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

المملكة العربية السعودية
المؤسسة العامة للتدريب التقني والمهني
الإدارة العامة للمناهج

نسخة أولية

الخطط التدريبية للكليات التقنية

Training Plans for Technical Colleges

Curriculum for Department of

Engineering of Computer and Information Technology

Major
Computer Network Systems Support

A Bachelor's Degree

Semesters
1439 H – 2018 G

Program Description

This program aims at enabling graduates to perform the daily routine duties and functions in a network environment in a professional manner. In addition, the program allows graduates to take a holistic approach to solve problems in their professions through applying professional judgment to balance risk, cost, and benefits.

Graduates can apply their knowledge and skills to solve a verity of Network systems in terms of being to analyses, design, construct, operate, synthesis, and maintain complex networks.

This program enhances graduate's skills of being highly adaptable to the workplace with the potential to succeed as a professional.

Moreover, the program enables graduates to build a continual life-long sustainable style of learning in their professions.

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 Network Systems Administration.

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Study Plan

Sixth Semester								
No.	Course Code	Course Name	Pre. Req	No. of Units				
				CRH	L	P	T	CTH
1	MATH 301	Mathematics -1		3	2	2	0	4
2	PHYS 301	Physics		3	2	2	0	4
3	ENGL 301	English Language -1		3	3	0	1	4
4	INSA 312	Basic Networks Systems Administration		4	2	4	0	6
5	INSA 351	Network Technologies -1		3	2	2	0	4
6	INSA 343	Problems Solving Strategies		3	2	2	0	4
Total				19	13	12	1	26
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Seventh Semester								
No.	Course Code	Course Name	Pre. Req	No. of Units				
				CRH	L	P	T	CTH
1	MATH 303	Discrete Math	MATH 301	3	2	2	0	4
2	GNRL 401	Introduction to Management and Leadership		2	2	0	0	2
3	INSA 371	Advanced Network Administration	INSA 312	4	2	4	0	6
4	INSA 452	Network Technologies -2	INSA 351	3	2	2	0	4
5		Elective Course -1		4	3	2	0	5
Total				16	11	10	0	21
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Eighth Semester								
No.	Course Code	Course Name	Pre. Req	No. of Units				
				CRH	L	P	T	CTH
1	STAT 303	Statistics and Probability		3	3	0	1	4
2	ENGL 302	English Language -2	ENGL 301	3	3	0	1	4
3	INSA 453	Data Center Operation -1	INSA 371	4	2	4	0	6
4	INSA 482	Ethics in Information Technology		2	2	0	0	2
5	INET 433	Information and Networks Security	INSA 312	3	2	2	0	4
Total				15	12	6	2	20
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Ninth Semester								
No.	Course Code	Course Name	Pre. Req	No. of Units				
				CRH	L	P	T	CTH
1	GNRL 405	Engineering Economy		2	2	0	0	2
2	INSA 443	Network Analysis and Design	INSA 452	3	2	2	0	4
3	INSA 454	Data Center Operation -2	INSA 453	4	2	4	0	6
4	INSA 483	Seminar	INSA 371	1	0	2	0	2
5		Elective Course -2		3	2	2	0	4
6		Elective Course -3		3	2	2	0	4
Total				16	10	12	0	22
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Tenth Semester								
No.	Course Code	Course Name	Pre. Req	No. of Units				
				CRH	L	P	T	CTH
1	GNRL 402	Engineering Projects Management		3	3	0	0	3
2	INET 434	Cyber Security	INET 433	3	2	2	0	4
3	INSA 484	IT Infrastructure Best Practices	INSA 312 INSA 351	3	2	2	0	4
4	INSA 492	Graduation Project	INSA 371 INSA 452 INSA 454 INSA 483	4	2	4	0	6
Total				13	9	8	0	17
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Total Number of Semesters Credit Units	CRH	L	P	T	CTH
	79	55	48	3	106
Total of training Hours **16 * 106**	**1696**				

Elective Courses

Elective Course-1								
No.	**Course Code**	**Course Name**	**Pre. Req**	**No. of Units**				
				CRH	L	P	T	CTH
2	IPRG 335	Advanced Web Programming		4	3	2	0	5
3	INSA 481	Selected Topics		4	3	2	0	5
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Elective Course-2								
No.	**Course Code**	**Course Name**	**Pre. Req**	**No. of Units**				
				CRH	L	P	T	CTH
1	INSA 444	Open Source Network Systems	INSA 312	3	2	2	0	4
2	IPRG 473	Multimedia Systems Development		3	2	2	0	4
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Elective Course-3								
No.	**Course Code**	**Course Name**	**Pre. Req**	**No. of Units**				
				CRH	L	P	T	CTH
1	INET 351	Communication Networks		3	2	2	0	4
2	INSA 485	Internet of Things		3	2	2	0	4
CRH:Credit Hours **L**:Lecture **P**:Practical **T**:Tutorial **CTH**:Contact Hours								

Brief Course Description

Course Name	Basic Networks Systems Administration	Course Code	INSA 312	Credit Hours	4
Description	This course focuses on the administration tasks necessary to maintain a Network Operating Systems infrastructure such as configuring and troubleshooting name resolution, user, and group management, implementing Remote Access solutions, VPNs and Web Application Proxy, implementing Network Policies and Network Access Protection, Data Security, deployment and maintenance of server images, as well as design and implement Virtualization.				

Course Name	Network Technologies -1	Course Code	INSA 351	Credit Hours	3
Description	This course provides a global review of the basic knowledge in computer network and its applications. It focuses on configuring, managing and troubleshooting elements of the basic network infrastructure. Trainee learns how to configure workstations, to operate and manage a basic network. Trainees learn also about OSI and TCP/IP protocols by examining packet and protocol traces. Hands-on exercises include the use of a variety of standard model-based applications and protocols. It covers types of routing protocols that used to route the packets in the networks. By the end of this course, trainees will be able to configure and troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, and STP in both IPv4 and IPv6 networks.				

Course Name	Problems Solving Strategies	Course Code	INSA 343	Credit Hours	3
Description	The main goal of this course is the expose trainees to the logical key problem-solving skills needed for systematic model for problem-solving. To be acquainted with common problem-solving traps that may impact the process and how problem solver can avoid these pitfalls. In this course students will be taught how to use creative problem-solving solutions for the problems under investigation. To realize this, the Java Script (JS) programming language will be used to foster these concepts through both theoretical and practical approaches.				

Course Name	Advanced Network Administration	Course Code	INSA 371	Credit Hours	4
Description	This course focuses on advanced configuration of services necessary in daily work at data centers administrating to deploy, manage and maintain a Network Operating Systems infrastructure such as Network Load Balancing, Failover Clustering, business continuity and disaster recovery services as well as access and information provisioning and protection technologies such as Dynamic Access Control (DAC), and Web Application Proxy integration.				

Course Name	Network Technologies -2	Course Code	INSA 452	Credit Hours	3
Description	This course focuses on the WAN technologies and network services required by converged applications in a complex network. By the end of this course, students will be able to configure PPPoE, GRE, single-homed eBGP, extended IPv4 and IPv6 ACLs. Students will also develop the knowledge and skills needed to implement a WLAN in a small-to-medium network. For LANs, students will be able to configure SNMP and Cisco SPAN. Students will also develop knowledge about QoS and the trends in networking including Cloud, virtualization, and SDN.				

