modules and functions of operating system 3. Recognize the basic modules and functions of operating system 4. Explain the basics of network architectures, protocols and security and the idea of cloud computing. 5. Explain the basics of AI and expert systems 6. State the enterprise and Internet business applications 7. State the basics of Mobile computing and Data warehousing. 8. Describe multimedia data, its representation.					
Topics:		•Introduction to the course content, text book(s), reference(s) and course plan. •Data Manipulation and CPU Architecture. •Data representation and storage •Operating Systems. •Networking and the Internet + cloud computing •Algorithms and Programming Languages. •Databases and enterprise information •Artificial Intelligence + expert systems •Software Engineering •Mobile computing. •Multimedia. •Data Warehousing					

Course	**No.:**	IT 221T	**Credit hours:**	**3**	**Contact hours:**	3,1	
	Name:	Computer Networks Fundamentals		**Instructor:**			
Text book or Reference:		Behrouz A. Forouzan " Data Communications and Networking", McGrew-Hill, fourth edition,2007					
Course Description:		This course provides an overview of basic networking concepts, including network architecture, design, the layering concept in networking and how data transferring between devices.					
Prerequisites or co-requisites :		CS 340T		**required, elective, or selected elective**		compulsory	

Outcomes:	By the completion of this course, the student will be able to: 1.Compare between the OSI and TCP/IP model 2.Describe the layering concept 3.Understand the network topology 4. Calculate the throughput and network capacity. 5. Identify the different types of medium with their differences 6.Calculate the error checking (CRC, Checksum) 7.Understand the protocol of flow control 8. Identify the IPV4 address space 9. Identify the difference between the classful and classes addressing 10.Performing the subnetting 11.Understanding the routing protocols (shortest path first) 12.TCP/ UDP 13. Identifying the connection establishment 14. Identifying connection establishment and connection release 15.Implementing the error control 16.Defining the multiplexing
Topics:	• Introduction to the course content, text book(s), reference(s) and course plan. • Give a brief definition of computer networks. • Introduction to Computer Networks: uses of computer Networks, types of connections, physical topology, PAN, LAN, MAN, WAN, and network software. • Physical layer: analog and digital signals, bandwidth and throughput, Fourier analysis, twisted pair, coaxial cable, fiber optic, wireless transmission, baseband and passband transmissions. • Data link layer: functions of the data link layer, framing, error detection (parity check, CRC, checksum), flow control (noisy and noiseless channels). • OSI versus TCP/IP model: OSI layers and their functions, TCP layers, TCP versus UDP, comparison between OSI and TCP/IP models. • Network layer: logical addressing, classful and classless addressing, IPV4, network routing algorithms: sink tree, shortest path, flooding, distance vector routing. • Transport layer: elements of the transport layer (connection establishment, connection release, error control, multiplexing), UDP (ports, checksum, UDP operation), TCP(service, segment, TCP connection, TCP flow control, TCP error control, TCP congestion control). • Application Layer: Brief introduction about the main protocols such as (HTTP, DNS, SMTP)

Course	**No. :**	IT 222 T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	Communications and Networks fundamentals		**Instructor :**		
Text book or Reference :		"Data and Computer Communications", by William Stalling, Prentice-Hall, The Latest Edition.				
Course Description:		Introduction to signals and systems; time & frequency domains; spectrum, bandwidth, data rate; transmission media & impairment constraints; modulation and encoding techniques; Multiplexing; Switching and routing; Ethernet technologies; Internet Protocol (IP).				
Prerequisites or co-requisites:		PHYS 101 T	**required, elective, or selected elective**	compulsory		

Outcomes:	Students who successfully complete this course will be able to: 1- Understand the fundamentals of communication and network systems. 2- Apply concepts and techniques from coding, and multiplexing 3- Understand the sources of noise in a communication system. 4- Having knowledge of various network protocols.
Topics:	• Introduction to the course content, text book(s), reference(s) and course plan. • Types of Signals & its Properties. Continuous-Time & Discrete-Time Signals • Analog & Digital Signals, Periodic Signals, Even & Odd Signals, Real & Complex Signals, Exponential & Sinusoidal Signals • Time Shift Transformation, Unit Step and Unit Impulse Functions • Systems and Classifications of Systems Linear-Time-Invariant Systems Convolution Sum • Types of communications, Time domain and frequency domain, Spectrum, Bandwidth and Data Rate Transfer, and relations between them • Transmission Impairments: Attenuation, delay distortion, noise, Channel capacity, Nyquist Bandwidth, Shannon capacity Formula • Transmission media: o Guided media (twisted-pair, coaxial and optical fiber cables) o Unguided media (wireless) • Modulation and Encoding Techniques: o Digital Data to Analog Signals (ASK, FSK,PSK) o Digital Data to Digital Signals (NRZI, NRZL,AMI, Manchester) o Analog Data to Digital Signals, Nyquest Theory for Sampling • Data Multiplexing (TDM, FDM) • Transmission Types: Serial, and Parallel o Communication Types: FDX, HDX o Communication Methods: Synchronous and Asynchronous, Forwarding • Error Control: Error Detection, Error Correction Retransmission Technique: ARQ • Network Models Wired LANs and Wireless LANs Internetworking and Addressing

Course	**No. :**	IT 311 T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	Information Security		**Instructor :**		
Text book or Reference:	Cryptography and Network Security: Principles and practice', William Stallings Fifth edition, 2011.					
Course Description:	Develop an understanding of information assurance as practiced in computer operating systems, software and web applications, gain familiarity with common attacking techniques such as virus, Trojan, worms and memory exploits defenses against them, develop a basic understanding of cryptography, how it has evolved, and two key encryption techniques used today(DEA, RSA).					
Prerequisites or co-requisites:	IT 221 T		**required, elective, or selected elective**	compulsory		

Outcomes:	By the completion of this course, the student will be able to: 1. Describe Computer security concepts. 2. Describe OSI security architecture. 3. Explain information assurance as practiced in software and web applications. 4. Describe cryptography. 5. Apply two key encryption techniques used today (DEA, RSA). 6. Develop a basic understanding of Message Authentication (MAC) 7. Apply Message Integrity (Secure Hash Algorithms: SHA-1) 8. Apply Digital signatures (ELGamal digital signature scheme and Digital Signature Standard) 9. Explain of malicious software, viruses, viruses' countermeasures, worms. 10. Study ways of attaching a virus to a program. 11. Explain the sources of viruses and how to countermeasure them. 12. List types of security policies, high and low level policy languages, operational issues. 13. Explain security feature in Linux. 14. Apply security feature in windows. 15. Explain the vulnerabilities in programs. 16. Explain Buffer Overflow, Cross-site Scripting (XSS) and SQL Injection. 17. Study cybercrime and computer crime, intellectual property (copyright). 18. Explain the problem of intrusion (behavior and techniques). 19. Classify intrusion detection techniques (statistical and rule-based) 20. Explain password management.
Topics:	• **Fundamental aspects:** Computer security concepts, OSI security architecture, security attacks, security services, security mechanisms. • **Security mechanisms:** Classical encryption techniques, block ciphers and Data Encryption Standard (DES), public key cryptography (RSA and ELGamal algorithms), cryptographic data integrity (SHA algorithm), digital signatures (ELGamal digital signature scheme and Digital Signature Standard) • **Attacks:** Types of malicious software, viruses, viruses countermeasures, worms • **Security policies:** Definition, types of security policies, high and low level policy languages, operational issues • **Operating system security:** Technical mechanisms (layering, abstraction, data hiding, process isolation, hardware segmentation), policy mechanisms (principles of least privileges, accountability), security models (state machine model, information flow model, Bell-Lapadula model, non-interference model, access control matrix, Clarck Wilson model) • **Software security:** Vulnerability, sandboxing, control flow integrity • **Computer forensic:** Cybercrime and computer crime, intellectual property (copyright, patent) hacking and intrusion

