



KINGDOM OF SAUDI ARABIA
Technical and Vocational Training Corporation
Director General for Curricula

المملكة العربية السعودية
المؤسسة العامة للتدريب التقني والمهني
الإدارة العامة للمناهج



الخطط التدريبية للكليات التقنية

Training Plans for Colleges of Technology

Curriculum for Department of Engineering of Computer and Information Technology

Major Computer Networks

نسخة أولية (تحت المراجعة)

Under Revision Draft

A Bachelor's Degree

Semesters
1444 H – 2022 G



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Program Description

Computer Networks bachelor program gives you technical knowledge and skills in computer networks, communications, and security. In this program will cover CCNP, networks media, voice over IP, information security, systems administration and more.

This program will give you skills needed to configure and manage different network devices and systems. These skills are helpful in getting the job in the network industry. As Telecomm & Information College is a part from CISCO Networking Academy Program, The various certifications (CCNP and CCNA Voice) are embedded into the program modules.

Additionally all students will be encouraged to take the widely accepted industry certifications, such as CCNA Voice and Cisco Certified Network Professional (CCNP) certifications. Most of companies and government organizations are demand for trained networking professionals to meet the rising network services inside these companies and organizations.

Students complete the program, which provides the knowledge students need in leadership, and interpersonal and communication skills. In addition, students can gain real-world experience through participation in the Co-op / training.

The Theoretical and Practical Tests and Graduation Projects Determine Learning Outcomes and Trainee Levels for each program.

The training courses contain a theoretical part and a practical part. The practical part is tested as a practical test and the theoretical part is a theoretical test with different evaluation methods.

The Bachelor Degree Graduate gets the seventh level in the Saudi Arabian Qualifications Framework (SAQF).

Admission Requirements: The applicant must have a diploma in Computer Networks.



The Curriculum Framework Distributed **توزيع الخطة التدريبية على الفصول التدريبية لمرحلة البكالوريوس بالنظام الثلثي**
on Trimesters

الفصل التدريبي الأول	1st Trimester	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م
						م.و	مج	عم	تم	س.أ				
						CRH	L	P	T	CTH				
	1	ENGL 301	English Language (1)		4	4	0	2	6		لغة انجليزية ١	٣٠١ انجل	١	
	2	MATH 301	Mathematics (1)		4	3	2	1	6		رياضيات ١	٣٠١ رياض	٢	
	3	PHYS 301	Physics		4	3	2	1	6		فيزياء	٣٠١ فيزي	٣	
	4	INET 313	Computer Networks		6	4	4	0	8		شبكات الحاسب	٣١٣ شبكا	٤	
Total Number of Units						18	14	8	4	26	المجموع			
الفصل التدريبي الثاني	2nd Trimester	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م
						م.و	مج	عم	تم	س.أ				
						CRH	L	P	T	CTH				
	1	ENGL302	English Language (2)	ENGL 301	4	4	0	2	6	انجل ٣٠١	لغة انجليزية ٢	٣٠٢ انجل	١	
	2	MATH 303	Discrete Math	MATH 301	4	3	2	1	6	رياض ٣٠١	رياضيات متقطعة	٣٠٣ رياض	٢	
	3	ICMT 402	Computer Programming		4	2	4	0	6		برمجة الحاسب الآلي	٤٠٢ حاسب	٣	
	4	INSA 312	Basic Networks Systems Administration		5	2	6	0	8		أساسيات إدارة أنظمة الشبكات	٣١٢ نشيك	٤	
Total Number of Units						17	11	12	3	26	المجموع			
الفصل التدريبي الثالث	3rd Trimester	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م
						م.و	مج	عم	تم	س.أ				
						CRH	L	P	T	CTH				
	1	STAT 303	Statistics and Probability		3	3	0	1	4		الإحصاء والاحتمالات	٣٠٣ احصا	١	
	2	INET***	Elective Courses -1		3	2	2	0	4		مقرر اختياري -١	***شيك	٢	
	3	INET 323	Advanced Routing Technologies	INET 313	6	4	4	0	8	شبكة ٣١٣	تقنيات التوجيه المتقدمة	٣٢٣ شبكا	٣	
	4	INET 371	Networks Media		3	0	6	0	6		وسائط النقل	٣٧١ شبكا	٤	
Total Number of Units						15	9	12	1	22	المجموع			
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours						و.م: وحدات معتمدة، مح: محاضرة، عم: عملي/ورش، تم: تمارين، س.أ: ساعات اتصال أسبوعي								



4th Trimester	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م
					م.و	مج	عم	تم	س.أ				
					CRH	L	P	T	CTH				
1	GNRL 401	Introduction to Management and Leadership		3	3	0	1	4		مقدمة في الإدارة و القيادة	٤٠١ عامة	١	
2	INSA 444	Open Source Network Systems	INSA 312	4	3	2	0	5	٣١٢ شبك	أنظمة شبكات المصادر المفتوحة	٤٤٤ شبك	٢	
3	INET 424	Advanced Switching Technologies	INET 323	6	4	4	0	8	٣٢٣ شبكا	تقنيات التحويل المتقدمة	٤٢٤ شبكا	٣	
4	INET 433	Networks and Information Security	INSA 312	4	3	2	1	6	٣١٢ شبك	أمن المعلومات والشبكات	٤٣٣ شبكا	٤	
Total Number of Units				17	13	8	2	23	المجموع				

5th Trimester	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م
					م.و	مج	عم	تم	س.أ				
					CRH	L	P	T	CTH				
1	GNRL 402	Engineering Project Management		3	3	0	1	4		إدارة المشاريع الهندسية	٤٠٢ عامة	١	
2	*****	Elective Courses -2		3	2	2	0	4		مقرر اختياري -٢	*****	٢	
3	INET 372	Voice Over IP	INET 313	4	3	2	1	6	٣١٣ شبكا	نقل الصوت عبر الشبكة	٣٧٢ شبكا	٣	
4	INET 444	Networks Design and Engineering	INET 424	4	2	4	0	6	٤٢٤ شبكا	تصميم وهندسة الشبكات	٤٤٤ شبكا	٤	
Total Number of Units				14	10	8	2	20	المجموع				

6th Trimester	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م
					م.و	مج	عم	تم	س.أ				
					CRH	L	P	T	CTH				
1	GNRL405	Engineering Economy		3	3	0	1	4		إقتصاد هندسي	٤٠٥ عامة	١	
2	INET***	Elective Courses -3		3	2	2	0	4		مقرر اختياري -٣	***شبكة	٢	
3	INET 473	Cloud Computing		4	2	4	2	8		الحوسبة السحابية	٤٧٣ شبكا	٣	
4	INET 492	Graduation Project	INET 424	4	2	4	0	6	٤٢٤ شبكا	مشروع التخرج	٤٩٢ شبكا	٤	
Total Number of Units				14	9	10	3	22	المجموع				

م.و: وحدات معتمدة، مح: محاضرة، عم: عملي/ورش، تم: تمارين، س.أ: ساعات اتصال أسبوعي
 CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours

Total Number of Semesters Units		CRH	L	P	T	CTH	المجموع الكلي لوحدات البرنامج		
		م.و	مج	عم	تم	س.أ			
		95	66	58	15	139			
Total Contact Hours × 13	Co-operative Training	المجموع الكلي لوحدات التدريب			التدريب التعاوني	ساعات الإتصال الكلية × ١٣			
1807	0	1807			.	١٨٠٧			



Elective Courses

Elective Courses -1	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م	المقررات الإختيارية - ١
					م.و	مج	عم	تم	س.أ					
					CRH	L	P	T	CTH					
1	INET 351	Communication Networks		3	2	2	0	4		شبكات الاتصال	شبكة ٣٥١	١		
2	INET 352	Wireless Networks Technologies	INET 313	3	2	2	0	4	شبكة ٣١٣	الشبكات اللاسلكية	شبكة ٣٥٢	٢		
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours					و.م: وحدات معتمدة، مح: محاضرة، عم: عملي/ورش، تم: تمارين، س.أ: ساعات اتصال أسبوعي									

Elective Courses -2	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م	المقررات الإختيارية - ٢
					م.و	مج	عم	تم	س.أ					
					CRH	L	P	T	CTH					
1	INSA 485	Internet of Things		3	2	2	0	4		إنترنت الأشياء	٤٨٥ نشبك	١		
2	INET 442	Networks monitoring and Management	INET 313	3	2	2	0	4	شبكة ٣١٣	مراقبة وإدارة الشبكات	شبكة ٤٤٢	٢		
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours					و.م: وحدات معتمدة، مح: محاضرة، عم: عملي/ورش، تم: تمارين، س.أ: ساعات اتصال أسبوعي									

Elective Courses -3	No.	Course Code	Course Name	Prereq	No. of Units					المتطلب	اسم المقرر	رمز المقرر	م	المقررات الإختيارية - ٣
					م.و	مج	عم	تم	س.أ					
					CRH	L	P	T	CTH					
1	INET 434	Cyber Security	INET 433	3	2	2	0	4	شبكة ٤٣٣	الامن السيبراني	شبكة ٤٣٤	١		
2	INET 443	Data Centers	INSA 312	3	2	2	0	4	نشبك ٣١٢	مراكز البيانات	شبكة ٤٤٣	٢		
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours					و.م: وحدات معتمدة، مح: محاضرة، عم: عملي/ورش، تم: تمارين، س.أ: ساعات اتصال أسبوعي									



Brief Course Description

Course Name	Computer Networks	Course Code	INET 313	Credit Hours	6
Description	This course provides a global review of the basic knowledge in computer network. This course will be devoted to studying three big parts: <ul style="list-style-type: none"> - The basic notions of networks, such as addressing, TCP/IP model, the different basic protocols (FTP, SMTP, DNS, HTTP, ...) and the standard IEEE802.X - Basic routing protocols such as RIPv1,2, OSPF, EIGRP. - The fundamental technique and protocols for VLAN creation and design: VTP, STP and inter-vlan 				
Course Name	Networks Media	Course Code	INET 371	Credit Hours	3
Description	In this course, the trainee will learn about different networks cabling and how to manage them. In addition, the trainee will learn how to design, implement and document a network cabling. The trainee will also be able to use the cable testing tools, manipulate connectors, repair damaged cables.				
Course Name	Advanced Routing Technologies	Course Code	INET 323	Credit Hours	6
Description	This course is designed to give the student a broad range of technical details on topics related to routing over IPV4 and IPv6. The different routing protocols are examined and explored: RIPv4, EIGRP, OSPF, and BGP. The Manipulating routing updates, redistribution and controlling information in routers are examined. The different architecture for the connectivity between Enterprise and ISP are presented.				
Course Name	Network and Information Security	Course Code	INET 433	Credit Hours	4
Description	The course covers theory and practice of network and information security, focusing in particular on the security aspects of the network. It surveys cryptographic tools used to provide security. The different weakness in routers and switches will be represented. The different security protocols will be studied, discussed and implemented AAA, IPS/IDS, VPN and PKI over routers or firewalls.				
Course Name	Advanced Switching technologies	Course Code	INET 424	Credit Hours	6
Description	This course is designed to give the student in-depth theoretical explanations of switch topics and provides illustrative design. This course describes in detail the different basic protocols for VLAN creation, such as: VTP1,2,3, STP, RSTP, PvSTP and MTP. A very important part is dedicated to the MLS Multilayer switch, as well as to the operation in the layer 3 for inter-vlan routing with SVI and etherchannel. The last part is dedicated to protocols and technologies for redundancy, HSRP, VRRP, GLBP and high availability with stackWise and VSS.				