Course Name	Data Center Operation -1	Course Code	INSA 453	Credit Hours	4
Description	This course provides the main concepts to initiate the infrastructure of data center. The trainees must have an ability to design and determine the requirements for deploying servers, storage devices, cables, and a connection to the Internet. In addition, this course covers protecting server of theft and the accidental or intentional manipulation of hardware.				

Course Name	Ethics in Information Technology	Course Code	INSA 482	Credit Hours	2
Description	This course focuses on the ethical dilemmas that exist where human beings, information objects, and social computing technologies interact. The course explores emerging ethical models from historical and cross-cultural perspectives and then applies these models to a variety of new and emerging technologies that are inherently social in their construction and use.				

Course Name	Network Analysis and Design	Course Code	INSA 443	Credit Hours	3
Description	Network requirements and traffic flows information gathering are necessary steps for being able to realize the capabilities of the network in terms of performance and function, which are necessary for the success of such network. Network analysis and design are essential parts of the engineering process that forms the basis of networking projects nowadays. Such projects have immediate, tactical (near-term), and strategic (long-term) significance, and networking projects should consider all of these areas. Network analysis can provide us with necessary data upon which various decisions are made, and these data can and should be documented as part of an audit trail once the network is architected.				

Course Name	Data Center Operation -2	Course Code	INSA 454	Credit Hours	4
Description	This course covers the different areas of software defined data center, which is an extension of existing physical assets. In addition, this course describes how to connect data center systems, devices, networks, applications, and data to the cloud and mail applications.				

Course Name	Seminar	Course Code	INSA 483	Credit Hours	1
Description	This course aims at equipping students with a firm background on a variety of topics. Topics of interest include the following: thesis writing basics, communication skills with a genre of audiences, forming teamwork, job interview. This course will assure that students will have enough background material and skills that can help compete in the job market with enough confidence.				

Course Name	IT Infrastructure Best Practices	Course Code	INSA 484	Credit Hours	3
Description	The IT service management industry relies heavily on implementing the Information Technology Infrastructure Library (ITIL) as a wheel that will transform service practices into service excellence. To achieve this goal, the ITIL qualified personal are on demand, since they acquire the necessary knowledge of theory and ho to apply ITIL standards within everyday context within the organization.				

Course Name	Graduation Project	Course Code	INSA 492	Credit Hours	4
Description	In this course the trainees 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. It is recommended that students exploit the seminar course (in the previous semester) to elaborate a topic for this course.				

Course Name	Selected Topics	Course Code	INSA 481	Credit Hours	4
Description	This course is designed to give the student a basic knowledge of how to maintain and operate a Huawei Unified Communications solution that is based on Huawei Unified Communications Manager, Huawei Unified Communications Manager Express. This course provides the students with the knowledge and skills to achieve associate-level competency in Huawei Unified Communications.				

Course Name	Open Source Network Systems	Course Code	INSA 444	Credit Hours	3
Description	In this course the trainees learn how to install, configure and maintain an Enterprise open source systems in a networked environment (Linux). Administrative tasks are covered such as: creating and managing users, creating and maintaining file systems, build a full server by using open source network system, and implementing security measures and performing software installation and package management.				

Course Name	Internet of Things	Course Code	INSA 485	Credit Hours	3
Description	Internet of Things is a new revolution of the Internet that is rapidly gathering momentum driven by the advancements in sensor networks, mobile devices, and wireless communications, networking and cloud technologies. In this specialized course, students will learn the importance of IoT in society, current components of typical IoT devices and trends for the future. IoT design considerations, constraints and interfacing between the physical world and devices will also be covered. In addition, it also covers key components of networking to ensure that students understand how to connect their devices to the Internet.				

Courses Description

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support							
Course Name	Basic Networks Systems Administration		**Course Code**	INSA 312							
Prerequisites			**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 focuses on the administration tasks necessary to maintain a Network Operating Systems infrastructure such as configuring and troubleshooting name resolution, user, and group management, implementing Remote Access solutions, VPNs and Web Application Proxy, implementing Network Policies and Network Access Protection, Data Security, deployment and maintenance of server images, as well as design and implement Virtualization.

Topics :

- Module 1: Creating and Managing Virtual Hard Disks, Virtual Machine‹ and Checkpoints
- Module 2: Creating and Configuring Virtual Machine Networks
- Module 3: Introduction to Active Directory Domain Services
- Module 4: Implementing Dynamic Host Configuration Protocol
- Module 5: Implementing Group Policy
- Module 6: Installing, Configuring, and Troubleshooting the Network Policy Server Role
- Module 7: Implementing Network Access Protection
- Module 8: Optimizing File Services

Experiments:

References :

1. 20409B-Server Virtualization with Windows Server Hyper-V® and System Center.
2. 20410C - Installing and Configuring Windows Server® 2012
3. 20411C - Administering Windows Server® 2012

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Creating and Managing Virtual Hard Disks, Virtual Machine‹ and Checkpoints:** • Lesson 1: Creating and Configuring Virtual Hard Disks • Lesson 2: Creating and Configuring Virtual Machines • Lesson 3: Installing and Importing Virtual Machines • Lesson 4: Managing Virtual Machine Checkpoints • Lesson 5: Monitoring Hyper-V • Lesson 6: Designing Virtual Machines for Server Roles and Services	4
2	**Creating and Configuring Virtual Machine Networks:** • Lesson 1: Creating and Using Hyper-V Virtual Switches • Lesson 2: Advanced Hyper-V Networking Features • Lesson 3: Configuring and Using Hyper-V Network Virtualization	4
3	**Introduction to Active Directory Domain Services:** • Lesson 1: Overview of AD DS • Lesson 2: Overview of Domain Controllers • Lesson 3: Installing a Domain Controller	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
4	**Implementing Dynamic Host Configuration Protocol:** • Lesson 1: Overview of the DHCP Server Role • Lesson 2: Configuring DHCP Scopes • Lesson 3: Managing a DHCP Database • Lesson 4: Securing and Monitoring DHCP	4
5	**Implementing Group Policy:** • Lesson 1: Overview of Group Policy • Lesson 2: Group Policy Processing • Lesson 3: Implementing a Central Store for Administrative Templates	4
6	**Installing, Configuring, and Troubleshooting the Network Policy Server Role:** • Lesson 1: Installing and Configuring a Network Policy Server • Lesson 2: Configuring RADIUS Clients and Servers • Lesson 3: NPS Authentication Methods • Lesson 4: Monitoring and Troubleshooting a Network Policy Server	4
7	**Implementing Network Access Protection:** • Lesson 1: Overview of Network Access Protection • Lesson 2: Overview of NAP Enforcement Processes • Lesson 3: Configuring NAP • Lesson 4: Configuring IPsec Enforcement for NAP • Lesson 5: Monitoring and Troubleshooting NAP	4
8	**Optimizing File Services:** • Lesson 1: Overview of FSRM • Lesson 2: Using FSRM to Manage Quotas, File Screens, and Storage Reports • Lesson 3: Implementing Classification and File Management Tasks • Lesson 4: Overview of DFS • Lesson 5: Configuring DFS Namespaces • Lesson 6: Configuring and Troubleshooting DFS Replication	4
Textbook	• 20409B-Server Virtualization with Windows Server Hyper-V® and System Center. • 20410C - Installing and Configuring Windows Server® 2012 • 20411C - Administering Windows Server® 2012	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	**Creating and Managing Virtual Hard Disks, Virtual Machine, and Checkpoints:** • Lab A: Creating and Managing Virtual Hard Disks and Virtual Machines • Lab B: Creating and Managing Checkpoints and Monitoring Hyper-V	8
2	**Creating and Configuring Virtual Machine Networks:** • Lab A: Creating and Using Hyper-V Virtual Switches • Lab B: Creating and Using Advanced Virtual Switch Features • Lab C: Configuring and Testing Hyper-V Network Virtualization	8
3	**Introduction to Active Directory Domain Services:** • Lab: Installing Domain Controllers	8
4	**Implementing Dynamic Host Configuration Protocol:** • Lab: Implementing DHCP	8
5	**Implementing Group Policy:** • Lab: Implementing Group Policy	8
6	**Module 7: Installing, Configuring, and Troubleshooting the Network Policy Server Role:** • Lab: Installing and Configuring a Network Policy Server	8
7	**Module 8: Implementing Network Access Protection:** • Lab**:** Implementing Network Access Protection	8
8	**Module 9: Optimizing File Services:** • Lab A: Configuring Quotas and File Screening Using File Server Resource Manager • Lab B: Implementing Distributed File System	8
Textbook	• 20409B-Server Virtualization with Windows Server Hyper-V® and System Center. • 20410C - Installing and Configuring Windows Server® 2012 • 20411C - Administering Windows Server® 2012	