Course	**No. :**	**IT361T**	**Credit hours : 3**		**Contact hours:**	3,1
	Name :	Information Technology Enterprise Systems Architecture and Integration		**Instructor:**		

Text book or Reference:	**Textbook**: 1. Enterprise Architecture for integration: Rapid delivery methods and Technologies by Clive Finkelstein, third edition, 2015 **References:** 1. Handbook of Enterprise Integration by Taylor and Francis Group, LLC, 2010 2. Bente, S., Bombosch, U., & Lagade S., Collaborative enterprise architecture: Enriching EA with lean, agile, and enterprise 2.0 practices. Waltham, MA:Morgan Kaufmann Publishers, 2012. 3. Enterprise Architecture in Practice: From IT Concept towards Enterprise Architecture Leadership by Harri Kimpimäki, Tampere University of TechnologyTampere 2014		
Course Description:	This course provides students with the foundational concepts of enterprise architecture to understand how enterprise architecture serves to integrate strategic, business, and technology planning methods, which support enterprise-wide information technology resource development. This course also covers the principles, technologies and best practices of enterprise integration.		
Prerequisites or co-requisites :	IT201T + CS385T	**required, elective, or selected elective**	**Core Course**
Outcomes:	By the completion of this course, the student will be able to: 1. Describe knowledge of IT acquisition 2. Describe the principles and methodologies for enterprise architecture 3. Understand enterprise architecture concepts and practices 4. Explain Enterprise Architecture and its relationship to other Information Technology processes and deliverables 5. Describe the key elements of Enterprise Architecture, including principles, views, artifacts, and roadmap 6. Discuss and compare contemporary enterprise architecture frameworks 7. Articulate how enterprise architecture supports the strategic objectives of the organization 8.Understand the fundamentals of enterprise architecture development and maintenance 9. Understand the importance of effective governance for successful enterprise architecture development and adoption 10. Understand enterprise application integration concepts 11. Define enterprise integration models 12. Recognize business problems 13. Explain solutions for a business problem 14. Understand service-oriented architecture for integration 15. Understand service integration and management		
Topics:	1- Introduction to the course content text book(s), reference(s) and course plan. Managing Organizations - Enterprise Architecture for Business Integration - Enterprise Architecture for Technology Integration - Rapid Delivery Methods for Enterprise Architecture IT acquisitions: introduction and associated models IT acquisition lifecycle IT acquisition lifecycle management models - Modeling Methods for Enterprise Architecture Introduction to systems integration - Technologies for Enterprise Integration Fundamentals of Enterprise networks Quality of service in enterprise networks Software architecture for enterprise applications Enterprise applications Standards Management of integration.		

Course	**No. :**	IT 371T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	**System Administration**		**Instructor :**		

Text book or Reference:	Essential System Administration, Third Edition Æleen Frisch O'Reilly ISBN: 0596003439		
Course Description	The course is intended to : - Develop an understanding of system administrations tasks such as users accounts management, file systems, system performance monitoring and troubleshooting - Gain familiarity with essential administrative tools and techniques - Develop a basic understanding of system security, network performance, backup and restore - Outline some automatic administration methods.		
Prerequisites or co-requisites:	**CS 340T**	**required, elective, or selected elective**	Required
Outcomes:	By the completion of this course, the student will be able to: 1- Describe system administrator activities and duties. 2- Explain the Unix file system 3- Use essential administrative tools and techniques 4-Analyse a TCP/IP conversation and to use system administration tools for network testing and troubleshooting 5- Manage user and group membership 6-Describe and implements the security policies 7- Manage network services, 7-Use and configure Electronic email 8-Manage and share filesystem types 9-Perform buck-up and restore tasks 10-Manage System resources		

*1: Low level (knowledge & Comprehension), 2: Medium (Application & Analysis), 3: High (Synthesis & Evaluation)

Topics:	• Introduction to System Administration: Systems administration concept, goals, activities performed by system administrator, challenges of system administration • Unix file system : Unix family tree (Linux, BSD and System V), superuser privileges (su sudo and commands) , Unix file system, file ownership (chown command) , file protection (chmod command) • Essential Administrative Tools and Techniques : Getting help using the manual, Command Piping, Finding files while defining criteria and actions, Periodic Program Execution, System messages, Administering Log Files • TCP/IP Networking: Protocols and layers, Ports and services, Administrative Commands, Analyzing a TCP/IP conversation, IP addressing, Subnetting, Network Testing and Troubleshooting • Managing Users and Groups: Managing user and group passwords, Managing group membership, User Account Database File Protections, Managing user accounts (password, environment initialization, specifying file ownership, disabling and removing), Administering User Passwords, Using a Directory Service for User Authentication (LDAP) • Security: Security Policies and Plans, Unix Lines of Defense (physical security, firewalls, data encryption, backups), Access Control Lists (ACL), -detecting security issues • Managing Network Services: Managing DNS Servers, Configuring a DHCP Server, Standard Networking Utilities, Packet sniffers, SNMP protocol • Electronic Mail: Mail Addressing and Delivery, Configuring User Mail Programs, Mail filtering with procmail • File Systems and Disks : Filesystem Types, Managing Filesystems, Sharing File Systems • Backup and Restore: Backup capacity planning and strategies, Backing Up Files and Filesystems, Restoring Files from Backups, Network Backup Systems • Automating Administrative Tasks : Creating Effective Shell, Scripts, Administration language Perl • Managing System Resources: System performance concepts, Monitoring and Controlling Processes, Managing CPU and Memory Resources, Network performance • Case study

Course	**No. :**	**IT435T**	**Credit hours: 2**		**Contact hours:**	
	Name :	Graduation Project -I		**Instructor:**		

Text book or Reference:	**Textbook**: **1-** Handbook of wireless networks and mobile computing', Ivan Stojmonovic, ISBN-0-471-41902-8, John Wiley Edition, 2002. **References:** List Essential References Materials (Journals, Reports, etc.) 1- Data Communications and Networking' Bahrouz A.Forouz , McGraw Hil , 2007 2- Cryptography and Network Security: Principles and practice William Stallings Prentice Hall 2011 3- Data and Computer Communications, William Stalling, Prentice-Hall, 2007.		
Course Description:	This course provides teamwork of students with a thorough guideline for survey and research to design, develop, and implement different fields covering the IT area.		
Prerequisites or co-requisites :	Passing successfully at least 90 credit hours and IS 350T	**required, elective, or selected elective**	**Required Course**