Course Name	Voice Over IP	Course Code	INET 372	Credit Hours	4
Description	This course is designed to give the student a basic knowledge of how to maintain and operate a Cisco Unified Communications solution that is based on Cisco Unified Communications Manager, Cisco Unified Communications Manager Express, Cisco Unity Connection, and Cisco Unified Presence. This course provides the students with the knowledge and skills to achieve associate-level competency in Cisco Unified Communications.				

Course Name	Network Design & Engineering	Course Code	INET 444	Credit Hours	4
Description	This course covers the design, implementation, remediation and security of computer network devices and computer network systems. Students should develop core skills in network engineering, they should plan and construct data communication networks, such as local area network (LAN) and wide area network (WAN) systems. This can involve selecting the hardware and software, determining the layout of cables, and overseeing other IT professionals to create networks.				

Course Name	Cloud Computing	Course Code	INET 473	Credit Hours	4
Description	The course aims to identify the ways in which clouds can be deployed as public, private, hybrid, and community clouds. Describing the various service delivery models of a cloud computing architecture, and, followed by a much deeper review of the security and privacy issues related to cloud computing environments.				

Course Name	Communication Networks	Course Code	INET 351	Credit Hours	3
Description	<p>The course covers the concepts and structure for the basic components and systems in communication network, including the architecture and topologies and ITU standards for these networks.</p> <p>The course will be focus in three big parts :</p> <ul style="list-style-type: none"> • PSTN networks • Components for the communication systems and the different transmission methods for analogue and digital systems (AM, FM, PM, ASK, PSK, FSK), Quantization & coding, Time division and frequency division multiplexing, Access network xDSL, and the different communication channel (Cables, Antenna, Satellite,) • Mobile Networks such as GSM, GPRS,... 				

Course Name	Wireless Networks Technologies	Course Code	INET 352	Credit Hours	3
Description	Students will be able to learn the wireless networks, basic wireless devices and wireless topologies. They will learn the fundamentals of Wireless LAN Radio Frequency, Spread spectrum technologies and modulations techniques. They are also going to learn the wireless regulation bodies, standards, and certifications. And, they will learn also on Installing and Configuring Wireless Security and Unified Wireless Network deployment.				



Course Name	Networks monitoring and Management	Course Code	INET 442	Credit Hours	3
Description	By the end of this course, student will achieve the following objectives: Describe fundamental network management concepts. Manage the Network inventory. Map the network using different tools. Manage user access to tasks, functions, and devices. Manage the devices and configuration archive in Cisco Prime Infrastructure. Work with QoS and monitor and troubleshoot the network				

Course Name	Cyber security	Course Code	INET 434	Credit Hours	3
Description	Cyber Security aims to give students a fundamental understanding of how to protect organizations, networks, IT systems and individuals against Cyber attacks and Cyber threats. The course features real-life scenarios and a cyber-security challenge to provide you with hands-on experience in penetration testing and analyzing computing systems with two challenges: Challenge 1: to identify flaws and detect attacks in a computer system by breaking its crypto components and retrieving sensitive information from computers and networks. Challenge 2: find some methods for mitigating the different attacks and eliminate the vulnerabilities in your networks and become an ethical hacker.				

Course Name	Data Centers	Course Code	INET 443	Credit Hours	3
Description	This course is aimed for Data Center Operation designs and Data Center Infrastructure technologies who are in charge of planning data center technology roadmaps. The course covers foundational knowledge, skills, and technologies including, data center networking concepts and technologies, data center storage networking, and Cisco Unified Computing System (UCS) architecture. The course covers also foundational knowledge, skills, and technologies including data center network virtualization, data center automation and orchestration, and Cisco Application Centric Infrastructure (ACI). The hands-on lab exercises focus on configuring features on Cisco Nexus Operating System (NX-OS), Cisco Unified Computing System (UCS), and Cisco UCS Director.				



Courses Description



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Computer Networks	Course Code	INET 313					
Prerequisites		Credit Hours CRH	6		CTH		8	
			L	4	P	4	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description :								
This course provides a global review of the basic knowledge in computer network This course will be devoted to studying three big parts:								
- The basic notions of networks, such as addressing, TCP/IP model, the different basic protocols (FTP, SMTP,DNS, HTTP,...) and the standard IEEE802.X								
- Basic routing protocols such as RIPv1,2, OSPF, EIGRP.								
- The fundamental technique and protocols for VLAN creation and design: VTP, STP and inter-vlan.								
Topics :								
<ul style="list-style-type: none"> ▪ Studies and configure the basic elements for the networks ▪ calculating and optimize the IPv4 and IPv6 addresses for the network. ▪ Studies and configure the basic elements for the static routing. ▪ Studies and configure the basic elements for the dynamic routing protocols such as RIPv1 and2, OSPF and EIGRP. ▪ Knowledge the Switching notions and topologies layers ▪ studies and configure the VTP, STP protocols. ▪ Configure the Inter-vlan routing witch the subinterfaces. 								
Experiments:								
References :								
<ul style="list-style-type: none"> • CCNA Routing and Switching Study Guide, Copyright 2013 by John Wiley & Sons, Inc., Indianapolis, Indiana Published by John Wiley & Sons, Inc. Indianapolis, Indiana Published simultaneously in Canada. • Cisco CCNA Routing and Switching 200-120 Exam Cram, Fourth Edition Copyright © 2014 by Pearson Education. 								

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Chapter 1: LANs, WANs, and the Internet <ul style="list-style-type: none"> • Explain the topologies and devices used in a small- to medium-sized business network. • Explain the basic characteristics of a network that supports communication in a small- to medium-sized business. • Explain trends in networking that will affect the use of networks in small to medium-sized businesses 	2
2	Chapter 2: Network Protocols and Communications <ul style="list-style-type: none"> • Communication • Standards : OSI, TCP/IP, IEEE802.x 	2
3	Chapter 3: Network Access <ul style="list-style-type: none"> • cables • devices 	2
4	Chapter 4: Ethernet <ul style="list-style-type: none"> • Mac Addresses and frame • ARP protocol and RARP 	2
5	Chapter 5: Network Layer and IP addressing <ul style="list-style-type: none"> • IPv4 address • IPv6 address 	3



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
6	Chapter 6: Transport Layer <ul style="list-style-type: none"> Role and proprieties for transport layer TCP and UDP 	3
7	Chapter 7: Application Layer <ul style="list-style-type: none"> FTP, SMTP, POP, DNS, DHCP 	3
8	Chapter 8: Routing Concepts <ul style="list-style-type: none"> Static route configuration Default static route configuration Default route configuration Describe the role of dynamic routing protocols and place these protocols in the context of modern network design. 	5
9	Chapter 9 : RIP version 1 & 2 <ul style="list-style-type: none"> Describe the functions, characteristics, and operation of the RIPv1 protocol. Describe the limitations of RIPv1's limitations. Apply the basic Routing Information Protocol Version 2 (RIPv2) Analyze router output to see RIPv2 support for VLSM and CIDR 	3
10	Chapter 10 : Single-Area & Multiarea OSPF <ul style="list-style-type: none"> Describe the types of packets in ospf Describe the OSPF operation Explain why multiarea OSPF is used. Explain how OSPF established neighbor adjacencies in a multiarea OSPF implementation. Configure multiarea OSPFv2 in a routed network. Configure multiarea route summarization in a routed network Configure a small network 	3
11	Chapter 11: Enhanced Interior Gateway Protocol (EIGRP)Tools <ul style="list-style-type: none"> Describe the features and operation of EIGRP. Examine the different EIGRP packet formats. Calculate the composite metric used by the Diffusing Update Algorithm (DUAL). Examine the commands to configure and verify basic EIGRP. 	3
12	Chapter 12: VLANs <ul style="list-style-type: none"> VLAN Segmentation VLAN Implementation 	3
13	Chapter 13 : Implement VTP and STP <ul style="list-style-type: none"> Explain the role of VTP in a converged switched network Describe the operation of VTP: VTP domains, VTP Modes, VTP Advertisements, and VTP Pruning. Configure VTP on the switches in a converged network. Spanning Tree Concepts Varieties of Spanning Tree Protocols Spanning Tree Configuration 	5
14	Chapter 14 : Inter-VLAN Routing <ul style="list-style-type: none"> Inter-VLAN Routing concepts Inter-VLAN Routing Configuration 	3
Textbook	<ul style="list-style-type: none"> CCNA Routing and Switching Study Guide, Copyright 2013 by John Wiley & Sons, Inc., Indianapolis, Indiana Published by John Wiley & Sons, Inc. Indianapolis, Indiana Published simultaneously in Canada. Cisco CCNA Routing and Switching 200-120 Exam Cram, Fourth Edition Copyright 2014 by Pearson Education. 	



Detailed of Practical Contents		
No.	Contents	Hours
1	Lab1: Networking simulation tools : <ul style="list-style-type: none"> • Packet tracer , GNS3 and Eve • Cisco configuration professional CCP 	8
2	Lab 2: VLSM addressing <ul style="list-style-type: none"> • Calculating a VLSM Addressing Scheme 	4
3	Lab 3: Configuring IPv4 static and default routes <ul style="list-style-type: none"> • Configure Static Routes • Configure and Verify a Default Route 	4
4	Lab 4: Configuring IPv6 Static and default routes <ul style="list-style-type: none"> • Configure Static Routes • Configure and Verify a Default Route 	6
5	Lab 5: Basic RIPv1 configuration <ul style="list-style-type: none"> • RIPv1 on Classful Networks • RIPv1 with Subnets and Between Classful Networks • RIPv1 on a Stub Network. 	4
6	Lab 6: Basic RIPv2configuration <ul style="list-style-type: none"> • Configure RIPv2. • Configure a passive interface. • Disable automatic summarization. • Configure a default route. 	5
7	Lab 7: configuring basic single-area OSPFv2 <ul style="list-style-type: none"> • Configure and Verify OSPF Routing • Change Router ID Assignments • Configure OSPF Passive Interfaces • Change OSPF Metrics 	5
8	Lab 8: Configuring multiarea OSPFv2 <ul style="list-style-type: none"> • Configure a Multiarea OSPFv2 Network • Configure Interarea Summary Routes 	8
9	Lab 9: Basic EIGRP configuration <ul style="list-style-type: none"> • Configure EIGRP routing • Disable automatic summarization. • Configure manual summarization. • Configure a static default route. • Propagate default route to EIGRP neighbors. 	8
10	Lab 10: Basic VLAN configuration <ul style="list-style-type: none"> • Create VLANs • Assign switch ports to a VLAN • Add, move, and change ports • Verify VLAN configuration • Enable trunking on inter-switch connections 	6
11	Lab 11: VTP configuration <ul style="list-style-type: none"> • Configure VLAN Trunking Protocol on all switches. • Modify VTP modes and observe the impact. • Enable VTP pruning on the network. 	6
12	Lab 12: Basic STP configuration <ul style="list-style-type: none"> • Observe and explain the default behavior of Spanning Tree Protocol • Observe the response to a change in the spanning tree topology 	8
13	Lab 13 : Basic inter-vlan routing <ul style="list-style-type: none"> • Configure VLANs and VLAN Trunking Protocol (VTP) on all switches • Configure a router to support 802.1q trunking on a Fast Ethernet interface 	8



Detailed of Practical Contents		
No.	Contents	Hours
	<ul style="list-style-type: none">• Configure a router with sub interfaces corresponding to the configured VLANs	
Textbook	CCNA Routing and Switching, student lab and instructor.	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Networks Media	Course Code	INET 371					
Prerequisites		Credit Hours CRH	3		CTH		6	
			L	0	P	6	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								

Course Description :

In this course, the trainee will learn about different networks cabling and how to manage them. In addition, the trainee will learn how to design, implement and document a network cabling. he will also be able to use the cable testing tools, manipulate connectors, repair damaged cables. Studies concerns copper and fiber cables.