Department	Engineering of Computer and Information Technology	Major	Computer Network Systems Support						
Course Name	Network Technologies -1	Course Code	INSA 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 :

This course provides a global review of the basic knowledge in computer network and its applications. It focuses on configuring, managing and troubleshooting elements of the basic network infrastructure. Trainee learns how to configure workstations, to operate and manage a basic network.

Trainees learn also about OSI and TCP/IP protocols by examining packet and protocol traces. Hands-on exercises include the use of a variety of standard model-based applications and protocols. It covers types of routing protocols that used to route the packets in the networks.

By the end of this course, trainees will be able to configure and troubleshoot routers and switches and resolve common issues with OSPF, EIGRP, and STP in both IPv4 and IPv6 networks.

Topics :

- Module 1: Explore the Network
- Module 2: IP Addressing
- Module 3: Subnetting IP Networks
- Module 4: Routing Concepts
- Module 5: Static Routing
- Module 6: Dynamic Routing
- Module 7: VLANs (Virtual Local Area Networks)
- Module 8: STP (Spanning Tree Protocol)
- Module 9: Single-Area OSPF

Experiments:

Many LABs related to the main topics in the theoretical part.

References :http://www.cisco.netacad.com -> Resources -> all resources -> CCNA Routing and Switching ->Introduction to Networks , Routing and Switching Essentials AND ->Scaling Networks

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 1: Explore the Network** • Globally Connected • LANs, WANs, and the Internet • The Network as the Platform • The Changing Network Environment	2
2	**Module 2: IP Addressing** • 2.1 IPv4 Network Addresses • 2.2 IPv6 Network Addresses • 2.3 Connectivity Verification	2
3	**Module 3: Subnetting IP Networks** • 3.1 Subnetting an IPv4 Network • 3.2 Addressing Scheme • 3.3 Design Consideration of IPv6	4
4	**Module 4: Routing Concepts** • 4.1 Router Initial Configuration • 4.2 Routing Decisions	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
	• 4.3 Router Operation	
5	**Module 5: Static Routing** • 5.1 Implement Static Routes • 5.2 Configure Static and Default Routes • 5.3 Troubleshoot Static and Default Routes	4
6	**Module 6: Dynamic Routing** • 6.1 Dynamic Routing Protocols • 6.2 RIPv2 • 6.3 EIGRP for IPv4 • 6.4 EIGRP for IPv6 • 6.5 The Routing Table	4
7	**Module 7: VLANs (Virtual Local Area Networks)** • 7.1 VLAN Segmentation • 7.2 VLAN Implementation • 7.3 Inter-VLAN Routing Using Routers	4
8	**Module 8: STP (Spanning Tree Protocol)** • 8.1 Spanning Tree Concepts • 8.2 Varieties of Spanning Tree Protocols • 8.3 Spanning Tree Configuration	4
9	**Module 9: Single-Area OSPF** • 9.1 OSPF Characteristics • 9.2 Single-Area OSPFv2 • 9.3 Single-Area OSPFv3	4
Textbook	**The Material is collected from many courses as the following:** • Introduction to Networks Companion Guide ,Version 6, By Cisco Networking Academy (Chapter 1 , Chapter 7 , and Chapter 8) • Routing and Switching Essentials Companion Guide, Version 6, By Cisco Networking Academy (Chapter 1, Chapter 2, Chapter 3, and Chapter 6) • Scaling Networks Companion Guide, Version 6, By Cisco Networking Academy (Chapter 3 and Chapter 8)	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	LAB1: Building a Simple Network	2
2	LAB2: Converting IPv4 Addresses to Binary	2
3	LAB3: Identifying IPv4 Addresses	2
4	LAB4: Identifying IPv6 Addresses	2
5	LAB5: Calculating IPv4 Subnets	2
6	LAB6: Configuring Basic Router Settings with IOS CLI	2

Detailed of Practical Contents		
No.	**Contents**	**Hours**
7	LAB7: Configuring IPv4 Static and Default Routes	2
8	LAB8: Configuring IPv6 Static and Default Routes	2
9	LAB9: Configuring Basic RIPv2	2
10	LAB10: Configuring Basic EIGRP for IPv4	2
11	LAB 11: Configuring Basic EIGRP for IPv6	2
12	LAB12: Configuring VLANs and Trunking	2
13	LAB13: Configuring Per-Interface Inter-VLAN Routing	2
14	LAB14: Building a Switched Network with Redundant Links	2
15	LAB15: Configuring Basic Single-Area OSPFv2	2
16	LAB 16: Configuring Basic Single-Area OSPFv3	2

Textbook	**The Material is collected from many courses as the following:** • Introduction to Networks, By Cisco Networking Academy , Student LAB Manual (Chapter 1 , Chapter 7 , and Chapter 8) • Routing and Switching Essentials, By Cisco Networking Academy , Student LAB Manual (Chapter 1, Chapter 2, Chapter 3, and Chapter 6) • Scaling Networks, By Cisco Networking Academy, Student LAB Manual (Chapter 3 and Chapter 8)

Textbooks	**The Material is collected from many courses as the following:** • Introduction to Networks Companion Guide ,Version 6, By Cisco Networking Academy (Chapter 1 , Chapter 7 , and Chapter 8) • Routing and Switching EssentialsCompanion Guide,Version 6, By Cisco Networking Academy (Chapter 1, Chapter 2, Chapter 3, and Chapter 6) • Scaling Networks Companion Guide, Version 6, By Cisco Networking Academy (Chapter **3 and Chapter 8)**
	The Material is collected from many courses as the following: • Introduction to Networks, By Cisco Networking Academy , Student LAB Manual (Chapter 1 , Chapter 7 , and Chapter 8) • Routing and Switching Essentials, By Cisco Networking Academy , Student LAB Manual (Chapter 1, Chapter 2, Chapter 3, and Chapter 6) • Scaling Networks, By Cisco Networking Academy, Student LAB Manual (Chapter 3 and Chapter 8)

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support					
Course Name	Problems Solving Strategies		**Course Code**	INSA 363					
Prerequisites			**Credit Hours**	3			CTH		4
			CRH	L	2	P	2	T	0
CRH: **Credit Hours** L: **Lecture** P: **Practical** T: **Tutorial** CTH: **Contact Hours**									

Course Description :

The main goal of this course is the expose trainees to the logical key problem-solving skills needed for systematic model for problem-solving. To be acquainted with common problem-solving traps that may impact the process and how problem solver can avoid these pitfalls. In this course students will be taught how to use creative problem-solving solutions for the problems under investigation. To realize this, the Java Script (JS) programming language will be used to foster these concepts through both theoretical and practical approaches.