Outcomes:	By the completion of this course, the student will be able to: 1. Provide the necessary background or context for the project and its importance. 2. Outline the problem they are working on, why it is interesting and what the challenges are. 3. Propose an appropriate solution for the project problem. 4. Conduct a related work survey. 5. Outline new information technologies such as mobile computing, and Data warehouses 6. Develop illustrative examples and programs to explain different IT systems 7. Operate a simple IT system. 8. Provide the requirements determination and analysis. 9. Provide system design, including the system architecture, implementation requirements and user interface design. 10. Operate a simple IT system. 11. Write a small project in a teamwork. 12. Demonstrate basics of an IT system
Topics:	1- Registering and selecting topics. 2- Registering and selecting topics. 3- Providing the problem statement & significance and propose a solution. 4- Providing the necessary background and related work survey. 5- Topic presentation. 6- Providing requirements determination and analysis. 7- Designing the system architecture. 8- Providing the implementation requirements (software and hardware that will be used). 9- Designing the user interface of the system by prototyping. 10- Finishing the proposal writing and submission

Course	**No. :**	IT 436 T	**Credit hours :**	**2**	**Contact hours:**	1,2	
	Name :	Graduation Project II		**Instructor :**			
Text book or Reference :	The choice of the books depends upon the project type, domain, and characterization.						
Course Description:	The aim of this module is to provide students with experience and appreciation of the process of performing projects in one of the streams of networks and communications associated with information technology, including the specification, design and development, and reporting processes. Students work together in teams under the supervision of a supervisor, and learn about the processes of teamwork. This involves a scientific project in an area (in Networking and Communications) which deals with the scientific challenges in the following or related areas: • Routing • Congestion • Integrated Services • Quality of Service • Secure network solutions • Mobility and energy related issues in wireless networks						
Prerequisites or co-requisites :	IT 435 T		**required, elective, or selected elective**	compulsory			

Outcomes:	By the completion of this course, the student will be able to: 1. Identify proper work procedures or approaches for the project. 2. Apply technical and scientific knowledge to a task. 3. Choose between technical alternatives. 4. Analyze, schedule and resource the task. 5. Convert the conceptual schema (relational tables into physical schema). 6. Translate functional requirements into functions and procedures 7. Engage in design and Implementation. 8. Develop the capacity to undertake lifelong learning. 9. Devise and carry out tests where necessary 10. Provide a test plan, test cases and test results. 11. Organize, compile and record all test results in an efficient manner. 12. Analyze data. 13. Evaluate and discuss the outcome of the project 14. Function effectively as an individual and as a team member. 15. Present the project outcome effectively using good presentation skills. 16. Compile and present the project carried out in the form of a report. 17. Communicate technical results, information and conclusions to others by means of poster and scientific paper.
Topics:	• Developing the system based on the design and method proposed in the Graduation Project I. • Implementing the system. • Testing the system. • Designing poster. • Submission of project documentation and poster. • Presentation.

Course	**No. :**	**IT437T**	**Credit hours: 4**		**Contact hours:**		
	Name :	Internship		**Instructor:**			
Text book or Reference:		**Textbook**: 1- "Practicum and Internship: Textbook and Resource Guide for Counseling and Psychotherapy", by John Boylan, Judith Scoot, Routledge, 2008.					
Course Description:		Internship course is an important component of the IT-Networks and communication systems program. This course is designed to provide a students' opportunity to gain a supervised practical experience in computer environment of an approved department, firm or agency in KSA. The students will gain a valuable on-site working experience. It further allows the students to develop skills like: communication, team work and problem solving which will enable them in joining a competitive job market in their fields. Cooperative Training Office (CTO) should coordinate with students to apply internship. The student and CTO should also submit a written plan for approval before taking-up the internship. All internships are subject to approval by the Internship Coordinator of the college. Note: maximum number of students 35 per class.					
Prerequisites or co-requisites:		Passing successfully at least 90 credit hours		**required, elective, or selected elective**		**Required Course**	

Outcomes:	By the completion of this course, the student will be able to: 1. Understand professional organizational culture 2. Develop relevant professional competencies and professional relation ship 3. Use existing knowledge to solve some technical problems 4. Apply Classroom Theory 5. Prepare written report about the internship experience 6. Construct experience and confidence in expressing ideas. 7. Communicate in a professional manner. 8. Establish network of acquaintances to increase employment opportunities. 9. Understand the practices and protocols of the particular company and industry in which they are working. 10. Demonstrate professional demands (such as behavior, attitude, appearance, and punctuality) of the workplace. 11. Apply academic knowledge in a professional setting. 12. Communicate effectively in verbal and written forms. 13. Explain current trends and issues specific to the topic of her internship program
Topics:	1- Routing. 2- Congestion 3- Integrated services. 4- High availability 5- Quality of service 6- Secure network solutions. 7- Mobility and energy issues for wireless networks.

Course	**No. :**	IT 481T	**Credit hours :**	**3**	**Contact hours:**	2,2
	Name :	Web Systems and Technologies		**Instructor :**		
Text book or Reference:		Web Technologies: A Computer Science Perspective by Jeffrey C. Jackson, Pearson Education				
Course Description:		This course introduces World Wide Web Consortium (W3C) standard, markup languages client-side programming using industry-established practices. Topics include JavaScript, markup elements, stylesheets, validation, accessibility, standards, and browsers. Upon completion, students should be able to develop hand-coded web pages using current markup standards.				
Prerequisites or co-requisites:		IT 221T	**required, elective, or selected elective**		required	
Outcomes:		Students who successfully complete this course will be able to: 1. Describe the structure of the World Wide Web as interconnected hypertext documents. 2. Apply the principles of progressive enhancement in front-end Web development using HTML, CSS, and Java Script. 3. Discuss web standards and standard bodies including the World Wide Web consortium (W3C). 4. Understand and be able to implement the basic principles of Web services from the perspective of both the client and service provider**.**				

Topics:	• Introduction to the course content, text book(s), reference(s) and course plan. • Introduction to HTML, HTML5 Validation Service • Introduction to Cascading Style Sheets (CSS) • JavaScript • Host Objects: Browsers and the DOM • Client-Side Scripting versus Server-Side Scripting: • W3C XML Schema Documents • Ajax-Enabled Rich Internet Applications with XML • Web applications security