Topics :

Part I • LAN Networks and Cabling

- Chapter 1 Introduction ,Cabling Specifications and Standards
- Chapter 2 Cable System and Infrastructure Constraints
- Chapter 3 Cabling System Components
- Chapter 4 Tools of the Trade
- Chapter 5 Cabling System Design and Installation
- Chapter 6 Cable Connector Installation
- Chapter 7 Cable System Testing and Troubleshooting

Part II • Fiber-Optic Cabling and Components

- Chapter 8 Fiber Splicing and Connectors
- Chapter 9 Fiber-Optic Light Sources
- Chapter 10 Fiber-Optic Detectors and Receivers
- Chapter 11 Cable Installation and Hardware
- Chapter 12 Troubleshooting and Restoration

Experiments:

References : Book : Cabling The Complete Guide to Copper and Fiber-Optic Networking Fourth Edition by Andrew Oliviero (Author), Bill Woodward (Author)

Detailed of Practical Contents		Hours
No.	Contents	Hours
Part I • LAN Networks and Cabling		
1	LAB : Introduction and Cabling Specifications and Standards • Identify different type of cables	6
2	LAB : Cable System and Infrastructure Constraints • Install cables, connect • Type of cloud computing services • Types of cloud storage services	10
3	LAB : Cabling System Components	5
4	LAB : Tools of the Trade • Identify tools , choose best product companies...	5



Detailed of Practical Contents		
No.	Contents	Hours
5	LAB : Cabling System Design and Installation <ul style="list-style-type: none"> • Cabling LAN from NIC to switch • Troubleshooting 	8
6	LAB : Cable Connector Installation <ul style="list-style-type: none"> • Bind Connectors and patch panels 	4
7	LAB : Cable System Testing and Troubleshooting	4
Part II • Fiber-Optic Cabling and Components		
8	LAB : Fiber Splicing and Connectors <ul style="list-style-type: none"> • Bind Connectors and patch cables 	8
9	LAB : Fiber-Optic Light Sources <ul style="list-style-type: none"> • Identify different fiber types and measure loss 	6
10	LAB : Fiber-Optic Detectors and Receivers <ul style="list-style-type: none"> • Research for the break point in fiber, measure the result loss 	6
11	LAB : Fiber Cable Installation and Hardware	6
12	LAB : Fiber Troubleshooting and Restoration	10
Textbook	Book : Cabling The Complete Guide to Copper and Fiber-Optic Networking Fourth Edition by Andrew Oliviero (Author), Bill Woodward (Author)	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Advanced Routing Technologies	Course Code	INET 323					
Prerequisites	INET 313	Credit Hours CRH	6		CTH		8	
			L	4	P	4	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								

Course Description :

This course is designed to give the student a broad range of technical details on topics related to routing. First, complex enterprise network frameworks, architectures, and models are explored, and the process of creating, documenting, and executing an implementation plan is detailed. Internet Protocol (IP) routing protocol principles are examined in detail before the following IP Version 4 (IPv4) routing protocols are explored: Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF), and Border Gateway Protocol (BGP). Manipulating routing updates and controlling the information passed between them are examined. Routing facilities for branch offices and mobile workers are explored. Finally, IP Version 6 (IPv6) is investigated in detail.

Topics :

- Plan and document the configuration and verification of routing protocols and their optimization in enterprise networks.
- Identify the technologies, components, and metrics of EIGRP used to implement and verify EIGRP routing in diverse, large-scale internetworks based on requirements.
- Identify, analyze, and match OSPF multi-area routing functions and benefits for routing efficiencies in network operations in order to implement and verify OSPF routing in a complex enterprise network.
- Implement and verify a redistribution solution in a multi-protocol network that uses Cisco IOS features to control path selection and provides a loop-free topology according to a given network design and requirements.
- Evaluate common network performance issues and identify the tools needed to provide Layer 3 path control that uses Cisco IOS features to control the path.
- Implement and verify a Layer 3 solution using BGP to connect an enterprise network to a service provider.

Experiments: if applicable it will support the theoretical topics.

References :

Diane Teare.,” Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide”, Cisco Press, 5th Printing.

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Basic Network and Routing Concepts: <ul style="list-style-type: none"> • Differentiating Between Dynamic Routing Protocols • How Different Traffic Types, Network Types, and Overlaying Network Technologies Influence Routing • Differentiating Between the Various Branch Connectivity Options and Describing Their Impact on Routing Protocols • How to Configure Routing Information Protocol Next Generation (RIPng) 	2



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
2	EIGRP Implementation: <ul style="list-style-type: none"> Establishing EIGRP Neighbor Relationships Building the EIGRP Topology Table Optimizing EIGRP Behavior Configuring EIGRP for IPv6 Named EIGRP Configuration. 	8
3	Open Short Path First : <ul style="list-style-type: none"> Basic OSPF Configuration and OSPF Adjacencies How OSPF Builds the Routing Table Configuration of Summarization and Stub Areas in OSPF Configuration of OSPFv3 for IPv6 and IPv4 	4
4	Manipulating Routing Updates : <ul style="list-style-type: none"> Using Multiple IP Routing Protocols on a Network Implementing Route Redistribution Controlling Routing Update Traffic 	2
5	Path Control Implementation : <ul style="list-style-type: none"> Using Cisco Express Forwarding Switching Understanding Path Control Implementing Path Control Using Policy-Based Routing Implementing Path Control Using Cisco IOS IP SLAs. 	4
6	Enterprise Internet Connectivity : <ul style="list-style-type: none"> Planning Enterprise Internet Connectivity Establishing Single-Homed IPv4 Internet Connectivity Establishing Single-Homed IPv6 IPv6 Internet Connectivity Improving Internet Connectivity Resilience 	2
7	BGP Implementation: <ul style="list-style-type: none"> BGP Terminology, Concepts, and Operation Implementing Basic BGP BGP Attributes and the Path-Selection Process Controlling BGP Routing Updates Implementing BGP for IPv6 Internet Connectivity 	8
8	Routers and Routing Protocol Hardening: <ul style="list-style-type: none"> Securing the Management Plane on Cisco Routers Describing Routing Protocol Authentication Configuring Authentication for EIGRP Configuring Authentication for OSPFv2 and OSPFv3 Configuring Authentication for BGP peers Configuring VRF-lite 	2
Textbook	Diane Teare., "Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide", Cisco Press, 5th Printing.	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Lab 1 Basic RIPng and Default Gateway Configuration : <ul style="list-style-type: none"> Configure IPv6 addressing. Configure and verify RIPng on R1 and R2. 	2



Detailed of Practical Contents		
No.	Contents	Hours
	<ul style="list-style-type: none"> Configure IPv6 static routes between R2 and R3. Propagate a default route using RIPng. 	
2	Lab 2 EIGRP Load Balancing: <ul style="list-style-type: none"> Review a basic EIGRP configuration. Explore the EIGRP topology table. Identify successors, feasible successors, and feasible distances. 	2
3	Lab 3 EIGRP Stub Routing : <ul style="list-style-type: none"> Configure basic EIGRP. Configure EIGRP stub routing options. Verify EIGRP stub routing options. 	4
4	Lab 4 EIGRP for IPv6: <ul style="list-style-type: none"> Configure EIGRP for IPv6. Verify EIGRP for IPv6. Configure and verify passive routes using EIGRP for IPv6. Configure and verify summary routes using EIGRP for IPv6. Configure and verify default route using EIGRP for IPv6 	4
5	Lab 5 Named EIGRP Configuration : <ul style="list-style-type: none"> Configure Named EIGRP for IPv4 and IPv6. Verify Named EIGRP configuration. Configure and verify passive routes Named EIGRP configuration. Configure and verify default route using Named EIGRP configuration. 	4
6	Lab 6 OSPF Virtual Links: <ul style="list-style-type: none"> Configure multi-area OSPF on a router. Verify multi-area behavior. Create an OSPF virtual link. Summarize an area. Generate a default route into OSPF 	4
7	Lab 7 Multi-Area OSPFv2 and OSPFv3 with Stub Area: <ul style="list-style-type: none"> Configure multi-area OSPFv2 for IPv4. Configure multi-area OSPFv3 for IPv6 Verify multi-area behavior. Configure stub and totally stubby areas for OSPFv2. Configure stub and totally stubby areas for OSPFv3. 	4
8	Lab 8 OSPFv3 Address Families: <ul style="list-style-type: none"> Configure multi-area OSPFv3 for IPv4 AF. Configure multi-area OSPFv3 for IPv6 AF. Verify multi-area behavior. Configure stub and totally stubby areas for both IPv4 and IPv6 AFs 	4
9	Lab 9 Redistribution Between EIGRP and OSPF: <ul style="list-style-type: none"> Review EIGRP and OSPF configuration. Summarize routes in EIGRP. Summarize in OSPF at an ABR. Redistribute into EIGRP. Redistribute into OSPF. Summarize in OSPF at an ASBR. 	4



Detailed of Practical Contents		Hours
No.	Contents	Hours
10	Lab 10 Redistribution Between EIGRP for IPv6 and OSPFv3: <ul style="list-style-type: none"> Review EIGRP and OSPF configuration. Summarize routes in EIGRP. Summarize in OSPF at an ABR and an ASBR. Redistribute into EIGRP. Redistribute into OSPF. 	5
11	Lab 11 Configure IP SLA Tracking and Path Control: <ul style="list-style-type: none"> Configure and verify the IP SLA feature. Test the IP SLA tracking feature. 	5
12	Lab 12 Configuring BGP with Default Routing: <ul style="list-style-type: none"> Configure BGP to exchange routing information with two ISPs. 	5
13	Lab 13 Using the AS_PATH Attribute: <ul style="list-style-type: none"> Use BGP commands to prevent private AS numbers from being advertised to the outside world. Use the AS_PATH attribute to filter BGP routes based on their source AS numbers. 	5
14	Lab 14 Configuring IBGP and EBGP Sessions, Local Preference, and MED: <ul style="list-style-type: none"> For IBGP peers to correctly exchange routing information, use the next-hop-self command with the Local-Preference and MED attributes. Ensure that the flat-rate, unlimited-use T1 link is used for sending and receiving data to and from the AS 200 on ISP and that the metered T1 only be used in the event that the primary T1 link has failed. 	5
15	Lab 15 IBGP, Next Hop and Synchronization : <ul style="list-style-type: none"> Configure EBGP and IBGP . Configure EIGRP in the ITA domain. Troubleshoot and resolve next hop issues in IBGP. Configure full-mesh IBGP to resolve routing issue within ITA domain. Configure ITA so it is not a transit AS. 	5
16	Lab 16 Configuring MP-BGP : <ul style="list-style-type: none"> Configure EIGRP on network. Using MP-BGP, configure EBGP for IPv4 and IPv6 between ISPs, using IPv4 BGP transport for both protocols. Configure MP-BGP IBGP between ISPs. Verify BGP neighbors, BGP tables and routing tables for IPv4 and IPv6. 	6
17	Lab 17 BGP Route Reflectors and Route Filters: <ul style="list-style-type: none"> Configure IBGP routers to use a route reflector and a simple route filter. 	6
Textbook	<ol style="list-style-type: none"> Diane Teare.,”Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide”,Cisco Press, 5th Printing. CCNPv6 ROUTE Student Lab Manual. CCNPv7 Route Student Lab Manual 	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Network and Information Security	Course Code	INET 433					
Prerequisites	INSA 312	Credit Hours CRH	3		CTH		6	
			L	3	P	2	T	1
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description : The course covers theory and practice of network and information security, focusing in particular on the security aspects of the network. It surveys cryptographic tools used to provide security. The different weakness in routers and switches will be represented. The different security protocols will be studied, discussed and implemented AAA, IPS/IDS,VPN and PKI over routers or firewalls.								
Topics : <ul style="list-style-type: none"> ▪ Upon successful completion of this course, students will be able to: ▪ Identify the fundamental concepts of network security and cryptography. ▪ Identify security threats and vulnerabilities. ▪ Identify and implement access control and account management security measures. ▪ IDS/IPS ▪ Configure Firewalls and UTM ▪ Configure VPN layer 2 and 3 with different protocols ▪ Wireless network security. 								
Experiments:								
References : <ul style="list-style-type: none"> ▪ Information technology security handbook, by George Sadowsky and all, the world bank edition 2003 ▪ Computer security handbook, by Seymour Bosworth and all, Wiley edition 2009 								