Topics :

- Module 0: HTML Tutorial.
- Module 1: The Craft of Programming.
- Module 2: The JS Language.
- Module 3: Objects, Events, and Graphical User Interfaces.
- Module 4: The Sequence Structure.
- Module 5: The Selection Structure.
- Module 6: The Repetition Structure.
- Module 7: Complex Conditions.
- Module 8: Modules and Functions.
- Module 9: Menus and Data Validation.
- Module 10: Arrays.
- Module 11: Sorting Data.

Experiments: If applicable, it will support the course topics.

References : Principles of Program Design, Problem Solving with JavaScript, Paul Addison, Course Technology; 1 edition (February 22, 2011), ISBN: 13: 978-1111526504.

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 0 HTML Tutorial.** • HTML Basics. • Tags. • Attributes and Values. • Block-Level Elements. • Text Enhancements. • Ordered and Unordered Lists. • Tables. • Images.	2
2	**Module 1 The Craft of Programming.** • What is computer program? • Programming Skills: Using the Right Tool for the Right Job. • Programming Basics and Data Types. • The Input-Processing-Output Method.	2

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
3	**Module2 The JS Language.** • Types of Programming Languages. • History of the Internet and JS. • HTML Tags for JS. • XHTML and HTML5. • From Pseudo code to JS coding.	4
4	**Module 3 Objects, Events, and Graphical User Interfaces.** • Object-Oriented Programming: Classes, Objects and Methods. • Creating Objects with Constructors. • Using Class Diagram. • Defining Classes with JS. • Adding Methods. • Using Existing JS Objects. • GUI.	4
5	**Module 4 The Sequence Structure.** • What is Structured Programming? • The Three Control Structures. • The Sequence Structure. • Comparing Pseudocode, JS, and Flow Chart.	2
6	**Module 5 The Selection Structure.** • Conditions: Boolean Expressions. • The Selection Structure and JS.	2
7	**Module 6 The Repetition Structure.** • Controlling Loops: Initialization, Condition Evaluation, and Alteration. • Conditions, Counters, and Sentinel Values. • Nested Loops. • Accumulators. • Using the Break and Continue Statements.	4
8	**Module 7 Complex Conditions.** • Describing Complex Conditions. • Logic Development Tools: Truth Tables, Decision Tables and Binary Trees. • Working with Complex Conditions.	2
9	**Module 8 Modules and Functions.** • Modular Programming and Top-Down Design. • Flowcharting Modules. • Modules in JS. • Module Efficiency: Cohesion and Coupling.	2
10	**Module 9 Menus and Data Validation.** • Interactive Versus No interactive Programs. • Single-Level Menus. • Types of Data Validation. • Using Multilevel Menus.	2
11	**Module 10 Arrays.** • What is an Array? • Arrays in JS. • Searching Arrays. • Multidimensional Arrays.	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
12	**Module 11 Sorting Data.** • Introduction to Sorting Algorithms. • The JS sort Method.	2
Textbook	• Principles of Program Design, Problem Solving with JavaScript, Paul Addison, Course Technology; 1 edition (February 22, 2011), ISBN: 13: 978-1111526504.	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	Lab 0: Programmer's Workshop for Module 0. Building a Homepage using HTML Tags, Tables and Images.	2
2	Lab 1: Programmer's Workshop for Module 1. Conduct Programmer's Workshop related to Module 1.	2
3	Lab 2: Programmer's Workshop for Module 2. Conduct Programmer's Workshop related to Module 2.	2
4	Lab 3: Programmer's Workshop for Module 3. Practice Building: Class, Objects, Methods, Object's Constructor.	4
5	Lab 4: Programmer's Workshop for Module 4. Conduct Programmer's Workshop related to Module 4.	2
6	Lab 5: Programmer's Workshop for Module 5. Conduct Programmer's Workshop related to Module 5.	2
7	Lab 6: Programmer's Workshop for Module 6. Conduct Programmer's Workshop related to Module 6.	2
8	Lab 7: Programmer's Workshop for Module 7. Conduct Programmer's Workshop related to Module 7.	2
9	Lab 8: Programmer's Workshop for Module 8. Conduct Programmer's Workshop related to Module 8.	2
10	Lab 9: Programmer's Workshop for Module 9. Conduct Programmer's Workshop related to Module 9.	2
11	Lab 10: Programmer's Workshop for Module 10. Conduct Programmer's Workshop related to Building Programs as in Module 10.	2
12	Lab 11: Programmer's Workshop for Module 11. Conduct Programmer's Workshop related to Sorting Data as in Module 11.	4
13	Lab 12: extra Programmer's Workshop in Recursion. Conduct Programmer's Workshop on Recursion. .	4
Textbook	• Principles of Program Design, Problem Solving with JavaScript, Paul Addison, Course Technology; 1 edition (February 22, 2011), ISBN: 13: 978-1111526504.	

Textbooks	• Principles of Program Design, Problem Solving with JavaScript, Paul Addison, Course Technology; 1 edition (February 22, 2011), ISBN: 13: 978-1111526504

Department	Engineering of Computer and Information Technology	Major	Computer Network Systems Support						
Course Name	Advanced Network Administration	Course Code	INSA 371						
Prerequisites	INSA 312	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 focuses on advanced configuration of services necessary in daily work at data centers administrating to deploy, manage and maintain a Network Operating Systems infrastructure such as Network Load Balancing, Failover Clustering, business continuity and disaster recovery services as well as access and information provisioning and protection technologies such as Dynamic Access Control (DAC), and Web Application Proxy integration.

Topics :

- Module 1: Configuring Encryption and Advanced Auditing
- Module 2: Deploying and Maintaining Server Images
- Module 3: Implementing Advanced Network Services
- Module 4: Implementing Advanced File Services
- Module 5: Implementing Dynamic Access Control
- Module 6: Implementing Active Directory Domain Services Sites and Replication
- Module 7: Implementing Network Load Balancing
- Module 8: Implementing Failover Clustering
- Module 9: Implementing Business Continuity and Disaster Recovery

Experiments:

References :

1. 20411C - Administering Windows Server® 2012
2. 20412C - Configuring Advanced Windows Server® 2012 Services