ELECTIVE COURSES

Course	**No.:**	IT 323 T	**Credit hours:**	**3**	**Contact hours:**	3,1	
	Name :	Networks Protocols		**Instructor :**			
Text book or Reference:		"Data Communication and Networking", by Behrouz A Forouzan, McGraw Hill, 2006 or the Latest Edition. "TCP/IP guide ", by Charles M. Kozierok, McGraw Hill, 2005 or the Latest Edition "Computer Networks", by Tanenbaum, Prentice-Hall, The Latest Edition.					
Course Description:		This course demonstrates the basics of Class-full addressing, classless addressing, and sub-netting; Delivery and routing of IP packets; Address resolution: ARP and RARP; IP protocol; Network troubleshooting: ICMP; Network design and performance; User datagram protocol (UDP); Transmission control protocol (TCP); Routing protocols: RIP, OSPF, and BGP. BOOTP, DHCP, DNS, and FTP.					
Prerequisites or co-requisites:		IT 221 T		**required, elective, or selected elective**		elective	
Outcomes:		By the completion of this course, the student will be able to: 1. Explain the difference between classful addressing and classless addressing 2. Compare the difference between the subnetting and suppernetting 3. Explain the attributes of IPv4 datagram 4. Explain mapping Logical to physical Address: ARP 5. Exemplify the ARP Packet 6. Enumerate the different cases of the services of ARP 7. Explain the proxy ARP technique 8. Explain the RARP and its problems 9. Analyze DHCP					
Topics:		• Introduction to the course content, text book(s), reference(s) and course plan. • Class full addressing, classless addressing, and Sub-netting • Delivery and routing of IP packets • Routing protocols: RIP, OSPF, and BGP • Address resolution: ARP, RARP, BOOTP, and DHCP • IP protocol (IP) • User Datagram Protocol (UDP) • Transmission Control Protocol (TCP) • Domain Name System (DNS) • File Transfer Protocol					

Course	**No.:**	IT 324T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	Networks Management and Analysis		**Instructor :**		

Text book or Reference:	Network Management: Accounting and Performance Strategies" Benoit Claise, Cisco Press, ISBN-10: 1-58705-198-2, 2007		
Course Description:	The course covers in detail the methodology of network analysis, architecture. The course addresses Network management and protocols such as SNPM, CMIP and RMON as well as traffic analysis and network performance evaluation software systems; Reliability concepts; Architectures for system observation and control; System utilization and traffic classification; Network management tools.		
Prerequisites or co-requisites:	IT 221T	**required, elective, or selected elective**	Elective
Outcomes:	By the completion of this course, the student will be able to: 1. Understand the methodology of network analysis. 2. Understand Network management and protocols such as SNMP, CMIP 3. know the SNMP structure 4. know the SNMP versions 5. know the SNMP SIM data coding format 6. encode data using SIM rules 7. know CMIP advantages 8. compare between SNMP and CMIP 9. Plan for security management 10. Know the security management steps 11. Analyze the results for security reasons 12. use ping command 13. understand the wireless concepts 14. understand the mobile fundamental 15. Understand the wired concepts. 16. Understand the main concept for security		
Topics:	• Introduction to the course content, text book(s), reference(s) and course plan. • Network Management Principles • Simple Network Management Protocol (SNMP) • Management paradigms and protocols • Wireless & mobile • Wired • Security		

Course	**No. :**	IT 331 T	**Credit hours :**	**3**	**Contact hours:**	3,1	
	Name :	Wireless Networks and Mobile Communication Systems		**Instructor :**			
Text book or Reference :	1.Wireless Communication and Networks" , by William Stalling , Prentice-Hall, The Latest Edition. 2.Wireless Communications: Principle and Practice", by T. S. Rappaport, Prentice-Hall, The Latest Edition.						
Course Description :	The course covers underlying and fundamental computer communication concepts, which support modern mobile and wireless communication systems and networks. Some of these concepts deal with propagation effects, including loss, fading, mobile systems, including design principles of base units and mobile units; micro cells and pico-cells; cell division, including frequency use and reuse; concepts of FDMA, TDMA, and CDMA. The focus for wireless networks is on the physical and medium access layers of the network protocol stack. Wireless systems include satellite and cellular networks, wireless LANs (IEEE 802.11) and personal area networks (Bluetooth and Zigbee).						

Prerequisites or co-requisites :	IT 221 T	**required, elective, or selected elective**	ELECTIVE
Outcomes:	By the completion of this course, the student will be able to: 1. Identify Wireless Networks and its elements. 2. Classification of Networks based on different criterion 3. Compare and Classify wired and Wireless Network 4. Plan ways to study a network 5. Study the network/Protocol architecture of networks 6. Study the Electromagnetic Waves and Spectrum 7. Understand Antenna fundamentals 8. Interpret/Recognize basic specifications from antenna spec sheets 9. Understand some of the attributes of analog and digital signals Time Period, Frequency, Wavelength and Bandwidth, Bit rate, Bit length. 10. Understand/Explain the key Factors/Parameters and tradeoffs for wireless system design(Bandwidth, Data Rate, Noise, Channel impairments, acceptable error rate. 11. Understand the different types of impairments present in wireless networks and analyze their impact on communication system performance.		
Topics:	• Introduction • "Antennas: definition, radiation patterns, antennas types. Antenna characteristics: gain, effective area, attenuation, free space loss, noise, Eb/N0, fading. • "Satellite Communications: parameters, satellite versus terrestrial communications, orbits, LEO,MEO, GEO, frequency bands, capacity allocation. • Channelization, TDMA,FDMA,CDMA • Spread spectrum Systems • Cellular Wireless Networks: Organization, frequency reuse, operations, power control, TDMA, GSM • IEEE802.11 Standard: architecture, Mac format, LLC, components, services, Mac protocols, physical layer, dynamic spread spectrum, frequency hopping. • Bluetooth: applications, piconet, radio layer, baseband layer, L2Cap layer. • IEEE 802.15: Bluetooth versus Zigbee, components of Zigbee, Zigbee network topology, device architecture, physical layer functionalities, network setup, beacon and non becon opeartions, mac layer. • "Wireless network devices: wireless network interface cards, access point, bridge, gateway Mobile Networks Fundamentals: Generations, Topologies, and Components		

Course	**No. :**	**IT 341T**	**Credit hours :**	**3**	**Contact hours:**	3,1	
	Name :	**Networks Programming and Applications**		**Instructor :**			
Text book or Reference:		**Textbook**: Behrouz A.Forouzan, Data Communications and Networking 5th Edition					
Course Description:		IT 341T is an introduction to developing networks applications and programs. From the application view, this courses explain the basic application protocols that are required to develop an application: HTTP, FTP, SMTP, POP, and DNS. From a programming point of view, this course is intended to explain how to write a code at the client and the server sides. NET 341D exploits JAVA which offers many networks libraries.					