Detailed of Theoretical Contents		Hours
No.	Contents	Hours
1	Security Fundamentals : <ul style="list-style-type: none"> • Concepts • Threats 	2
2	Security Fundamentals : <ul style="list-style-type: none"> • Attacks • Vulnerabilities 	2
3	Cryptography, signature and Hashing : <ul style="list-style-type: none"> • Symmetric and asymmetric cryptography (DES, AES, RCx, DH, RSA,...) 	2
4	Cryptography, signature and hashing : <ul style="list-style-type: none"> • Hashing SHA1, HMAC, MD5. 	2
5	Public Key Infrastructure: <ul style="list-style-type: none"> • X509 & Digital Certificate • CA, RA, CRL, Certificate Repository, Certificate user, PKCS 	2
7	User Authentication : <ul style="list-style-type: none"> • Describe AAA, Kerberos • Describe TACACS+ and Radius protocols. 	4
8	IDS/IPS <ul style="list-style-type: none"> • Explain the functions and operations of IDS and IPS systems. • Describe the characteristics of IPS signatures. 	4



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
	<ul style="list-style-type: none"> Explain how signature alarms are used in Cisco IPS solutions. Describe the purpose of tuning signature alarms in a Cisco IPS solution. Explain how the signature actions in a Cisco IPS solution affect network traffic. 	
8	Firewalls : <ul style="list-style-type: none"> Concepts Describe the purpose and operation of firewall technologies Zone-based Policy Firewall and DMZ zone 	2
9	Unified threats Management : <ul style="list-style-type: none"> What is Unified Threat Management Unified Threat Management (UTM) Appliance Comparison Fortinet Technologies Fortinet Single sign On Certificate operations Data leak and prevention 	6
10	Implementing Virtual Private Networks: <ul style="list-style-type: none"> Describe VPNs and their benefits VPN layer 2 and 3 VPN Architecture PPTP protocol L2TP protocol IPsec protocol GRE Protocol MPLS Protocol 	10
Textbook	<ul style="list-style-type: none"> Handbook of Applied Cryptography, by Bruce Schneier Wiley Computer Publishing 1998. The Cisco Networking Academy, CCNA Security. CCIE Routing and Switching v5.0 Official Cert Guide, Volume 1 and 2 fifth edition cisco press, November 2014. Comptia security + certification Support skills, James Pengelly, gtslearning2011 . 	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Researching Network Attacks and Security: Audit Tools : <ul style="list-style-type: none"> Researching Network Attacks Researching Security Audit Tools 	4
2	Exploring Encryption Methods : <ul style="list-style-type: none"> Create a Vigenere Cipher Encrypted Message and Decrypt It Use Steganography to Embed a Secret Message in a Graphic Symmetric and asymmetric encryption Singing and hashing 	2
3	Implementing a Basic PKI in Windows Server 2012 R2: <ul style="list-style-type: none"> Install and configure a stand-alone root certification authority (CA). Enroll an enterprise root CA. Modify a certificate template. Enable auto enrollment in a domain. Manage certificates using Windows PowerShell. 	6



Detailed of Practical Contents		
No.	Contents	Hours
4	<p>User Authentication : Securing Administrative Access Using AAA and RADIUS</p> <ul style="list-style-type: none"> • Configure the local user database using Cisco IOS. • Configure AAA local authentication using Cisco IOS. • Configure users on the RADIUS server. • Use Cisco IOS to configure AAA services on a router to access the RADIUS server for authentication. • Test the AAA RADIUS configuration. 	6
5	<p>Firewalls: Implementing Cisco the Adaptive Security Appliance</p> <ul style="list-style-type: none"> • Describe and compare Concepts ASA solutions to other routing firewall technologies. • Describe the default configuration of an ASA 5505 • Configure an ASA to provide basic firewall services. • Configuring Basic ASA Settings and Interface Security Levels • Explain and configure objects groups on an ASA. • Explain and configure access lists with objects groups on an ASA. • Configure an ASA to provide NAT, DMZ, DHCP, ACL services • Configure access control using the local database and AAA server.. 	6
6	<p>Fortigate UTM configuration</p> <ul style="list-style-type: none"> • Basic configuration • Router • Firewall • High availability • Advanced IPsec VPN • Intrusion prevention • Fortiguard security • IPS 	8
7	<p>Configuring a Site-to-Site VPN Using Cisco IOS:</p> <ul style="list-style-type: none"> • Configure VPN Layer 2 • Configure MPLS VPN Layer2. • Configure IPsec VPN settings on two routers • Configure VPN witch GRE • Configure MPLS VPN layer 3 • Configure BGP MPLS VPN • Interconnecting between VPN layer 2 and VPN Layer 3 	10
Textbook	<ul style="list-style-type: none"> • Handbook of applied cryptography by Alfred J Menezes and all, CRC press 2001 • The Cisco Networking Academy CCNA Security. • Security+ Study Guide & DVD Training System, Syngress Publishing 2007 • CCNP Security FIREWALL 642-618 Official Cert Guide, David Hucaby and all, ciscopress 2012. • CCNP Security IPS 642-627 Official Cert Guide, David Hucaby and all, ciscopress 2012. • CCNP Security SECURE 642-637 Official Cert Guide, Sean Wilkins, Ciscopress 2011. • CCIE Routing and Switching v5.0 Official Cert Guide, Volume1 and 2 fifth edition cisco press, November 2014. 	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Advanced switching Technologies	Course Code	INET 424					
Prerequisites	INET 323	Credit Hours CRH	6		CTH		8	
			L	4	P	4	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description : This course is designed to give the student in-depth theoretical explanations of switch topics and provides illustrative design. This course describes in detail the different basic protocols for VLAN creation, such as: VTP1,2,3, STP, RSTP, PvSTP and MTP. A very important part is dedicated to the MLS Multilayer switch, as well as to the operation in the layer 3 for inter-vlan routing with SVI and etherchannel. The last part is dedicated to protocols and technologies for redundancy, HSRP, VRRP, GLBP and high availability with stackWise and VSS.								
Topics : <ul style="list-style-type: none"> ▪ Analyze campus network designs ▪ Implement VLANs in a network campus ▪ Implement spanning tree ▪ Implement inter-VLAN routing in a campus network ▪ Implement a highly available network ▪ Implement high-availability technologies and techniques using multilayer switches ▪ Integrate Switching Features and Technologies for the Campus Network 								
Experiments:								
References : Richard Froom, BalajiSivasubramanian and ErumFrahim, "Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide", Cisco Press, 3rd Printing.								

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Fundamentals Review : <ul style="list-style-type: none"> • Hubs and switches • Bridges and switches • Switches of today • Broadcast domains • MAC addresses • The basic Ethernet frame format • Basic switching function • VLANs • The Spanning Tree Protocol • Trunking • Port channels • Multilayer switching (MLS) 	2
2	Network Design Fundamentals : <ul style="list-style-type: none"> • Campus network structure • Introduction to Cisco switches and their associated architecture 	4
3	Campus Network Architecture : <ul style="list-style-type: none"> • Implementing VLANs and trunks in campus switched architecture • Understanding the concept of VTP and its limitation and configurations • Implementing and configuring EtherChannel 	4



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
4	Spanning Tree in Depth : <ul style="list-style-type: none"> Spanning Tree Protocol (STP) overview, its operations, and history Implement Rapid Spanning Tree Protocol (RSTP) Describe how and where to configure the following features: PortFast, UplinkFast, BackboneFast, BPDU Guard, BPDU Filter, Root Guard, Loop Guard, Unidirectional Link Detection, and FlexLinks Configure Multiple Spanning Tree (MST) Troubleshooting STP. 	4
5	Inter-VLAN Routing: <ul style="list-style-type: none"> Given an enterprise network, design, implement, and verify inter-VLAN routing using an external router or a multilayer switch, using either switch virtual interfaces or routed interfaces Understand Layer 3 EtherChannel and its configuration Understand DHCP operation and its implementation and verification in a given enterprise network. 	4
6	First-Hop Redundancy : <ul style="list-style-type: none"> Overview of FHRP and HSRP Configure and verify VRRP Configure and verify GLBP. 	5
7	Network Management : <ul style="list-style-type: none"> AAA Identity-based networking 802.1X NTP SNMP 	3
8	Switching Features and Technologies for the Campus Network : <ul style="list-style-type: none"> Discovery protocols Unidirectional Link Detection Power over Ethernet SDM templates Monitoring features IP SLA 	5
9	High Availability : <ul style="list-style-type: none"> StackWise The benefits of StackWise Verifying StackWise VSS VSS benefits Verifying VSS Supervisor redundancy Supervisor redundancy modes. 	5
Textbook	Richard Froom, BalajiSivasubramanian and ErumFrahim, "Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide", Cisco Press, 3rd Printing.	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Static VLANs, VLAN Trunking, and VTP Domains and Modes: <ul style="list-style-type: none"> Set up a VTP domain. Create and maintain VLANs. Configure ISL and 802.1Q trunking. 	6
2	Configuring EtherChannel: <ul style="list-style-type: none"> Create EtherChannel Links. Configure and test load balancing options 	4



Detailed of Practical Contents		
No.	Contents	Hours
3	Implement Spanning Tree : <ul style="list-style-type: none"> Observe default Spanning Tree behavior Implement Rapid Spanning Tree Implement STP tool kit components 	6
4	Multiple spanning Tree: <ul style="list-style-type: none"> Implement Multiple Spanning Tree Leverage VTP version 3 with MST 	4
5	Inter-vlan Routing: <ul style="list-style-type: none"> Implement a Layer 3 EtherChannel Implement Static Routing Implement Inter-VLAN Routing 	8
6	DHCP: <ul style="list-style-type: none"> Configure DHCP for IPv4 Configure Stateless DHCP for IPv6 Configure Stateful DHCP for IPv6 	6
7	First Hop Redundancy Protocols – HSRP and VRRP: <ul style="list-style-type: none"> Configure inter-VLAN routing with HSRP with load balancing Configure HSRP authentication Configure HSRP Interface Tracking Configure VRRP Configure VRRP object tracking 	8
8	Hot Standby Router Protocol for IPV6: <ul style="list-style-type: none"> Configure inter-VLAN routing with HSRP for IPV6 to provide redundant, fault-tolerant routing to the internal network. Configure HSRP object tracking Adjust HSRP times for optimization 	4
9	Gateway Load Balancing Protocol (GLBP): <ul style="list-style-type: none"> Configure trunking, VTP, and inter-VLAN routing using router-on-a stick Configure GLBP Configure GLBP priorities Configure GLBP object tracking. 	7
11	Synchronizing Campus Network Devices using Network Time Protocol (NTP): <ul style="list-style-type: none"> Configure network to synchronize time using the Network Time Protocol. Secure NTP using MD5 authentication and access-lists Verify NTP Operation 	5
12	Configure Campus Network Devices to support Simple Network Management Protocol (SNMPv3): <ul style="list-style-type: none"> Configure an SNMP View Configure SNMP version 2c Configure SNMP version 3 Verify SNMP operation 	5
13	IP Service Level Agreements and Remote SPAN in a Campus Environment: <ul style="list-style-type: none"> Configure trunking, VTP, and SVIs. Implement IP SLAs to monitor various network performance characteristics. Implement Remote SPAN 	5
Textbook	<ul style="list-style-type: none"> Richard Froom, BalajiSivasubramanian and ErumFrahim,” Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide”,Cisco Press, 3rd Printing. CCNPv6 SWITCH Student Manual CCNPv7 switch student manual lab 	