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Configuring Encryption and Advanced Auditing** • Lesson 1: Encrypting Drives by Using BitLocker • Lesson 2: Encrypting Files by Using EFS • Lesson 3: Configuring Advanced Auditing • Lab: Configuring Encryption and Advanced Auditing • 20410C	4
2	**Deploying and Maintaining Server Images** • Lesson 1: Overview of Windows Deployment Services • Lesson 2: Managing Images • Lesson 3: Implementing Deployment with Windows Deployment Services • Lesson 4: Administering Windows Deployment Services • Lab: Using Windows Deployment Services to Deploy Windows Server 2012 20410C	4
3	**Implementing Advanced Network Services** • Lesson 1: Configuring Advanced DHCP Features • Lesson 2: Configuring Advanced DNS Settings • Lesson 3: Implementing IPAM • Lesson 4: Managing IP Address Spaces with IPAM	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
4	**Implementing Advanced File Services** • Lesson 1: Configuring iSCSI Storage • Lesson 2: Configuring BranchCache • Lesson 3: Optimizing Storage Usage	2
5	**Implementing Dynamic Access Control** • Lesson 1: Overview of DAC • Lesson 2: Implementing DAC Components • Lesson 3: Implementing DAC for Access Control • Lesson 4: Implementing Access Denied Assistance • Lesson 5: Implementing and Managing Work Folders	4
6	**Implementing Active Directory Domain Services Sites and Replication** • Lesson 1: AD DS Replication Overview • Lesson 2: Configuring AD DS Sites • Lesson 3: Configuring and Monitoring AD DS Replication	2
7	**Implementing Network Load Balancing** • Lesson 1: Overview of NLB • Lesson 2: Configuring an NLB Cluster • Lesson 3: Planning an NLB Implementation	4
8	**Implementing Failover Clustering** • Lesson 1: Overview of Failover Clustering • Lesson 2: Implementing a Failover Cluster • Lesson 3: Configuring Highly Available Applications and Services on a Failover Cluster • Lesson 4: Maintaining a Failover Cluster • Lesson 5: Implementing a Multisite Failover Cluster	4
9	**Implementing Business Continuity and Disaster Recovery** • Lesson 1: Data Protection Overview • Lesson 2: Implementing Windows Server Backup • Lesson 3: Implementing Server and Data Recovery	4
Textbook	• 20411C - Administering Windows Server® 2012 • 20412C - Configuring Advanced Windows Server® 2012 Services	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	**Configuring Encryption and Advanced Auditing** • Lab: Configuring Encryption and Advanced Auditing	8
2	**Deploying and Maintaining Server Images** • Lab: Using Windows Deployment Services to Deploy Windows Server 2012	8
3	**Implementing Advanced Network Services** • Lab: Implementing Advanced Network Services	8
4	**Implementing Advanced File Services** • Lab B: Implementing BranchCache • Lab A: Implementing Advanced File Services	4
5	**Implementing Dynamic Access Control** • Lab: Implementing Secure Data Access	8

Detailed of Practical Contents		
No.	**Contents**	**Hours**
6	**Implementing Active Directory Domain Services Sites and Replication** • Lab: Implementing AD DS Sites and Replication	4
7	**Implementing Network Load Balancing** • Lab: Implementing NLB 9-17	8
8	**Implementing Failover Clustering** • Lab: Implementing Failover Clustering	8
9	**Implementing Business Continuity and Disaster Recovery** • Lab: Implementing Windows Server Backup and Restore 12-23	8
Textbook	1. 20411C - Administering Windows Server® 2012 2. 20412C - Configuring Advanced Windows Server® 2012 Services	

Textbooks	• 20411C - Administering Windows Server® 2012 • 20412C - Configuring Advanced Windows Server® 2012 Services

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support					
Course Name	Network Technologies -2		**Course Code**	INSA 452					
Prerequisites	INSA 351		**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 :

This course focuses on the WAN technologies and network services required by converged applications in a complex network. By the end of this course, students will be able to configure PPPoE, GRE, single-homed eBGP, extended IPv4 and IPv6 ACLs. Students will also develop the knowledge and skills needed to implement a WLAN in a small-to-medium network. For LANs, students will be able to configure SNMP and Cisco SPAN. Students will also develop knowledge about QoS and the trends in networking including Cloud, virtualization, and SDN.

Topics :

- Module 1: WAN Concepts
- Module 2: Point-to-Point Connections
- Module 3: Branch Connections
- Module 4: DHCP (Dynamic Host Configuration Protocol)
- Module 5: NAT for IPv4 (Network Address Translation for IPv4)
- Module 6: Access Control Lists
- Module 7: Network Security and Monitoring
- Module 8: Quality of Service
- Module 9: Network Evolution
- Module 10: Network Troubleshooting

Experiments:

Many LABs related to the main topics in the theoretical part.

References :

http://www.cisco.netacad.com -> Resources -> all resources -> CCNA Routing and Switching -> Connecting Networks

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 1: WAN Concepts** • WAN Technologies Overview • Selecting a WAN Technology	2
2	**Module 2: Point-to-Point Connections** • 2.1 Serial Point-to-Point Overview • 2.2 PPP Operation • 2.3 Configure PPP • 2.4 Trubleshooting PPP	4
3	**Module 3: Branch Connections** • 3.1 Remote Access Connections • 3.2 PPPoE • 3.2 VPNs • 3.4 GRE • 3.5 eBGP	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
4	**Module 4: DHCP (Dynamic Host Configuration Protocol)** • 4.1 DHCPv4 • 4.2 DHCPv6	4
5	**Module 5: NAT for IPv4 (Network Address Translation for IPv4)** • 5.1 NAT Operation • 5.2 Configure NAT • 5.3 Trubleshooting NAT	4
6	**Module 6: Access Control Lists** • 6.1 Standard ACL Operation and Configuration Review • 6.2 Extended IPv4 ACLs • 6.3 IPv6 ACLs • 6.4 Trubleshoot ACLs	4
7	**Module 7: Network Security and Monitoring** • 7.1 LAN Security • 7.2 SNMP • 7.3 Cisco Switch Port Analyzer (SPAN)	4
8	**Module 8: Quality of Service** • 8.1 QoS Overview • 8.2 QoS Mechanism	2
9	**Module 9: Network Evolution** • 9.1 Internet of Things • 9.2 Cloud and Virtualization • 9.3 Network Programming	2
10	**Module 10: Network Trubleshooting** • 10.1 Trubleshooting Methodology • 10.2 Trubleshooting Scenarios	2
Textbook	• The Material is collected from many courses as the following: • Routing and Switching EssentialsCompanion Guide,Version 6, By Cisco Networking Academy (Chapter 8 and Chapter 9) • Connecting Networks Companion Guide,Version 6, By Cisco Networking Academy.	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	LAB 1: Researching WAN Technologies	2
2	LAB 2: Configuring Basic PPP with Authentication	2
3	LAB 3: Configuring a Router as a PPPoE Client for DSL Connectivity	2
4	LAB 4: Configuring a Point-to-Point GRE VPN Tunnel	2
5	LAB 5: Configure and Verify eBGP	2
6	LAB 6: Configuring Basic DHCPv4 on a Router	2
7	LAB 7: Configuring Basic DHCPv4 on a Switch	2
8	LAB 8: Configuring Stateless and Stateful DHCPv6	2
9	LAB 9: Configuring Dynamic and Static NAT	2

Detailed of Practical Contents		
No.	**Contents**	**Hours**
10	LAB 10: Configuring and Verifying Extended ACLs	2
11	LAB 11: Configuring and Verifying IPv6 ACLs	2
12	LAB 12: Configuring SNMP	2
13	LAB 13: Implement Local SPAN	2
14	LAB 14: Network Breakdown Instructions	2
15	LAB 15: Configure IP SLA ICMP Echo	2
16	LAB 16: Documentation Development Instructions	2
Textbook	• The Material is collected from many courses as the following: • 1.Routing and Switching Essentials, By Cisco Networking Academy , Student LAB Manual (Chapter 8 and Chapter 9) • 2. Connecting Networks, By Cisco Networking Academy , Student LAB Manual	

Textbooks	**The Material is collected from many courses as the following:** 1. Routing and Switching EssentialsCompanion Guide,Version 6, By Cisco Networking Academy (Chapter 8 and Chapter 9) 2. Connecting Networks Companion Guide,Version 6, By Cisco Networking Academy.
	The Material is collected from many courses as the following: 1.Routing and Switching Essentials, By Cisco Networking Academy , Student LAB Manual (Chapter 8 and Chapter 9) 2. Connecting Networks, By Cisco Networking Academy , Student LAB Manual

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support							
Course Name	Data Center Operation -1		**Course Code**	INSA 453							
Prerequisites	INSA 371		**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 provides the main concepts to initiate the infrastructure of data center. The trainees must have an ability to design and determine the requirements for deploying servers, storage devices, cables, and a connection to the Internet. In addition, this course covers protecting server of theft and the accidental or intentional manipulation of hardware.