Prerequisites or co-requisites:	**IT 221T**	**required, elective, or selected elective**	Selected elective
Outcomes:	Students who successfully complete this course will be able to: 1- 1. Remember computer networks basics. 2. Describe HTTP. 3. Describe FTP. 4. Describe SMTP. 5. Describe POP. 6. Describe DNS. 7. Compare HTTP, FTP, SMTP, POP, DNS. 8. Explain HTTP persistent connection. 9. Explain HTTP nonpersistant connection. 10. Explain FTP commands. 11. Explain a SMTP session. 12. Explain DNS resolution techniques. 13. Describe sockets. 14. Use Java to write simple programs. 15. Use Java to write a UDP application 16. Use Java sockets for networks and to write a TCP application 17. Describe TCP socket options. 18. Use Java sockets for networks programming. 19. Describe JavaMail classes. 20. Use Java to send an e-mail. 21. Use Java to check an e-mail. 22. Use Java to send an e-mail attachment. 23. Explain a servlet structure. 24. Use Java servlets to generate HTML code . 25. Use Java servlets to generate an HTTP request and response. 26. Use Java servlets to read and send cookies.		
Topics:	1. Introduction to the course content text book(s), reference(s) and course plan 2. Internet Applications: HTTP, FTP, SMTP, POP, DNS 3 3. Network programming basics: socket concept 2 4. Java Overview: IO, Threads, streams 2 5. UDP programming 1 6. TCP programming 2 7. Mail programming 2 8. Web programming using servlets		

Course	**No. :**	IT 351 T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	Networks Operating Systems		**Instructor :**		
Text book or Reference:	Network Operating Systems: Making the Right Choices Addison-Wesley Longman Publishing Co., Inc. Boston, MA, USA					
Course Description:	This course aims to explain how to install a secure, multi-user, client-based network operating system , Implement and administer operating system resources, Implement, share and NTFS permissions, Configure and troubleshoot workstation performance, Monitor a network, Implement, monitor, and troubleshoot operating system security and Configure, troubleshoot network connectivity.					
Prerequisites or co-requisites :	IT 221 T		**required, elective, or selected elective**	elective		

Outcomes:	Students who successfully complete this course will be able to: 1. Describe the network operating system NOS. 2. Describe the Mechanisms for Network Operating Systems. 3. Describe how NOS provides the LAN with access to other networks 4. Describe the services and applications of NOS. 5. Describe the role of the NOS in network computing. 6. Describe How is the NOS likely to evolve. 7. Describe What is client/server computing. 8. Describe how to Install and deploy Windows 7 9. Describe how to Install Windows 2008 server on networking hardware 10. Explain terms associated with installing and configuring an NOS 11. Describe how to work with Disks and Devices. 12. Apply the Windows 2008 Registry. 13. Explain how to install and configure a TCP/IP protocol stack. 14. Apply Windows 2008 Server DHCP. 15. Apply Exercises on Windows 2008 Domain Name Service. 16. Apply exercises on Internet Information Server (web services). 17. Describe the process of monitoring a network server. 18. Explain the importance of backing up systems and data. 19. Describe procedures for backing up systems and data. 20. Describe the processes for updating network operating systems 21. Describe terms associated with administering server resources. 22. Explain IP Addressing. 23. Apply Initial Network setup. 24. Explain Linux System Administration. 25. Explain how to install Software. 26. Describe concepts associated with file system security. 27. Describe procedures for sharing and securing server resources.
Topics:	• Introduction to the course content, text book(s), reference(s) and course plan. • Basics of network operating system NOS. • How does the NOS provide the LAN with access to other networks and computer systems? • What is the role of NOS in network management? • What are application programming interfaces (APIs) and how are they supported in the NOS? • What is network computing and what is the role of the NOS in this? How is the NOS likely to evolve? What is client/server computing? • Introducing Windows 7 and Windows 2008 architecture concepts. • Installing and deploying Windows 7. • Install Windows 2008 server on networking hardware, under VMWare Workstation. • Working with Disks and Devices, explore and exercise the Windows 2008 Registry. • Install and configure a TCP/IP protocol stack. • Explore Windows 2008 Server DHCP. • Exercise Windows 2008 Domain Name Service. • Exercise Internet Information Server (web services). • Managing and Monitoring Windows 7 Performance • Linux Installation, IP Addressing, Initial Network setup, Linux System Administration, Software installation

Course	**No. :**	**IT352T**	**Credit hours : 3**		**Contact hours:**	
	Name :	**Real time and embedded systems**		**Instructor:**		

Text book or Reference :	**Textbook**: 1. Real-time flow systems, Jane W.S.Liu, ISBN -10:0130996513, 2000 2. Real-Time Systems: Design Principles for Embedded Applications, Second Edition, ISBN 978-1-4419-8236-0, Springer, 2011. **References:** 1. PIC Microcontroller: A Introduction to Software & Hardware Interfacing", Han-Way Huang, Delmar Cengage Learning, 2007. ISBN 978-1-4018-3967-3		
Course Description :	The course covers the concepts, fundamental problems, and approaches in the design and analysis of real-time and embedded systems inherent in many hardware platforms. It addresses the issues related to the design and analysis of systems with real-time constraints (Synchronization and communication; Scheduling Real Time systems; Advanced scheduling; Simulation of a Real Time system). The students also learn the fundamentals of embedded system hardware, micro controller and microprocessor architecture and assembly language programming for the PIC Micro controller.		
Prerequisites or co-requisites :	**CS340T**	**required, elective, or selected elective**	**Elective Course**
Outcomes:	Students who successfully complete this course will be able to: 1. Describe embedded systems and embedded systems with real time applications. 2. Understand technical, economic factors characterizing a real-time application to interpret demands that the system designer must cope with. 3. Understand the key characteristics of real time embedded systems: logical, functional and timing correctness and resource scheduling. 4. Classify real time systems. 5. Compare hard and soft real time systems. 6. Understand the functional and temporal requirements of real time systems. 7. Differentiate between real-time applications based on their timing attributes. 8. Study some typical real time embedded systems and their current and future trends. 9. Describes the general model of real-time systems. 10. Understand the real time system model (work load model, a resource model and algorithms). 11. Define the basic component of any real-time application system. 12. Describe the parameters that characterize application systems. 13. Study parameters that characterize the processors 14. Understand the concept of scheduling in real time systems. 15. Study the scheduling approaches for real time systems: clock-driven, weighted round robin and priority-driven. 16. Analyze the advantages and disadvantages of clock driven scheduling. 17. Analyze the merits and limitations of the priority driven scheduling algorithms. 18. Compare scheduling methods. 19. Classify priority-driven algorithms for scheduling periodic tasks on a processor. fixed priority and dynamic priority 20. Describe algorithms for Scheduling aperiodic and sporadic jobs. 21. Describe what is meant by real time networks 22. Enumerate key goals of Real-time Communication 23. Describe Hard and soft real time communication systems 24. Understand Real time network architecture 25. Study the Real time transport and internet protocol 26. Study Flow control for real time communication systems 27. Classify the flow control protocol. Explicit and Implicit flow control 28. Assess real time communication system needs 29. Understand scheduling in real time communications 30. Define Embedded systems 31. Understand the architecture of embedded systems 32. Analyze the design goals of embedded systems (Performance, cost, power consumption, size) 33. Describe some functional and non-functional requirements of embedded systems. 34. Study the key components of embedded system hardware.		