Department	Computer Engineering and Information Technologies	Major	Computer Networks							
Course Name	Voice Over IP	Course Code	INET 372							
Prerequisites	INET 313	Credit Hours CRH	4		CTH		6			
			L	3	P	2	T	1		
CRH: Credit Hours			L: Lecture		P: Practical		T: Tutorial		CTH: Contact Hours	
Course Description :										
<p>This course Voice over Internet Telephony (VoIP) is associated with the CCNA Voice certification. The course provides the students with the knowledge and skills to achieve associate-level of competency in Cisco Unified Communications. This course is designed to give the student a basic knowledge of IP telephony installation, configuration, and maintenance skills from small to medium sized IP telephony solutions using Cisco Unified Communications Manager (CUCM), Cisco Unified Communication Manager Express (CUCME) and Voicemail and Presence Solutions.</p>										
Topics :										
<ul style="list-style-type: none"> ▪ Voice Perspectives ▪ Cisco Unified Communications Manager Express ▪ Cisco Unified Communications Manager ▪ Voicemail and Presence Solutions ▪ Voice Network Management and Troubleshooting 										
Experiments:										
References : CCNA Collaboration CICD 210-060 by Mike Valentine - Cisco Press										
CCNA Voice Lab Manual by Brent Sieling- Cisco Press										

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Traditional Voice Versus Unified Voice <ul style="list-style-type: none"> ▪ Analog Connections ▪ Digital Connections ▪ Understanding the PSTN ▪ The Emergence of VoIP 	2
2	Understanding the Components of Cisco Unified Communications <ul style="list-style-type: none"> ▪ Understanding Cisco Unified Communications Manager Express ▪ Understanding Cisco Unified Communication Manager ▪ Understanding Cisco Unity Connection ▪ Understanding Cisco Unified CM IM and Presence ▪ Understanding Video Communications Server and TelePresenceMngt. 	2
3	Understanding Cisco IP Phones <ul style="list-style-type: none"> ▪ Connecting and Powering Cisco IP Phones ▪ VLAN Concepts and Configuration ▪ Understanding the Cisco IP Phone Boot Process ▪ Configuring a Router-Based DHCP Server ▪ Setting the Clock of a Cisco Device with NTP ▪ IP Phone Registration ▪ Quality of Service 	2
4	Getting Familiar with CME Administration <ul style="list-style-type: none"> ▪ Preparing the CME Router for Cisco Configuration Professional 	2



Detailed of Theoretical Contents		
No.	Contents	Hours
	<ul style="list-style-type: none"> ▪ Managing CME Using CCP 	
5	Managing Endpoints and End Users in CME <ul style="list-style-type: none"> ▪ Describe End Users in CME ▪ Create or Modify End Users and Endpoints in CME Using the CCP GUI 	2
6	Understanding the CME Dial Plan <ul style="list-style-type: none"> ▪ Configuring Physical Voice Port Characteristics ▪ Understanding and Configuring Dial Peers ▪ Understanding Router Call Processing and Digit Manipulation ▪ Understanding and Implementing CME Class of Restriction ▪ Using CCP to Implement COR 	2
7	Enabling Telephony Features with CME <ul style="list-style-type: none"> ▪ Configuring a Voice Network Directory ▪ Configuring Call Forwarding ▪ Configuring Call Park ▪ Configuring Call Pickup ▪ Configuring Intercom ▪ Configuring Paging ▪ Configuring After-Hours Call Blocking ▪ Configuring Music on Hold ▪ Configuring Single Number Reach ▪ Configuring Ephone Hunt Groups 	2
8	Administrator and End-User Interfaces <ul style="list-style-type: none"> ▪ Describe the CUCM Administration Interfaces ▪ Describe the End-User Interfaces for CUCM 	2
9	Managing Endpoints and End Users in CUCM <ul style="list-style-type: none"> ▪ Implementing IP Phones in CUCM ▪ Describe End Users in CUCM ▪ Implementing End Users in CUCM 	2
10	Understanding CUCM Dial Plan Elements and Interactions <ul style="list-style-type: none"> ▪ CUCM Call Flows 	2
11	Enabling Telephony and Mobility Features with CUCM <ul style="list-style-type: none"> ▪ Describe Extension Mobility in CUCM ▪ Enable EM in CUCM ▪ Describe Telephony Features in CUCM ▪ Enable Telephony Features in CUCM 	2
12	Enabling Mobility Features in CUCM <ul style="list-style-type: none"> ▪ Understanding CUCM Mobility Features ▪ Implementing Mobility Features in CUCM 	2
13	Voice Messaging Integration with Cisco Unity Connection <ul style="list-style-type: none"> ▪ Describe Cisco Unity Connection ▪ Describe Cisco Unity Connection Users and Mailboxes ▪ Implement Cisco Unity Connection Users and Mailboxes 	3



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
14	Enabling CM IM and Presence Support <ul style="list-style-type: none"> ▪ Describe CM-IMP Features ▪ Describe Cisco Unified Presence Architecture ▪ Enabling CM-IMP 	3
15	Common CME Management and Troubleshooting Issues <ul style="list-style-type: none"> ▪ Troubleshooting Common CME Registration Issues ▪ Troubleshooting Dial Plan and QoS Issues 	3
16	CUCM Monitoring, Maintenance, and Troubleshooting <ul style="list-style-type: none"> ▪ Describe How to Provide End-User Support for Connectivity and Voice Quality Issues ▪ Describe Cisco Unified RTMT ▪ Describe the Disaster Recovery System 	3
Textbook	CCNA Collaboration CICD 210-060 by Mike Valentine - Cisco Press	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Lab1: Establishing Network Connectivity and IP Phone Registration	2
2	Lab2: Exploring CUCME using Command-Line Interface (CLI) Exploring CUCME using Cisco Configuration Professional (CPP) Exploring CUCME using Integrated HTML GUI	2
3	Lab3: Configuring Phones and Users in Cisco Unified Communications Manager Express (CUCME)	2
4	Lab4: Advanced Manual Phone Configuration Using the CLI Adding Directory Numbers, Phones, and Users with Cisco Configuration Professional (CCP)	2
5	Lab5: Cisco Unified Communications Manager Express (CUCME) Dial Plans Configuring Call Legs, Dial Peers, and Wildcards	2
6	Lab6: Cisco Unified Communications Manager Express (CUCME) Productivity Features Configuring the Phone Directory Configuring Call Forwarding Configuring Call Detail Records and Accounting	2
7	Lab7: Exploring the CUCM GUI CUCM Services	2
8	Lab8: Preparing for Phone Registration Autoregistration for Phones	2
9	Lab9: Registering Phones Manually Adding End Users Manually	2
10	Lab10: Registering and Updating Phones Using the Bulk Administration Tool (BAT) Adding End Users with the Bulk Administration Tool (BAT)	2
11	Lab11: Adding End Users with LDAP Synchronization	2



Detailed of Practical Contents		
No.	Contents	Hours
12	Lab12: Call Routing	2
13	Lab13: Class of Control - Partitions and Calling Search Spaces (CSS)	4
14	Lab14: Centralized Cisco Unified Communications Manager (CUCM)–to– Branch Office Call Routing	4
15	Lab15: Hunt Groups	4
16	Lab16: CUCM Telephony Features	4
Textbook	CCNA Voice Lab Manual by Brent Sieling- Cisco Press CCNA Collaboration CICD 210-060 by Mike Valentine - Cisco Press CCNA Voice Lab Manual by Brent Sieling- Cisco Press	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Network Design and Engineering	Course Code	INET 444					
Prerequisites	INET 424	Credit Hours CRH	4		CTH		6	
			L	2	P	4	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								

Course Description :

This course covers the design, implementation, remediation and security of computer network devices and computer network systems. Students should develop core skills in network engineering, computer and network programming and installation. They should know which technology or solution to deploy based on a certain requirements or specifications.

Topics :

Part I General Network Design

- Chapter 1 Network Design Methodology
- Chapter 2 Network Design Models

Part II LAN and WAN Design

- Chapter 3 Enterprise LAN Design
- Chapter 4 Data Center Design
- Chapter 5 Wireless LAN Design
- Chapter 6 WAN Technologies and the Enterprise Edge
- Chapter 7 WAN Design

Part III The Internet Protocol and Routing Protocols

- Chapter 8 Internet Protocol Version 4 Design
- Chapter 9 Internet Protocol Version 6 Design

Part IV Security, Convergence, Network Management

- Chapter 10 Managing Security
- Chapter 11 Voice and Video Design
- Chapter 12 Network Management Protocols

Part V Comprehensive Scenarios

- Chapter 13 Comprehensive Scenarios

Experiments:

References :

Detailed of Theoretical Contents		Hours
No.	Contents	
1	Chapter 1 Network Design Methodology <ul style="list-style-type: none"> • Cisco architecture for the enterprise devices • The plan design • The prepare plan • Implement, operate , optimize 	1
2	Chapter 2 Network Design Models <ul style="list-style-type: none"> • Hierarchical network model • High availability network services 	1
3	Chapter 3 Enterprise LAN Design <ul style="list-style-type: none"> • LAN media • Campus LAN design and models • Best practice for campus network 	2



Detailed of Theoretical Contents		
No.	Contents	Hours
4	Chapter 4 Data Center Design <ul style="list-style-type: none"> Enterprise data center fundamentals Data centers challenges Virtualization technologies Data center interconnect Load balancing in the DC 	3
5	Chapter 5 Wireless LAN Design <ul style="list-style-type: none"> Technologies and options used for wireless LAN 	2
6	Chapter 6 WAN Technologies and the Enterprise Edge <ul style="list-style-type: none"> Design technologies DMZ connectivity Internet Connectivity 	2
7	Chapter 7 WAN Design <ul style="list-style-type: none"> Remote Access VPN 	3
8	Chapter 8 Internet Protocol Version 4 Design <ul style="list-style-type: none"> Header Addressing subnetting 	2
9	Chapter 9 Internet Protocol Version 6 Design <ul style="list-style-type: none"> Header Addressing subnetting 	2
10	Chapter 10 Managing security <ul style="list-style-type: none"> Examine security management Security policy Threats risks 	2
11	Chapter 11 Voice and video design <ul style="list-style-type: none"> Review classical architecture Integrated multiservice networks Call processing deployment models 	2
12	Chapter 12 Network management protocols <ul style="list-style-type: none"> SNMP RMON Net flow CDP LLDP 	2
13	Chapter 13 Comprehensive scenario <ul style="list-style-type: none"> Network case studies 	2
Textbook	Book :Cisco Certified Design Associate Study Guide, 2nd Edition (640-861) 2nd Edition by Todd Lammle (Author), Andy Barkl (Author)	