Topics :

- Module 1 Data Center Protocols.
- Module 2 Layer 3 Switching Features in Data Center.
- Module 3 Data Center Infrastructure Security.
- Module 4 Data Center Infrastructure Storage Fabric.
- Module 5 FCoE Unified Fabric.
- Module 6 Data Center Infrastructure Storage Services.
- Module 7 Data Center Infrastructure Maintenance, Management, and Operations

Experiments: According to (DCII) Lap curriculum.

References : Cisco Networking Academy – Implementing Cisco Data Center Infrastructure (DCII).

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 1:Data Center Protocols.** • Spanning Tree Protocols. • Port Channels. • Virtual Port Channels. • Fabric extender. • Fabric Path Implementation. • Dynamic Fabric Automation. • Overlay Transport Virtualization. • VXLAN. • LISP.	4
2	**Module 2:Layer 3Switching Features in the Data Center.** • First-hop Redundancy. • Routing Protocols on Nexus Devices. • IP Multicast. • IGMP and MLD configuration.	4
3	**Module 3:Data Center Infrastructure Security.** • User accounts. • User roles. • SSH on NX-OS. • AAA Framework. • Keychain Authentication. • DHCP.	6

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
	• IP source guard. • ARP. • Port Security. • MAC addressing.	
4	**Module 4:Data Center Infrastructure Storage Fabric.** • Fibre Channel. • FCID Format. • FLOGI and FCNS. • VSAN. • SAN Port Channels. • Manage FC Domains. • Fibre Channel Port Security. • Port Security vs. Fabric binding.	4
5	**Module 5:FCoE Unified Fabric.** • FCoE. • FCoE Configuration. • FCoE verification.	4
6	**Module 6:Data Center Infrastructure Storage Services.** • Device Alias Overview. • Alias Modes. • Distribution of Device Alias. • Zone • NPIV and NPV. • Fibre Channel over IP	6
7	**Module 7: Data Center Infrastructure Maintenance, Management, and Operations.** • Cisco Fabric Services. • NTP and PTP. • Cisco ISSU. • EPLDs • GIR (maintenance mode). • Monitoring and Programmability.	4
Textbook	Cisco Networking Academy – Implementing Cisco Data Center Infrastructure (DCII)	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	LAB 1: Configure Layer 2 Switching.	4
2	LAB 2: Configure Port Channels.	4
3	LAB 3: Configure FEX.	4
4	LAB 4: Configure Cisco FabricPath.	4
5	LAB 5: Configure OTV.	4
6	LAB 6: Configure VXLAN.	4
7	LAB 7: Configure VRRP.	4

Detailed of Practical Contents		
No.	**Contents**	**Hours**
8	LAB 8: Configure OSPF.	4
9	LAB 9: Configure User Management Security Features.	4
10	LAB 10: Configure System Security Features.	4
11	LAB 11: Configure Fibre Channel.	4
12	LAB 12: Manage Domains and Configure Persistent FCIDs.	4
13	LAB 13: Configure Fabric Binding and Port Security.	4
14	LAB 14: Configure FCoE.	2
15	LAB 15: Configure Device Aliases.	2
16	LAB 16: Configure Zoning.	2
17	LAB 17: Configure NPV.	2
18	LAB 18: Configure System Management.	2
19	LAB 19: Implement Infrastructure Monitoring	2
Textbook	Cisco Networking Academy – Implementing Cisco Data Center Infrastructure (DCII)	

Textbooks	Cisco Networking Academy – Implementing Cisco Data Center Infrastructure (DCII)

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support					
Course Name	Ethics in Information Technology		**Course Code**	INSA 482					
Prerequisites			**Credit Hours**	2		CTH		2	
			CRH	L	2	P	0	T	0

CRH: **Credit Hours** L: **Lecture** P: **Practical** T: **Tutorial** CTH: **Contact Hours**

Course Description :

This course focuses on the ethical dilemmas that exist where human beings, information objects, and social computing technologies interact. The course explores emerging ethical models from historical and cross-cultural perspectives and then applies these models to a variety of new and emerging technologies that are inherently social in their construction and use.

Topics :

- Module 1 - Introduction to Ethics
- Module 2 - Networking
- Module 3 - Intellectual property
- Module 4 - Privacy
- Module 5 - Computer and network security
- Module 6 - Computer reliability
- Module 7 - Professional ethics

Experiments:

References: Ethics for the information age – Author \ Michael J Quinn

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Introduction to Ethics** • Introduction • Subjective relativism • Cultural relativism • Divine command theory • Kantianism • Act utilitarianism • Rule utilitarianism • Social contact theory • Comparing workable ethical theories • Summary	6
2	**Networking** • Email and spam • Fighting spam • World wide web • Ethical perspective on pornography • Censorship • Children and the web • Breaking trust on the internet • Internet addiction • Summary	4
3	**Intellectual property** • Introduction • Intellectual property rights	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
	• Protection intellectual property • Fair use • New restriction in use • Peer to peer networking • Protection for software • Open source software • Legitimacy of intellectual property protection for software • Creative commons • Summary	
4	**Privacy** • Introduction • Perspective on privacy • Disclosing information • Public information • Public records • Covert government surveillance • Data mining • Identity theft • Encryption • Summary	4
5	**Computer and network security** • Introduction • Viruses, worms and trojan horses • Phreaks and hackers • Denial of service attacks • Online voting	2
6	**Computer reliability** • Introduction • Data-entry or data-retrieval errors • Software and billing errors • Notable software system failure • Therac • Computer simulation • Software engineering • Software warranties • Summary	4
7	**Professional ethics** • Introduction • Are computer experts professionals? • Software engineering code of ethics • Analysis of the code • Case studies • Whistleblowing • Summary	8
Textbook	Ethics for the information age Author \ Michael J Quinn	

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support					
Course Name	Network Analysis and Design		**Course Code**	INSA 443					
Prerequisites	INSA 452		**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 :

Network requirements and traffic flows information gathering are necessary steps for being able to realize the capabilities of the network in terms of performance and function, which are necessary for the success of such network. Network analysis and design are essential parts of the engineering process that forms the basis of networking projects nowadays. Such projects have immediate, tactical (near-term), and strategic (long-term) significance, and networking projects should consider all of these areas. Network analysis can provide us with necessary data upon which various decisions are made, and these data can and should be documented as part of an audit trail once the network is architected.

Topics :

- Module 1 Introduction.
- Module 2 Requirement Analysis: Concepts.
- Module 3 Requirement Analysis: Process.
- Module 4 Flow Analysis.
- Module 5 Network Architecture.
- Module 6 Addressing and Routing Architecture.
- Module 7 Network Management Architecture.
- Module 8 Performance Architecture.
- Module 9 Security and Privacy Architecture.
- Module 10 Network Design.
- Module 11 Case Study.