	35. Understand micro- processors and micro-controllers. 36. Understand the Key design requirements of micro-processors (energy efficiency, code density) 37. Differentiate between microprocessors and micro-controllers. 38. Enumerate the components of a micro-controller 39. Describe the architectural characteristics of the Pic family of micro-controllers. 40. Describe the peripherals devices of the PIC micro-controllers (Digital I/O, ADC, Memory) 41. Study Instruction set for PIC Micro-controller 42. Understand the PIC Interrupts, Interrupt processing, management and Peripheral interrupts. 43. Understand the difference between High-level languages and machine language. 44. Explain the Assembly language program structure (directives, instructions And comments) 45. Use assembler directives to allocate memory blocks. 46. Write programs loops to perform repetitive operations. 47. Write assembly programs to perform simple arithmetic operations. 48. Understand the concept of IDE (Integrated development environment). 49. Study the MPLAB IDE development tool. 50. Write; assemble some basic assembly programs for PIC. 51. Use MPLAB IDE to enter programs and build executable codes and Software debugging.
Topics:	1. Typical real-time applications: digital control, optimal control, tracking, and multimedia applications. 2. Reference model of real-time systems: workload model, resource model, and algorithms. 3. Hardware real-time systems scheduling: clock driven scheduling, priority driven scheduling, scheduling aperiodic tasks. 4. Real-time communication: real-time flow control, scheduling for switched networks, internet and transport protocols for real-time applications. 5. Introduction to embedded systems: definition and examples of embedded systems, design constraints. 6. Introduction to embedded systems: microcontroller and microprocessor architecture, memory (RAM, ROM, EPROM, EEROM, Flash memory), I/O, interruptions 7. Introduction to the assembly language: labels, instructions, operands, directives. 8. Assembly programming for PIC microcontroller: programming interfaces.

Course	**No. :**	IT353	**Credit hours :**	**3**	**Contact hours:**	
	Name :	**Parallel Computers**		**Instructor :**		
Text book or Reference:		**Textbook**: 1. Fundamentals of parallel computer architectures: multichip and multicore systems", Yan Solihin, ISBN-13-978-0-9841630-0-7, 2009. 2. Parallel Computer Architecture: A hardware/software approach, David E. Culler, Jaswinder Pal Singh, Anoop Gupta, Morgan Kaufmann publishers, 1999, ISBN: 1-55860-343-3. **References:** 1. John Hennessy and David Patterson, Computer Architecture: A Quantitative Approach, Morgan Kauffman Publisher.				
Course Description:		This course covers fundamental and comprehensive concepts related to the design of parallel computer systems (including modern parallel architectures and alternatives), architecture for shared memory multi processors and multicore architectures. Topics include program issues with shared memory multiprocessors, memory hierarchy, cache coherence, synchronization, multicore organization choices and cache.				

Prerequisites or co-requisites:	CS 340T, CS 206T	required, elective, or selected elective	Elective Course
Outcomes:	Students who successfully complete this course will be able to: 1. Define parallel architectures. 2. Understand the technological, architectural trends, economic and application requirements that dictate the growth of parallel systems. 3. State some of the motivations behind the development of parallel systems 4. Understand some of the fundamental design issues of the parallel computer Systems such as Resource allocation, data access, performance and scalability. 5. Understand and Classify Parallelism. ILP, task level and program level parallelism. 6. Understand and illustrate the Taxonomy of Parallel computers and the Flynn taxonomy 7. Study the different types of Parallel architectures such as SIMD, MISD, MIMD 8. Understand the concept of memory hierarchies and its big impact on the Performance of applications. 9. Study the operation of memory hierarchy and the analyze the range of Performance issues influencing its design. 10. Classify the components/levels of memory hierarchy such as register, Cache (SRAM), Memory (DRAM), Disk etc 11. Understand the Cache memory, its organizations (Direct Mapped, Set associative and fully associative), addressing and performance metrics. 12. Understand the concept of prefetching in multiprocessor systems and how it is used to improve the cache performance. 13. Understand the concept of shared memory, its advantages and disadvantages. 14. Classify the Shared Memory Multiprocessors Variations. Uniform and Non-Uniform Memory Access (UMA) Multiprocessors 15. Study the shared memory multi-processor organization. (shared cache, shared bus and distributed shared memory). 16. Understand the type of hardware support required to construct a shared Memory multi-processor. 17. Assess the key technical challenges in the design of such machines (such as organization and implementation of the shared memory subsystem). 18. Understand issues for a shared memory architecture (Cache coherence, Memory consistency models, synchronization support) 19. Explain the cache coherence problem, cache coherence protocols, Implementations (snooping, directory) and assessing their behavior) 20. List and compare key characteristics of the bus based and shared cache Multi processors. 21. Understand cache coherence in bus-based multiprocessors. 22. Study the Bus-Snooping cache coherence protocol. 23. Analyze the impact of the cache design on Cache coherence performance. 24. Understand the different types of synchronization in parallel architectures such as (event and group synchronization) 25. List the components of a synchronization event. 26. Study some synchronization operations such as locks and barriers, their Performance criteria, implementation, illustration and drawbacks. 27. Compare different synchronization operations. 28. Understand the limitations of the Symmetric shared multi processors. 29. Understand the concept of scalable-shared memory systems. 30. Study the implementation of distributed shared memory coherence protocols. 31. Describe the advantages (reduce bandwidth demands) limitations and the Performance criterion of directory based protocol. 32. Define the inter connection networks 33. Describe the network characteristics such as topology, routing algorithm, switching strategy, and flow control. 34. Compare between different network topologies 35. Analyze the impact of network characteristics on the performance and functionality of the communication system.		

	36. Study the organizational structure of parallel computer networks. 37. Describes the different classes of routing algorithms used in modern machines. 38. Understand key properties of good routing algorithms (producing deadlock-free routes, maintaining low latency, spreading load evenly, and tolerating faults) 39. Understand the multi core processors. 40. Contrast single core and multi-core processors 41. List some of the advantages and applications of multi-core processors. 42. Study the multi-core memory hierarchy, issues, design space and constraints. 43. Multi core memory hierarchy issues design space and constraints 44. Cache coherence problem and its solution in multi-core architectures. 45. Compare SMT (Simultaneous Multi-threading) and Multi-core systems

Topics:	**Introduction to parallel architectures:** evolution, definition, motivation, Flynn's taxonomy of MIMD parallel computers, examples. **Introduction to memory hierarchy organization:** motivation for memory Hierarchy, basic architectures of a cache, cache performance, prefetching. **Shared memory multiprocessors:** cache coherence problem, memory Consistency problem, synchronization. **Shared memory multiprocessors:** cache coherence problem, memory Consistency problem, synchronization. **Bus based coherent multiprocessors:** basic support for bus-based multiprocessors, cache coherence in bus-based multiprocessors, and impact of cache design on Cache Coherence performance. **Hardware support for synchronization:** lock implementation, barrier Implementation. **Distributed shared memory multiprocessors:** approaches to large-scale multiprocessors, building a directory-based coherence protocol, basic DSM cache coherence protocol, implementation correctness and performance. **Interconnection network architecture:** link and channel, network topology, Routing policies and algorithms, router architecture. **Designing multicore architectures:** multicore architecture, multicore Memory hierarchy organization, performance volatility.