Detailed of Practical Contents		
No.	Contents	Hours
1	Lab 1 Network Design Methodology <ul style="list-style-type: none"> Selecting methodologies and Devices for Campus Networks Selecting methodologies and Devices for Enterprise Networks 	3
2	Lab 2 Network Design Models <ul style="list-style-type: none"> Planning a Network with Different Users, Hosts, and Services 	3
3	Lab 3 Enterprise LAN Design <ul style="list-style-type: none"> Identify the different elements composed the LAN Network 	3
4	Lab 4 Data Center Design <ul style="list-style-type: none"> Benchmark measurement and energy consumption calculation 	3
5	Lab 5 Wireless LAN Design <ul style="list-style-type: none"> Install and configure basic wireless Network 	4
6	Lab 6 WAN Technologies and the Enterprise Edge <ul style="list-style-type: none"> WAN topology study 	4
7	Lab 7 WAN Design	4
8	Lab 8 Internet Protocol Version 4 Design	4
9	Lab 9 Internet Protocol Version 6 Design	3
10	LAB 12: Managing Security	3
11	LAB 13 : Voice and Video Design	6
12	LAB 14 : Network Management Protocols <ul style="list-style-type: none"> SNMP, SysLog... 	3
13	LAB Comprehensive scenario <ul style="list-style-type: none"> Network case studies 	6
14	LAB :Comprehensive scenario <ul style="list-style-type: none"> Network case studies 	3
Textbook	Book :Cisco Certified Design Associate Study Guide, 2nd Edition (640-861) 2nd Edition by Todd Lammle (Author), Andy Barkl (Author)	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Cloud Computing	Course Code	INET 473					
Prerequisites		Credit Hours CRH	6		CTH		8	
			L	2	P	4	T	2
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description : The course aims to identify the ways in which clouds can be deployed as public, private, hybrid, and community clouds and describing the various service delivery models of a cloud computing architecture, and, followed by a much deeper review of the security and privacy issues related to cloud computing environments.								
Topics : <ul style="list-style-type: none"> ▪ Introduction to Cloud computers ▪ Understanding Cloud Computing ▪ Fundamental Concepts and Models ▪ Cloud-Enabling Technology ▪ Fundamental Cloud Security ▪ Cloud Infrastructure Mechanisms ▪ Cloud Management Mechanisms ▪ Cloud Security Mechanisms ▪ Cloud Architectures ▪ Cost Metrics and Pricing Models cloud 								
Experiments:								
References :								

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Introduction to cloud computing : <ul style="list-style-type: none"> • History of cloud computers. • Architecture. • Why cloud computing • Cloud computing characteristics 	2
2	Understanding Cloud Computing <ul style="list-style-type: none"> • Meaning of the cloud computing • Type of cloud computing services • Types of cloud storage services • Meaning of the cloud computing • Type of cloud computing services • Types of cloud storage services 	2
3	Fundamental Concepts and Models <ul style="list-style-type: none"> • Roles and boundary • Cloud characteristics. • Cloud delivery model • Cloud deployment model 	4



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
4	Cloud-Enabling Technology: <ul style="list-style-type: none"> • Service Oriented Architecture (SOA) and Web Services • Virtualization technologies and components • Virtualization platforms like Xen, KVM, VMware, Virtual Box, Hyper-V • Virtual disk images • Network virtualization 	2
5	Fundamental Cloud Security : <ul style="list-style-type: none"> • Basic Terms and Concepts • Threat Agents • Cloud Security Threats • Additional Considerations • Case Study Example 	4
6	Cloud Infrastructure Mechanisms : <ul style="list-style-type: none"> • Logical Network Perimeter • Virtual Server • Cloud Storage Device • Cloud Usage Monitor • Resource Replication 	4
7	Cloud Management Mechanisms : <ul style="list-style-type: none"> • Single Sign-On (SSO) • Cloud-Based Security Groups • Remote administration System. • Resource management system. Encryption • Hashing • Digital Signature • Public Key Infrastructure (PKI) • Identity and Access Management (IAM) 	4
8	Cloud Security Mechanisms : <ul style="list-style-type: none"> • Hardened Virtual Server Images 	2
9	Cloud Architectures : <ul style="list-style-type: none"> • Describe high availability monitoring options. • Describe switch supervisor redundancy Workload Distribution Architecture • Resource Pooling Architecture Dynamic Scalability Architecture • Elastic Resource Capacity Architecture • Service Load Balancing Architecture • Cloud Bursting Architecture • Elastic Disk Provisioning Architecture • Redundant Storage Architecture 	5
10	Cost Metrics and Pricing Models cloud : <ul style="list-style-type: none"> • Cloud Delivery Models: The Cloud Provider Perspective • Cloud Delivery Models: The Cloud Consumer Perspective 	5
Textbook	Book : Fundamental Cloud Architectures By Thomas Erl, Zaigham Mahmood, Ricardo Puttini	



Detailed of Practical Contents		
No.	Contents	Hours
1	LAB : Understanding Cloud Computing <ul style="list-style-type: none"> • Create accounts Configuration	4
2	LAB : Fundamental Concepts and Models <ul style="list-style-type: none"> • Roles and boundary • Cloud characteristics. • Cloud delivery model • Cloud deployment model 	8
3	LAB : Fundamental Concepts and Models <ul style="list-style-type: none"> • Roles and boundary • Cloud characteristics. • Cloud delivery model • Cloud deployment model 	4
4	LAB : Cloud-Enabling Technology: <ul style="list-style-type: none"> • Develop Web applications • Publish Web applications • Virtualization platforms, VMware, Virtual Box, Hyper -V • Virtual disk images Network virtualization 	8
5	LAB : Fundamental Cloud Security : <ul style="list-style-type: none"> • Threat Agents treatments • Cloud Security Threats developing 	8
6	LAB : Cloud Infrastructure Mechanisms : <ul style="list-style-type: none"> • Install Virtual Server • Configure Cloud Storage Device • Configure Cloud Usage Monitor 	5
7	LAB : Cloud Management Mechanisms : <ul style="list-style-type: none"> • Remote administration System. • Resource management system. 	5
8	LAB : Cloud Security Mechanisms : <ul style="list-style-type: none"> • Encryption • Hashing • Digital Signature • Public Key Infrastructure (PKI) 	9
9	LAB : Cloud Security Mechanisms : <ul style="list-style-type: none"> • Identity and Access Management (IAM) • Single Sign-On (SSO) • Cloud-Based Security Groups • Hardened Virtual Server Images 	5
10	LAB : Cloud Architectures : <ul style="list-style-type: none"> • Describe high availability monitoring options. • Describe switch supervisor redundancy Workload Distribution Architecture • Resource Pooling Architecture 	9



Detailed of Practical Contents		
No.	Contents	Hours
11	LAB : Cost Metrics and Pricing Models cloud : Case study <ul style="list-style-type: none">• Cloud Delivery Models: The Cloud Provider Perspective• Cloud Delivery Models: The Cloud Consumer Perspective	5
Textbook	Book : Fundamental Cloud Architectures By Thomas Erl, Zaigham Mahmood, Ricardo Puttini	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Communication Network	Course Code	INET 351					
Prerequisites		Credit Hours CRH	3		CTH		4	
			L	2	P	2	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description : Introduction to telecommunications for non-telecom majors. A brief description for the different components in telecommunication systems and networks with an introduction for the characteristic in analog and digital signals and modulation systems. A transmission channels (cable, fiber, satellite,...) and a PSTN, GSM network are also introduced.								
Topics : <ul style="list-style-type: none"> ▪ Signals ▪ Modulation ▪ Multiplexing ▪ Transmission channels ▪ PSTN, GSM 								
Experiments:								
References :								

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Chapter 1: Information and signals : - Analog and digital signals - Bandwidth, speed, frequency, - sources code (BCD, Baudot, ASCII)	3
2	Chapter 2 : Communications systems - Components of communications systems - Analog Communications (AM, FM, PM)	3
3	Chapter 3: Digital information coding - RZ, NRZ, HDBn,...	3
4	Chapter 4: Digital communications : - ASK, FSK, PSK, QAM	3
5	Chapter 5: Digital modem - ADSL, SDSL - HDSL, VDSL	2
6	Chapter 6: Error detector - Parity - CRC, Hamming	2
7	Chapter 7 : multiplexing technologies - TDM - FDM	2
8	Chapter 7: Transmission channel: - Cable, - Optical Fiber - Antenna - Satellite - Signals converter component	3



Detailed of Theoretical Contents		
No.	Contents	Hours
9	Chapter 8 : Telecommunication Networks - PSTN - PDH - SDH - Mobile	6
Textbook	Introduction to Telecommunications Networks, Gordon F. Snyder, Thomson/Delmar Learning, 2003 Signaling in Telecommunication Networks, John G. van Bosse, Wiley & Sons, 2008	

Detailed of Practical Contents		
No.	Contents	Hours
1	Lab 1: Signals study	4
2	Lab 2 : Analog communication	3
3	Lab 3: Information Coding	3
4	Lab 4: Digital Communication	6
5	Lab 5: Information multiplexing	3
6	Lab 6: Transmission channels study	6
Textbook		



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Wireless Networks	Course Code	INET 352					
Prerequisites	INET 313	Credit Hours CRH	3		CTH		4	
			L	2	P	2	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description : Implementing Cisco Wireless Network Fundamentals course, is designed to help students prepare for the Wireless certification, an associate level certification specializing in the wireless field. The Wireless curriculum will prepare wireless network associate for the use, positioning, planning, implementation and operation of Cisco WLAN networks. The goal of the course is to provide students with information and practice activities to prepare them to help design, install, configure, monitor and conduct basic troubleshooting tasks of a Cisco WLAN in Small to Medium and Enterprise installations.								
Topics : <ul style="list-style-type: none"> ▪ RF Fundamentals ▪ 802.11 Technology Fundamentals ▪ Implementing a Wireless Network ▪ Operating a Wireless Network ▪ Configuring of Client Connectivity ▪ Performing Client Connectivity Troubleshooting ▪ Site Survey Process 								
Experiments:								
References : CCNA Wireless 200-355 by David Hucaby Official Cert Guide (CiscoPress) https://www.cisco.com/c/en/us/support/wireless/index.html								

Detailed of Theoretical Contents		
No.	Contents	Hours
1	RF Signals and Modulation <ul style="list-style-type: none"> ▪ Comparing Wired and Wireless Networks ▪ Understanding Basic Wireless Theory ▪ Carrying Data Over an RF Signal 	1
2	RF Standards <ul style="list-style-type: none"> ▪ Regulatory Bodies ▪ IEEE Standards Body ▪ 802.11 Channel Use ▪ IEEE 802.11 Standards ▪ Wi-Fi Alliance 	1
3	RF Signals in the Real World <ul style="list-style-type: none"> ▪ Interference ▪ Free Space Path Loss ▪ Effects of Physical Objects 	1
4	Understanding Antennas <ul style="list-style-type: none"> ▪ Antenna Characteristics and Antenna Types ▪ Adding Antenna Accessories 	1
5	Wireless LAN Topologies <ul style="list-style-type: none"> ▪ Types of Wireless Networks ▪ Wireless LAN Topologies ▪ Other Wireless Topologies 	1