Experiments: If applicable, it will support the course topics.

References : Network Analysis, Architecture, and Design, Third Edition, James D. McCabe, Morgan Kaufmann, 2007.

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 1 Introduction.** • Overview of analysis, architecture, and design process. • A system Methodology. • System, service, performance Description. • Network Supportability.	2
2	**Module 2 Requirement Analysis: Concepts.** • User , application, device, network and other Requirements. • The Requirements Specifications and Map.	2
3	**Module 3 Requirement Analysis: Process.** • Gathering and Listing Requirements. • Developing Service Metrics. • Characterizing behavior. • Developing RMA, delay, capacity, specification, mapping and supplemental performance Requirements.	2

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
4	**Module 4 Flow Analysis.** • Identifying and Developing Flows. • Data Sources and Sinks. • Flow specifications and prioritization. • Example Application of Flow Analysis.	2
5	**Module 5 Network Architecture.** • Component architecture. • Reference Architecture. • Architecture Models.	2
6	**Module 6 Addressing and Routing Architecture.** • Addressing fundamentals and mechanisms. • Routing Mechanisms.	2
7	• Module 6 Addressing and Routing Architecture. • Addressing Strategies. • Routing Strategies. • Architecture Considerations.	2
8	**Module 8 Network Management Architecture.** • Defining Network Management. • Network Management Mechanisms.	2
9	**Module 7 Network Management Architecture.** • Architecture Considerations. • In-Band, Out-of-Band Management. • Centralized, Distributed, and Hierarchical Management. • Scaling Network Management Traffic. • Managing Network Management Data. • Integration into OSS. • Internal and External Relations.	2
10	**Module 8 Performance Architecture.** • Developing Goals for Performance. • Performance Mechanisms. • Prioritization, Traffic Management, Scheduling and Queuing. • Service level agreement. • Policies. • Architecture Considerations.	2
11	**Module 9 Security and Privacy Architecture.** • Developing a Security and Privacy Plan. • Security and Privacy Administration.	2
12	**Module 9 Security and Privacy Architecture.** • Security and Privacy Mechanisms. • Architecture Considerations.	2
13	**Module 10 Network Design.** • Network Design Concepts. • Design Process.	2
14	**Module 10 Network Design.** • Vendor, Equipment, and Service-Provider Evaluations.	2

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
15-16	**Module 11 Case Study.** • Case Study that includes all steps learned in the course that ends with a full network design that takes into account all steps learned in the course using some network tools in the design and analysis of the network under consideration	4
Textbook	Network Analysis, Architecture, and Design, Third Edition, James D. McCabe, Morgan Kaufmann, 2007.	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	**Lab 1: Switching Fundamentals.** • OSI Networking Model. • Campus Switching. • Network Control. • Wireless Networking.	4
2	**Lab 2: WAN Connectivity.** • WAN Protocols. • Network Routing. • IP Multicast Protocols.	4
3	**Lab 3: Application Services.** • Quality of Service (QoS). • Application Model. • Network Virtualization.	4
4	**Lab 4: Requirements and Assessment.** • Network Design Methodology. • Business Requirements. • Design Requirements. • Network Assessment.	4
5	**Lab 5: WAN Design.** • Network Topology. • Bandwidth Requirements. • WAN Transport. • WAN Routers. • WAN Design. • Application Services. • IOS Selection.	4
6	**Lab 6: Campus Design.** **Traffic Model.** • Equipment Selection. • Campus Topology. • Campus Protocols. • Network Addressing. • Application Services. • IOS Selection.	4
7	**Lab 7: Network Security Strategy.** • Enterprise Security Model. • Internet Exposure Rating (IER).	4

Detailed of Practical Contents		
No.	**Contents**	**Hours**
	• Dynamic SecureX Framework. • Security Information and Event Management. • Vendor Security Alerts.	
8	**Lab 8: Management, Testing, Deployment and Network Design.** • Network Management Solutions. • Deployment Workflow. • Vendor, Equipment, and Service-Provider Evaluations.	4
Textbook	Cisco Design Fundamentals, Multilyered Design Approach for Network Engineers, Shaun L. Hummel, www.cisocnetsolutions.com, 2015.	

Department	Engineering of Computer and Information Technology	Major	Computer Network Systems Support						
Course Name	Data Center Operation -2	Course Code	INSA 454						
Prerequisites	INSA 453	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 different areas of software defined data center, which is an extension of existing physical assets. In addition, this course describes how to connect data center systems, devices, networks, applications, and data to the cloud and mail applications.

Topics :

- Module 1: Deploying and Managing Microsoft Exchange Server 2013
- Module 2: Planning and Configuring Mailbox Servers
- Module 3: Managing Recipient Objects
- Module 4: Planning and Deploying Client Access Servers
- Module 5: Planning and Configuring Message Transport
- Module 6: Introduction to the Cloud Model
- Module 7: Configuring a Private Cloud Environment
- Module 8: Deploying Cloud Services
- Module 9: Monitoring Cloud Based Applications
- Module 10: Configuring Application Performance Monitoring

Experiments:

References :

20341B-Core Solutions of Microsoft Exchange Server 2013
20246D-Monitoring and Operating a Private Cloud

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Deploying and Managing Microsoft Exchange Server 2013** • Lesson 1: Exchange Server 2013 Prerequisites and Requirements • Lesson 2: Exchange Server 2013 Deployment • Lesson 3: Managing Exchange Server 2013	2
2	**Planning and Configuring Mailbox Servers** • Lesson 1: Overview of the Mailbox Server Role • Lesson 2: Planning the Mailbox Server Deployment • Lesson 3: Configuring the Mailbox Servers	2
3	**Managing Recipient Objects** • Lesson 1: Managing Exchange Server 2013 Mailboxes • Lesson 2: Managing Other Exchange Recipients • Lesson 3: Planning and Implementing Public Folder Mailboxes • Lesson 4: Managing Address Lists and Policies	4
4	**Planning and Deploying Client Access Servers** • Lesson 1: Planning Client Access Server Deployment • Lesson 2: Configuring the Client Access Server Role • Lesson 3: Managing Client Access Services	2

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
5	**Planning and Configuring Message Transport** • Lesson 1: Overview of Message Transport and Routing • Lesson 2: Planning and Configuring Message Transport • Lesson 3: Managing Transport Rules	4
6	**Introduction to the Cloud Model** • Lesson 1: Overview of the Cloud Computing Model • Lesson 2: Requirements for a Private Cloud • Lesson 3: Requirements for a Public or Hybrid Cloud • Lesson 4: Operating a Hybrid Cloud Infrastructure with System Center • Lesson 5: Maintaining the Health of a Cloud • Lesson 6: Integrating System Center Components	4
7	**Configuring a Private Cloud Environment** • Lesson 1: Overview of System Center 2012 R2 Virtual Machine Manager • Lesson 2: Managing the Virtual Environment with Virtual Machine Manager • Lesson 3: Creating Clouds	2
8	**Deploying Cloud Services** • Lesson 1: Overview of Service Templates • Lesson 2: VMM Profiles • Lesson 3: Web Deploy Packages • Lesson 4: Overview of Server App-V • Lesson 5: Data-Tier Application Packages • Lesson 6: Deploying Services through App Controller	4
9	**Monitoring Cloud Based Applications** • Lesson 1: Overview of System Center 2012 R2 Operations Manager • Lesson 2: Agent Deployment in Operations Manager • Lesson 3: Configuring Custom Monitoring • Lesson 4: Monitoring the Network Infrastructure • Lesson 5: Monitoring Distributed Applications	4
10	**Configuring Application Performance Monitoring** • Lesson 1: Application Performance Monitoring • Lesson 2: Advanced Monitoring in APM • Lesson 3: Viewing Application Performance Data in Operations Manager	4
Textbook	20341B-Core Solutions of Microsoft Exchange Server 2013 20246D-Monitoring and Operating a Private Cloud	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	Deploying and Managing Microsoft Exchange Server 2013 Lab: Deploying and Managing Exchange Server 2013	4
2	Planning and Configuring Mailbox Servers Lab: Configuring Mailbox Servers	4