Course	**No. :**	IT 412T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	**Networks Security**		**Instructor :**		

Text book or Reference:	**'Cryptography and Network Security: Principles and practice', William Stallings Fifth edition, 2011**		
Course Description:	An introductory course, intended to cover the fundamental concepts and techniques of **Networks Security Protocols**. The student is expected to develop number of applications that demonstrate an understanding of the course.		
Prerequisites or co-requisites :	**IT 311T**	**required, elective, or selected elective**	selected elective
Outcomes:	By the completion of this course, the student will be able to: 1- Use the different methods of attack. Understand and apply selected technologies used to ensure security. 2- Evaluate existing Network Security attacks Programs 3- use new types to prevent attacks 4- Describe the architectural models for TCP/IP Stack 5- evaluate different methods for Attacks through TCP/IP 6- Explain the Security Components 7- use Security through Firewall 8- Describe VPN 9- Describe the main architecture for IPSec 10- use different models for IPSec 11- use Combining Security Association 12- Describe DNS protocol stack 13- use the different types attach for DNS 14- explain the intrusion process 15- Explain types of intrusion detection systems 16- Describe current challenges of intrusion detection systems 17- use Secure Multipurpose 18- Describe Internet security Mail Exchange using S/MIME 19- Explain models for Secure socket layer (SSL) 20- Explain transport layer security (TLS).		

Topics:	• Foundation of Network Security: what network security is? goals of network security, secure network architecture, network security policies, network security components • Overview of TCP/IP: TCP/IP architectural models, TCP/IP possible attacks (packet sniffing, spoofing, process table attack). • TCP/IP security components: Firewall protection, types of firewalls (packet filter, proxy server, stateful filter), Firewall architectures (dual-homed host, screened host), VPN, advantages of VPNs, types VPNs, architecture of VPNs (point to point tunneling protocol, layer 2 forwarding), VPN models (Nas-initiated VPN, client-initiated VPN). • IPSec: architecture, authentication header, encapsulating security payload, combining security association, key management, benefits, limitations. • DNS: protocol stack (spoofing, ID hacking, cache poisoning), protection • Intrusion detection: definition, intrusion process, intrusion detection system, types of intrusion detection systems, challenges of intrusion detection systems, intrusion detection systems. • Application and transport layers security: (Pretty Good Privacy (PGP), Secure Multipurpose Internet security Mail Exchange (S/MIME), Secure HTTP, Secure socket layer (SSL), transport layer security (TLS).

Course	**No. :**	IT 425 T	**Credit hours :**	**3**	**Contact hours:**	3,1
	Name :	Satellite Communications		**Instructor :**		

Text book or Reference:	"Timothy Pratt, Charles W. Bostian, Jeremy E. Allnutt, "Satellite Communication Systems", John Wiley & Sons, The Latest Edition		
Course Description:	The course is intending to cover the fundamental concepts of satellite communications and orbital concepts. The student is expected to understand the basics of satellite communications, satellite system elements, key issues of satellite, handle error control for digital satellites, and grasp the propagation effects on satellite-earth links		
Prerequisites or co-requisites :	IT 221 T	**required, elective, or selected elective**	Elective
Outcomes:	Students who successfully complete this course will be able to: 1- Describing satellite orbit 2. Explain Kepler's three lows 3. Compute orbital Period 4. Classify different orbital elements 5. Recognizing coordination elevation and azimuth angles 6. Describing orbital size, shape, orientation, and satellite location 7. Compare the role of different subsatellite systems 8. Compare between different transponders 9. Solve problems on antenna gain and diameters 10. Design link budget for satellite uplink/downlink 11. Differentiate between different frequency bands used by satellite 12. Differentiate between satellites in different altitudes 13. Recalling basic transmission theory 14. Classify different propagation effects (gases, rain, ionosphere, scintillations) 15. Compare between rain types 16. Compute rain attenuation 17. Recognize contour maps for rain rate 18. Explain digital transmission 19. Describe QPSK modulation technique 20. Recognize different multiple access techniques 21. Stating errors occurred and solutions 22. Classify different satellite applications		

Topics:	• Introduction to satellite - communications and its applications • Satellite systems elements • Satellite signal coding • Satellite link design • Orbits and launching methods • Beam angle and directivity • Altitude control • Frequency distribution • Radiation Pattern • Error control for digital satellite • Modulation and Multiplexing techniques • Multiple access • Propagation effects and their impact on satellite-earth link • Exploration of some applications of satellite systems (GPS, Mobile communication, WEB communications)

Course	**No. :**	IT 432T	**Credit hours :**	**3**	**Contact hours:**	3,1	
	Name :	Networks Design and Implementation		**Instructor :**			
Text book or Reference:		"Top-Down Network Design (3ed Edition) by Priscilla Oppenheimer, 2010					
Course Description:		The course is intending to cover modern integrated networks, the types of traffic generated and their quality of service requirements. It provides an appreciation of performance issues in networks, and competence in the use of techniques to analyze and optimize performance.					
Prerequisites or co-requisites :		IT 221 T		**required, elective, or selected elective**		Elective	
Course Topics:		Students who successfully complete this course will be able to: 1. Recognize business goals and constrains. 2. Compare technical goals and different tradeoffs. 3. Explain differences for existing internetworks. 4. Understand the design of a network topology. 5. Classify different protocols for switches and routers 6. Implement network security strategy. 7. Describe LAN's hierarchical models, and secure models. 8. Recognize LAN's types. 9. Differentiate between different LAN's hardware. 10. State the WAN technology concepts. 11. Distinguish between WAN's connection options. 12. Understand the configuration of the frame relay 13. Stating the design models for the WLAN. 14. Compare between the WLAN's models. 15. Describe the traffic flow. 16. Check the traffic load. 17. Apply different networks using Wireshark or OPNET					

Topics:	•**Identifying customers' needs and goals:** analyzing business goals and constraints, analyzing technical goals and tradeoffs, analyzing existing internetworks •**Logical network design:** design a network topology, design models for addressing and numbering, selecting switching and routing protocols, developing network security strategy, developing network management strategy •**LAN design:** hierarchical models, redundant models, secure models, LAN types (large buildings and campus LANs, small remote sites), LAN hardware (repeaters, switches, bridges, routers). •**WAN:** WAN technology concepts (physical layer, data link layer, switching), WAN connection options (dedicated connection link options, circuit-switched connection options, packet switched connection options, Internet connection options, choosing a WAN link connection), frame relay (basic frame relay concepts, configuring a frame relay network) •**WLAN:** wireless design models, topologies, and infrastructures, service sets (base station, SSID distributed system, infrastructure, AD Hoc mode), WLAN design modes (site-to-site connections, point-to point, point-to-multipoint), wireless mesh networks, evolution of WLAN models. •**Network traffic**: traffic flow (terminal/host traffic, client server traffic, peer to peer traffic, server/server traffic, distributed computing traffic flow, traffic flow in Voice over IP), traffic load (calculating theoretical traffic load, estimating theoretical load by routing protocols, traffic behavior). •**Analysis and design tools:** Wireshark and OPNET 2