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
6	Understanding 802.11 Frame Types <ul style="list-style-type: none"> ▪ 802.11 Frame Format ▪ 802.11 Frame Addressing ▪ Accessing the Wireless Medium ▪ 802.11 Frame Types ▪ Client Housekeeping 	1
7	Planning Coverage with Wireless APs <ul style="list-style-type: none"> ▪ AP Cell Size ▪ Adding APs to an ESS ▪ Designing and Validating Coverage with Site Surveys 	2
8	Understanding Cisco Wireless Architectures <ul style="list-style-type: none"> ▪ Distributed Architectures ▪ Split-MAC Architectures ▪ Cisco Wireless Network Building Blocks 	2
9	Implementing Autonomous and Cloud Deployments <ul style="list-style-type: none"> ▪ Initially Configuring an Autonomous AP ▪ Initially Configuring Cloud-based APs 	2
10	Implementing Controller-based Deployments & Controller Discovery <ul style="list-style-type: none"> ▪ Connecting a Centralized Controller ▪ Performing an Initial Setup ▪ Maintaining a Wireless Controller ▪ Discovering a Controller 	2
11	Understanding Roaming <ul style="list-style-type: none"> ▪ Roaming Overview ▪ Roaming Between Centralized Controllers ▪ Roaming Between Converged Controllers 	2
12	Wireless Security Fundamentals <ul style="list-style-type: none"> ▪ Anatomy of A secure Connection ▪ Wireless Client Authentication Methods ▪ Open Authentication ▪ WEP ▪ 802.1x/EAP ▪ Wireless Privacy and Integrity Methods ▪ WPA and WPA2 ▪ Security Management Frames with MFP ▪ Configuring Wireless Security 	2
13	Configuring a WLAN & Implementing Wireless Guest Network <ul style="list-style-type: none"> ▪ WLAN Overview ▪ Configuring a WLAN ▪ Guest Network Overview ▪ Configuring a Guest Network 	2
14	Configuring Client Connectivity & Managing Cisco Wireless Networks <ul style="list-style-type: none"> ▪ Configuring Common Wireless Clients ▪ Cisco Compatibility Extensions ▪ Cisco Unified Access Overview ▪ Using Prime Infrastructure 	2
15	Dealing with Wireless Interference <ul style="list-style-type: none"> ▪ Understanding Types of Interference ▪ Using Tools to Detect and Manage Interference 	2
16	Troubleshooting WLAN Connectivity <ul style="list-style-type: none"> ▪ Troubleshooting Client Connectivity ▪ Troubleshooting AP Connectivity ▪ Checking the RF Environment 	2
Textbook	CCNA Wireless 200-355 by David Hucaby Official Cert Guide (CiscoPress)	



Detailed of Practical Contents		
No.	Contents	Hours
1	Basic Wireless LAN Connection Configuration	1
2	WPA and Wi-Fi Protected Access 2 (WPA 2) Configuration	1
3	VLANs on Aironet Access Points Configuration	1
4	Access Point as a Workgroup Bridge, Repeater and an Extended Configuration	1
5	Lightweight AP (LAP) Registration to a Wireless LAN Controller	1
6	Authentication on Wireless LAN Controllers Configuration	1
7	Guest WLAN and Internal WLAN using WLCs Configuration	2
8	Unified Wireless Network Local EAP Server Configuration	2
9	EAP-FAST Authentication with Wireless LAN Controllers and External RADIUS Server Configuration	4
10	PEAP under Unified Wireless Networks with Microsoft Internet Authentication Service (IAS)	4
11	PEAP under Unified Wireless Networks with ACS and Windows Server	4
12	Wireless LAN Controller Layer 2 Roaming and Configuration	2
13	Wireless LAN Controller Layer 3 Roaming and Configuration	2
Textbook	CCNA Wireless 200-355 by David Hucaby Official Cert Guide (CiscoPress)	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Networks monitoring and Management	Course Code	INET 442					
Prerequisites	INET 313	Credit Hours CRH	3		CTH		4	
			L	2	P	2	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								

Course Description :

By the end of this course, student will achieve the following objectives:
 Describe fundamental network management concepts. Manage the Network inventory. Map the network using different tools. Manage user access to tasks, functions, and devices. Manage the devices and configuration archive in Cisco Prime Infrastructure. Work with QoS and monitor and troubleshoot the network

Topics :

- Chapter 1: Inventory Software and Tools Overview
- Chapter 2: Inventory Management
- Chapter 3: Map the Network
- Chapter 4: Access Control
- Chapter 5: System Administration
- Chapter 6: Configuration Management
- Chapter 7: Compliance Management
- Chapter 8: Services Management
- Chapter 9: Monitor and Troubleshoot

Experiments:

References :

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Chapter 1: Inventory software tolls Overview	2
2	Chapter 2: Inventory Management	2
3	Chapter 3: Map the Network	2
4	Chapter 4: Access Control	2
5	Chapter 5: System Administration	3
6	Chapter 6: Configuration Management	3
7	Chapter 7: Compliance Management	3
8	Chapter 8: Services Management	4



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
9	Chapter 9: Monitor and Troubleshoot	2
Textbook	Book : Managing Enterprise Networks with Cisco Prime Infrastructure	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Lab 2: Infrastructure and Configuration	1
2	Lab 3: Populate the Network Inventory	1
3	Lab 4: Manage the Network Inventory	1
4	Lab 5: Manage Groups	2
5	Lab 6: Manage Device Software Images	2
6	Lab 7: Manage Wireless Maps	2
7	Lab 8: Manage Network Topology Maps	2
8	Lab 9: Create a Virtual Domain and Add a User	2
9	Lab 10: Manage the Configuration Archive	2
10	Lab 11: Manage Wired Device Templates	2
11	Lab 12: Manage Wireless Device Configurations	2
12	Lab 13: Manage Compliance Features	2
13	Lab 14: Manage Converged Access Work Flow	2
14	Lab 15: Manage AVC (Application Visibility and Control) and QoS	2
15	Lab 16: Monitor Devices and Interfaces	2
16	Lab 19: Generate Reports	2
Textbook	Cisco Prime Infrastructure : Administrator Guide	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Cyber Security	Course Code	INET 434					
Prerequisites	INET 433	Credit Hours CRH	3		CTH		4	
			L	2	P	2	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								

Course Description :

Cyber security is a skilled professional who understands and knows how to look for weaknesses and vulnerabilities in target systems and uses the same knowledge and tools as a malicious hacker, but in a lawful and legitimate manner to assess the security posture of a target system(s).

Cyber security can be automated with software applications or they can be performed manually. Either way, the process includes gathering information about the target before the test (reconnaissance), identifying possible entry points, attempting to break in (either virtually or for real) and reporting back the findings.

Topics :

- Reconnaissance
- Scanning
- System hacking
- Vulnerabilities detection,
- Counter measures

Experiments:

- Kali linux
- Metasploit
- Vmware

References :

- Cisco, Cyber security essentials, network academy
- Certified ethical hacking version 9
- Practical Hacking Techniques and Countermeasures, Mark D. Spivey, CISSP, Auerbach Publications 2007.
- Metasploit, The Penetration Tester's Guide, Copyright 2011 by David Kennedy, Jim O'Gorman, Devon Kearns, and Mati Aharoni. Publisher: William Pollock Production Editor: Alison Law

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Chapter 1: Introduction to cybersecurity: <ul style="list-style-type: none"> • Information security overview • Ethical hacking concepts, phases, types and scope • Information security laws and standards 	1
2	Chapter 2: Footprinting and reconnaissance <ul style="list-style-type: none"> • Footprinting concepts • Footprinting methodology • Footprinting tools • Footprinting countermeasures 	2
3	Chapter 3: Scanning network <ul style="list-style-type: none"> • Network scanning • Ports scanning • Vulnerabilities scanning 	2
4	Chapter 4: Enumeration <ul style="list-style-type: none"> • Enumeration concepts • NetBios enumeration • SNMP, LDAP, NTP Enumeration • Enumeration countermeasures 	3



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
5	Chapter 5: System Hacking <ul style="list-style-type: none"> Cracking passwords Escalating privileges Executing applications Hiding files Covering tracks Penetration testing 	3
6	Chapter 6: Malware threats <ul style="list-style-type: none"> Introduction to malware Torjan, virus and worm concepts Malware reverse engineering Malware detection countermeasures 	3
7	Chapter 7: Sniffing <ul style="list-style-type: none"> Sniffing concepts MAC, DHCP, DNS, ARP attacks Sniffing tools Sniffing countermeasures 	2
8	Chapter 8: Social engineering <ul style="list-style-type: none"> Social engineering concepts and techniques Impersonation and identity theft Countermeasures 	3
9	Chapter 9: Denial of service <ul style="list-style-type: none"> DoS/DDoS concepts and attack techniques Botnets DoS/DDoS attack tools Countermeasures 	3
Textbook	<ul style="list-style-type: none"> Certified ethical hacking version 9 Practical Hacking Techniques and Countermeasures, Mark D. Spivey, CISSP, Auerbach Publications 2007. Metasploit, The Penetration Tester's Guide, Copyright 2011 by David Kennedy, Production Editor: Alison Law. 	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Lab 1: creation your Cyber security lab <ul style="list-style-type: none"> Install Vmware Install kali linux Windows server Windows pro 	2
2	Lab 2 : Footprinting and reconnaissance with: <ul style="list-style-type: none"> Maltego dmitry Armitage 	3
3	Lab 3: scanning network with : <ul style="list-style-type: none"> Nmap ID serve Netcraft 	3
4	Lab 4: Enumeration with : <ul style="list-style-type: none"> SuperScan Heyna NetBios Enumerator 	4



Detailed of Practical Contents		
No.	Contents	Hours
5	Lab 5: System Hacking with : <ul style="list-style-type: none"> • Rtgcb, winrtgen • Elcomsoft • PDQ deploy 	4
6	Lab 6: Malware threats with : <ul style="list-style-type: none"> • Rootkit • Shell virus 	4
7	Lab 7: Sniffing with : <ul style="list-style-type: none"> • Cain Abel • Xarp • Observer 	2
8	Lab 8: Social Engineering with : <ul style="list-style-type: none"> • phishing • Spying • Social networking 	4
9	Lab 9: Denial of service with : <ul style="list-style-type: none"> • Botnet • Dereil • LOIC 	4
Textbook	<ul style="list-style-type: none"> - Certified ethical hacking version 9 - Practical Hacking Techniques and Countermeasures, Mark D. Spivey, CISSP, Auerbach Publications 2007. - Metasploit, The Penetration Tester's Guide, Copyright 2011 by David Kennedy, Production Editor: Alison Law. 	



Department	Computer Engineering and Information Technologies	Major	Computer Networks					
Course Name	Data centers	Course Code	INET 443					
Prerequisites	INSA 312	Credit Hours CRH	3		CTH		4	
			L	2	P	2	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								

Course Description :

The course covers foundational knowledge, skills, and technologies including data center network virtualization, data center networking concepts and technologies, data center storage networking, and Cisco Unified Computing System (UCS) architecture, unified computing, data center automation and orchestration, and Cisco Application Centric Infrastructure (ACI). The hands-on lab exercises focus on configuring features on Cisco Nexus Operating System (NX-OS), Cisco Unified Computing System (UCS), and Cisco UCS Director.

Topics :

- Nexus switches
- Compare storage connectivity options in the data center
- Fibre Channel name server and fabric login (FLOGI) process
- Configure Cisco Unified Computing System
- Configure Cisco data center virtualization
- Configure Cisco data center networking
- Configure Cisco automation and orchestration
- Verify Cisco Application-Centric Infrastructure

Experiments:

- Cisco UCS Manager, UCS Central, UCS Director
- Cisco Nexus 2000 Fabric Extenders
- Cisco Nexus 1000-5000 Switches
- Cisco MDS 9000 Multilayer Fabric Switches
- Cisco MDS 9710 Multilayer Director

References :

- CCNA Data Center DCICT 200-155 Official Cert Guide, Published Jan 31, 2017 by [Cisco Press](#).
- CCNA Data Center (200-150, 200-155) Official Cert Guide Library, Published Jan 31, 2017 by [Cisco Press](#).
- CCNA Data Center DCICT 640-916 Official Cert Guide, Navaid Shamsee, David Klebanov, Hesham Fayed, Ahmed Afrose, Ozden Karakok Copyright 2015 Pearson Education, Inc. Published by: Cisco Press.