Course	**No.:**	IT 433T	**Credit hours:**	**3**	**Contact hours:**	3,1
	Name:	Wireless Sensor Networks		**Instructor:**		
Text book or Reference:		-Ian F.kyildiz, and M.Can Vuran , Wireless sensor networks, 2010. -C. Poellabauer , Fundamentals of wireless sensor networks. Theory and practice, 2010 Wiley.				
Course Description:		This course provides an overview of basic networking concepts, including network architecture, design, the layering concept in networking and how data transferring between devices.				
Prerequisites or co-requisites:		IT 221T	**required, elective, or selected elective**		Elective	

Outcomes:	By the completion of this course, the student will be able to: 1. Recognize sensors platforms. 2. State the features of wireless sensor networks (WSN). 3. Describe wireless technologies for WSN 4. Explain the different applications of WSN 5. State different types of WSN. 6. State the current challenges for WSN. 7. State the research trends for WSN. 8. Describe Layers of the WSN Protocol stack. 9. Interpret CSMA technique 10. Describe MAC protocol 11. Describe SMAC protocol 12. Describe TRAMA protocol 13. Recognize routing mechanisms for Wireless sensor networks 14. Differentiate between Flat, Hierarchical, and geographic routing protocols. 15. Differentiate between flooding and gossiping protocols. 16. Describe SPIN routing protocol. 17. Describe Leach routing protocol. 18. Describe Pegasis routing protocol. 19. Explain Geographic routing. 20. Differentiate between Greedy and Face routing. 21. Describe GPRS routing protocol. 22. State the features of operating systems for WSN 23. Describe the components of tinyOs 24. Describe the interfaces of tinyOs, configurations, and wiring. 25. Describe the configurations of tinyOs. 26. Describe the wiring of tinyOs. 27. State challenges for time synchronization in WSN 28. Describe Global Positioning System 29. Describe NTP protocol 30. Describe TPSN protocol 31. State the general characteristics of IEEE 802.15.4 standard. 32. Describe the supported topologies of IEEE 802.15.4 standard. 33. Describe the physical layer of IEEE 802.15.4 standard. 34. Describe MAC layer of IEEE 802.15.4 standard. 35. State the challenges for localization algorithms in WSN. 36. Differentiate between range-based, range free localization techniques. 37. Describe Time of arrival (TOA) ranging technique 38. Describe one way TOA technique 39. Describe two way TOA technique 40. Describe Received Signal Strength RSS technique.
Topics:	**-**Introduction to the course content, text book(s), reference(s) and course plan. -Sensor networks: sensor platforms, WSN architecture and protocol stack, applications (military, environmental, health, home, industrial), factors influencing WSN design (hardware constraints, fault tolerance, scalability, power consumption, topology, transmission media) -MAC protocols: challenges for MAC, CSMA, SMAC, and TRAMA. -Network layer: challenges for routing, data centric and flat architecture protocols (flooding, gossiping, SPIN), hierarchical (Leach, Pegasis), geographic routing, energy efficient routing protocols. -Location and positioning in wireless sensor networks: greedy and face routing protocols. -TinyOs concepts and programming: components, interfaces, configurations, and wiring. -Time synchronization in wireless sensor networks: challenges for time synchronization, Network Time Protocol, Timing Sync Protocol for WSN. -IEEE 802.15.4 standard: general characteristics, supported topologies, physical, and Mac layers overview. -Localization: challenges, ranging techniques, range based localization techniques, range free localization techniques**.**

Course	**No. :**	IT 434T	**Credit hours:**	**3**	**Contact hours:**	3,1	
	Name :	Optical Networks		**Instructor :**			

Text book or Reference:	Textbook: - Rajiv Ramaswani ,Kumar N. Sivarajan, Galen H. Sasaki, "Optical Networks. A practical perspective" , Morgan Kauffman publishers, 3rd Edition. References: - Optical Fiber Communication, Gerd Keiser, Mc-Graw Hill, Last edition.John R. Vacca, " Optical Networking. Best practices Handbook" , John Wiley & Sons publisher, 2007.		
Course Description:	The course covers underlying and fundamental light characteristics concepts and demonstrates components, types, and communication of fiber optics which support modern wireless communication systems and networks. Some of the basic knowledge of some networks (SONET/SDH) has been described in this course. The focus for optical networking fundamentals is on the physical layer of the network protocol stack. The optical line terminal and optical line amplifier of WDM networks is studied in this course.		
Prerequisites or co-requisites :	IT 221T	**required, elective, or selected elective**	Elective
Outcomes:	By the completion of this course, the student will be able to: 1. describing light as an electromagnetic wave 2. describing the polarization of light wave 3. explain the interference effects on light wave 4. Explain the basic elements of optical fiber transmission link 5. Explain the fiber modes 6. Stating the basic operating principles of single mode and multimode fibers. 7. Describe the different Transmission constraints 8. Compare between different types of propagation 9. Stating the difference between the couplers, isolators and circulators 10. Explain the principle of operation of multiplexers and filters 11. Stating the advantages and disadvantages of optical amplifiers 12. Compare between the different types of optical amplifiers 13. Explain the different components of digital communication optical system 14. Explain the transmitters and detectors, switches, wavelength converters. 15. Explain the switches and wavelength converters. 16. Describing the interaction between optical components and IP 17. Explain light path routing solution, 18. Explain the OSPF enhancements 19. Stating the different types of IP links 20. Discriminate between the control channels, data channels, 21. Explain the integrated optical networks 22. Recalling the modulation 23. Explain the subcarrier modulation and multiplexing 24. Stating spectral efficiency 25. Explain the spectral efficiency 26. Explain the error detection and correction. 27. Explain the time division multiplexing, 28. Differentiate between the VCAT and LCAS, 29. Describe the SONET/SDH layers, 30. Explain the SONET frame structure, 31. Explain the SONET/SDH physical layer, 32. Discriminate the elements of a SONET/SDH infrastructure 33. Explain the optical line terminal. 34. Distinguish between the different types of optical line amplifiers. 35. Explain the Add/Drop multiplexers 36. Explain the cross-connects.		

Topics:	- Light Characteristics: light as an electromagnetic wave, polarization, interference - Fiber Optics: Modes, Transmission constraints (fiber-optic cable modes, fiber optic glass, plastic optical-fiber, fluid-filled fiber optics, transmitting light on a fiber, light propagation in multimode fiber, single mode propagation) - Fiber Optics Components: couplers, isolators and circulators, multiplexers and filters, optical amplifiers, transmitters, detectors, switches, wavelength converters. - Optical networking fundamentals: interaction between optical components and IP, light path routing solution, OSPF enhancements/ IS-IS, IP links, control channels, data channels, integrated optical networks - Fiber Optics Communications: modulation, subcarrier modulation and multiplexing, spectral efficiency, demodulation, error detection and correction. - SONET/SDH Networks: multiplexing, VCAT and LCAS, SONET/SDH layers, SONET frame structure, SONET/SDH physical layer, elements of a SONET/SDH infrastructure - WDM Networks: optical line terminal, optical line amplifiers, Add/Drop multiplexers, cross-connects.