Detailed of Theoretical Contents		
No.	Contents	Hours
1	Chapter 1: Basic Data Center Storage <ul style="list-style-type: none"> • Describing Storage Connectivity Options in the Data Center • Describing Fibre Channel Storage Networking • Describing VSANs 	2
2	Chapter 2: Advanced Data Center Storage <ul style="list-style-type: none"> • Describing Communication Between Initiator and Target • Describing Fibre Channel Zone Types and Their Uses • Describing Cisco NPV Mode and NPIV • Describing Data Center Ethernet Enhancements • Describing Fibre Channel over Ethernet 	2
3	Chapter 3: Cisco UCS Architecture <ul style="list-style-type: none"> • Describing Cisco UCS Server Hardware Components • Cisco UCS Physical Connectivity for a Fabric Interconnect Cluster • Describing the Cisco UCS Manager Interfaces 	3



Detailed of Theoretical Contents		Hours
No.	Contents	Hours
4	Chapter 4: Cisco Data Center Network Virtualization <ul style="list-style-type: none"> • Functional Planes of Cisco Nexus Switches • Cisco Nexus Operating System VRF Contexts • Virtual Device Contexts • Function of Overlays • Virtualization • Virtual Switches 	4
5	Chapter 5: Cisco Data Center Network Technologies Configuration <ul style="list-style-type: none"> • Cisco Fabric Extender Connectivity • Port Channels and Virtual Port Channels • Cisco Fabric Path • Unified Port Feature of Cisco Nexus Switches • Cisco Unified Fabric 	4
6	Chapter 6: Cisco Unified Computing System <ul style="list-style-type: none"> • Data Center Server Connectivity • Cisco IMC Supervisor • Cisco UCS Manager Operations • Role-Based Access Control • Hardware Abstraction in Cisco UCS 	4
7	Chapter 7: Data Center Automation and Orchestration <ul style="list-style-type: none"> • Utility of Application Programming Interfaces • Cloud Computing Basic Concepts • Cloud Attributes and Service Models • Cisco UCS Director • VDCs, Tenants, and Policies • Orchestration • Managing Catalogs and Templates • Reporting in Cisco UCS Director (Cloud Sense) 	4
8	Chapter 8: Cisco Application-Centric Infrastructure <ul style="list-style-type: none"> • Cisco ACI • Cisco ACI Fabric • Programming and Orchestrating Cisco ACI 	4
Textbook	<ul style="list-style-type: none"> ▪ CCNA Data Center DCICT 200-155 Official Cert Guide, Published Jan 31, 2017 by Cisco Press. ▪ CCNA Data Center (200-150, 200-155) Official Cert Guide Library, Published Jan 31, 2017 by Cisco Press. ▪ CCNA Data Center DCICT 640-916 Official Cert Guide, Navaid Shamsee, David Klebanov, Hesham, 2015 Pearson Education, Published by: Cisco Press 	

Detailed of Practical Contents		Hours
No.	Contents	Hours
1	Lab : Configure VSANs and zoning	2
2	Lab : Validate FLOGI and FCNS	3
3	Lab : Explore the Cisco UCS Manager GUI	2
4	Lab: Configure a Port Group in the DVS	3



Detailed of Practical Contents		
No.	Contents	Hours
5	Lab: Configure Virtual Port Channels <ul style="list-style-type: none"> Configure Virtual Port Channels with FEX Configure Unified Ports on Cisco Nexus Switch 	3
6	Lab: Implement FCoE <ul style="list-style-type: none"> Configure Local RBAC Configure a Service Profile Template 	3
7	Lab: Configure Cisco NX-OS with APIs <ul style="list-style-type: none"> Explore Cisco UCS Director Create Policies and VDCs 	6
8	Lab: Create a Catalog and Provision a VM Using the Self-Service <ul style="list-style-type: none"> Explore Cisco UCS Director Built-In Reports View Chargeback and Reports 	3
Textbook	<ul style="list-style-type: none"> CCNA Data Center DCICT 200-155 Official Cert Guide, Published Jan 31, 2017 by <u>Cisco Press</u>. CCNA Data Center (200-150, 200-155) Official Cert Guide Library, Published Jan 31, 2017 by <u>Cisco Press</u>. CCNA Data Center DCICT 640-916 Official Cert Guide, Navaid Shamsee, David Klebanov, Hesham Fayed, Ahmed Afrose, Ozden Karakok Copyright 2015 Pearson Education, Inc. Published by: Cisco Press. 	



Department	Engineering of Computer and Information Technology	Major	Computer Networks					
Course Name	Graduation Project	Course Code	INET 492					
Prerequisites	INET 242	Credit Hours CRH	4		CTH		6	
			L	2	P	4	T	0
CRH: Credit Hours L: Lecture P: Practical T: Tutorial CTH: Contact Hours								
Course Description : Trainee should choose a topic that reflects the knowledge and skills he learned throughout the program study. It is recommended that each student does his own project. The project based learning method should be conducted in this course.								
Topics : <ul style="list-style-type: none"> ▪ Week 1-2: Forming the team, selecting a project topic, and studying the final report format. ▪ Week 3: project proposal approval by the advisor. ▪ Week 4: Project plan due. ▪ Week 5-8: Start building/implementing the project and advisor feedback. ▪ Week 9: Progress report and presentation and advisor feedback. ▪ Week 10-13: Building project continue and start writing the final report. ▪ Week 14: Testing or/and Debugging or/and Troubleshooting. ▪ Week 15: Distributing the final report to the testing committee. ▪ Week 16: The final report and presentation in front of the committee. 								
Experiments:								
References :								



Appendix Laboratory Equipment, Workshops and Laboratories

No.	Laboratory name / workshop	Capacity of training	Human Resources	Training courses benefiting from the laboratory / workshop / lab
1	CCNA/CCNP Lab	20	CCNP trainers	Computer Networks Advanced Routing Technologies Advanced Switching Technologies
2	Voice Lab	20	CCNA Voice trainer	Voice Over IP
3	Wireless Lab	20	CCNA Wireless trainer	Wireless Networks
4	Security Lab	20	CCNA Security trainers	Networks and Information Security Cyber Security
5	MCSA Lab	20	MCSA trainers	Network Administration 1 Networks monitoring and Management
6	Linux Lab	20	Linux trainer	Open Source Networks Systems
7	Data Center Lab	20	Data Center trainers	Data Centers Cloud Computing

List of Detailed Equipment for Each Laboratory, Workshop or Lab

CCNA / CCNP Lab		
No.	Product's Name	Quantity
1.	Cisco 1941 with Security Technology Package License	3
2.	2-Port Serial WAN Interface Card	3
3.	V.35 Cable, DTE Male to Smart Serial, 10 Feet	3
4.	V.35 Cable, DCE Female to Smart Serial, 10 Feet	3
5.	Cisco Catalyst 3650 24 Port Data 4x1G Uplink IP Services	3
6.	Catalyst 2960 24 10/100 + 2 1000BT LAN Base Image	3
7.	PCs acting as clients/servers	21
8.	Ethernet cables	21
9.	Ethernet cables (x-over)	10



Voice Lab		
No.	Product's Name	Quantity
1.	Cisco Unified Communications Manager Version 12.0 (Virtualized Environment 16GB RAM recommended or more)	5
2.	Cisco IP PHone 7800 or 8800 Series	21
3.	PCs acting as clients	21
4.	Ethernet cables	21
5.	Ethernet cables (x-over)	10

Wireless Lab		
No.	Product's Name	Quantity
1.	Cisco 2504 Wireless Controller (small to midsize)	6
2.	Cisco Aironet 1830 Series Access Points	12
3.	PCs acting as clients	21
4.	Ethernet cables	21
5.	Ethernet cables (x-over)	10

Security Lab		
No.	Product's Name	Quantity
1.	Cisco 1941 w/2 GE,2 EHWIC slots,256MB CF,512MB DRAM,IP Base	3
2.	Cisco 1941 with Security Technology Package License w/2 GE, 2 EHWIC slots, 256MB CF, 512MB DRAM, IP Base	3
3.	V.35 Cable, DTE Male to Smart Serial, 10 Feet	3
4.	V.35 Cable, DCE Female to Smart Serial, 10 Feet	3
5.	ASA 5505 Appliance with SW, 10 Users, 8 ports, 3DES/AES	3
6.	SMARTnet 8X5XNBD ASA5505-BUN-K9	3
7.	PCs acting as clients	21
8.	Ethernet cables	21



9.	Ethernet cables (x-over)	5
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MCSA Lab

No.	Product's Name	Quantity
1.	Computer (MCSA 2012 Virtual Machines (20410-20409 – 20411 - 20412))	21

Linux Lab

No.	Product's Name	Quantity
1.	Computer (with Linux Operating System)	21

Data Center Lab

No.	Product's Name	Quantity
1.	Computer (with Virtual Machines (20341 - 20246))	21



References

Textbooks	1.	CCNA Routing and Switching Study Guide, Copyright 2013 by John Wiley & Sons, Inc., Indianapolis, Indiana Published by John Wiley & Sons, Inc. Indianapolis, Indiana Published simultaneously in Canada.
	2.	Cisco CCNA Routing and Switching 200-120 Exam Cram, Fourth Edition Copyright 2014 by Pearson Education.
	3.	CCNA Routing and Switching, student lab and instructor.
	4.	Book : Cabling The Complete Guide to Copper and Fiber-Optic Networking Fourth Edition by Andrew Oliviero (Author), Bill Woodward (Author)
	5.	Diane Teare.,”Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide”,Cisco Press, 5th Printing.
	6.	Diane Teare.,”Implementing Cisco IP Routing (ROUTE) Foundation Learning Guide”,Cisco Press, 5th Printing.
	7.	CCNPv6 ROUTE Student Lab Manual.
	8.	CCNPv7 Route Student Lab Manual
	9.	Handbook of Applied Cryptography, by Bruce Schneie Wiley Computer Publishing 1998.
	10.	The Cisco Networking Academy, CCNA Security.
	11.	CCIE Routing and Switching v5.0 Official Cert Guide, Volume1 and 2 fifth edition cisco press, November 2014.
	12.	Comptia security + certification Support skills, James Pengelly, gtslearning2011
	13.	Handbook of applied cryptography by Alfred J Menezes and all, CRC press 2001
	14.	The Cisco Networking Academy CCNA Security.
	15.	Security+ Study Guide & DVD Training System, Syngress Publishing 2007
	16.	Richard Froom, BalajiSivasubramanian and ErumFrahim,” Implementing Cisco IP Switched Networks (SWITCH) Foundation Learning Guide”,Cisco Press, 3rd Printing.
	17.	CCNPv6 SWITCH Student Manual
	18.	CCNA Collaboration CICA 210-060 by Mike Valentine - Cisco Press
	19.	CCNA Voice Lab Manual by Brent Sieling- Cisco Press
	20.	Book : Fundamental Cloud Architectures By Thomas Erl, Zaigham Mahmood, Ricardo Puttini
	21.	CCNA Wireless 200-355 by David Hucaby Official Cert Guide (CiscoPress)