Detailed of Practical Contents		
No.	**Contents**	**Hours**
3	Managing Recipient Objects Lab: Managing Recipient Objects	8
4	Planning and Deploying Client Access Servers Lab: Deploying and Configuring a Client Access Server Role	4
5	Planning and Configuring Message Transport Lab: Planning and Configuring Message Transport	8
6	Introduction to the Cloud Model **Lab:** Verifying the Private Cloud Infrastructure	8
7	Configuring a Private Cloud Environment **Lab:** Configuring and Optimizing a Microsoft Private Cloud	4
8	Deploying Cloud Services **Lab:** Importing and Deploying the StockTrader Application	8
9	Monitoring Cloud Based Applications **Lab:** Monitoring Private Cloud Services	8
10	Configuring Application Performance Monitoring **Lab:** Configuring Application Performance Monitoring	8
Textbook	20341B-Core Solutions of Microsoft Exchange Server 2013 20246D-Monitoring and Operating a Private Cloud	

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support							
Course Name	Seminar		**Course Code**	INSA 483							
Prerequisites	INSA 371		**Credit Hours CRH**	1			CTH		2		
				L	0	P	2	T	0		
CRH: **Credit Hours** L: **Lecture** P: **Practical** T: **Tutorial** CTH: **Contact Hours**											

Course Description :

This course aims at equipping students with a firm background on a variety of topics. Topics of interest include the following: thesis writing basics, communication skills with a genre of audiences, forming teamwork, job interview. This course will assure that students will have enough background material and skills that can help compete in the job market with enough confidence.

Topics :

- Module 1: Definitions.
- Module 2: Research proposal (plan).
- Module 3: Structure of the thesis.
- Module 4: Teamwork.
- Module 5: Communication Skills.
- Module 6: Job Interview.

Experiments:

References :

1. How to write a research proposal and a thesis, a manual for students and researchers, Mohamed E. Hamid, 2nd edition, Create Space Independent Publishing Platform; 2nd edition (March 8, 2013), ISBN: **13:** 978-1482675054.
2. Speech Communication made Simple 2, Pearson Education ESL; 4th edition, 2013, ISBN: 978-0132861694.
3. Amazing Interview Answers, 44 Tough JOB Interview Questions with88 Winning Answers, Richard Blazevich, Signal Tower Publishing (July 2, 2017), **SIN:** B073P38SX9.
4. Ultimate IQ Tests: 1000 practice test questions to boost your brainpower, 3rd edition, Philip Carter, Ken Russell, Kogan Page; 3 edition (August 28, 2015), 13: 978-0749474300.

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	**Module 1: Definitions.** • Proposal, • thesis, • hypothesis, • research, • theory, • literature review, • references.	2
2	**Module 2: Research proposal (plan).** • Short research proposal. • Long research proposal. • Details of proposal sections. • Introduction. • Objectives.	6

Detailed of Practical Contents		
No.	**Contents**	**Hours**
	• Literature review. • Design, methodology and procedures. • Ethical considerations. • Delimitation and limitation of research. • Bibliography (references). • Time schedule.	
3	**Module 3: Structure of the thesis.** • Title page. • Dedication. • Acknowledgment. • Summary (abstract). • Introduction and objectives. • Statement of the problem. • Research questions. • Hypothesis. • Significant and research outcomes. • Objectives • Chapter 1: literature review. • Chapter 2: materials and methods. • Chapter 3: results. • Chapter 4: discussion, conclusions and recommendations. • Discussion. • Conclusions. • Recommendations. • Bibliography (references). • Appendix.	6
4	**Module 4: Teamwork.** • Brainstorming • Identifying Topics for a Problem-Solving Discussion • Path to Successful Problem-Solving for Group Discussions • Path to Being an Effective Group Leader • Path to Being a Responsible Group Member • Presentation Preview • Presentation Project: Problem-Solving Group Discussion	4
5	**Module 5: Communication Skills.** • Developing varied speech genres that range from personal story to persuasive. • Making interviews and group discussion.	6
6	**Module 6: Job Interview.** • Sample job descriptions. • Preparing for the interview. • Experience questions. • Interest questions. • Fit questions. • Case questions. • Odd-ball questions. • Closing questions.	6

Detailed of Practical Contents		
No.	**Contents**	**Hours**
7	**Module 7: IQ test questions.** • Students are exposed to some selected IQ questions to sharpen their brains.	2
Textbook	• How to write a research proposal and a thesis, a manual for students and researchers, Mohamed E. Hamid, 2nd edition, Create Space Independent Publishing Platform; 2nd edition (March 8, 2013), ISBN: 13: 978-1482675054. • Speech Communication made Simple 2, Pearson Education ESL; 4th edition, 2013, ISBN: 978-0132861694. • Amazing Interview Answers, 44 Tough JOB Interview Questions with88 Winning Answers, Richard Blazevich, Signal Tower Publishing (July 2, 2017), **SIN:** B073P38SX9. • Ultimate IQ Tests: 1000 practice test questions to boost your brainpower, 3rd edition, Philip Carter, Ken Russell, Kogan Page; 3 edition (August 28, 2015), 13: 978-0749474300.	

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support							
Course Name	IT Infrastructure Best Practice		**Course Code**	INSA 484							
Prerequisites	INSA 312 INSA 351		**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 IT service management industry relies heavily on implementing the Information Technology Infrastructure Library (ITIL) as a wheel that will transform service practices into service excellence. To achieve this goal, the ITIL qualified personal are on demand, since they acquire the necessary knowledge of theory and ho to apply ITIL standards within everyday context within the organization.

Topics :

Module 1: Introduction.
Module 2: Guiding principles.
Module 3: The CSI approach.
Module 4: Metrics and measurement.
Module 5: Communication.
Module 6: Organizational change management.
Module 7: Toolkit.

Experiments: : If applicable, it will support the course topics.

References : ITIL Practitioner Guidance, Oxelos, The stationery Office , January, 2016, ISBN-10: 0113314876.

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	Module 1 Introduction.	2
2	Module 2 Guiding principles.	4
3	Module 3 The CSI approach.	6
4	Module 4 Metrics and measurement.	6
5	Module 5 Communication.	4
6	Module 6 Organizational change management.	6
7	Module 7 Toolkit.	4
Textbook	ITIL Practitioner Guidance, Oxelos, The stationery Office , January, 2016, ISBN-10: 0113314876.	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	**Module 1: The ITIL qualification scheme.**	2
2	**Module 2: Introduction to service management.** • Service and service management. • Processes, functions and roles. • Best practice. • Sample questions.	2

Detailed of Practical Contents		
No.	**Contents**	**Hours**
3	**Module 3: ITIL and the service lifecycle.** • The ITIL service management practices. • Why ITIL? • The service lifecycle.	2
4	**Module 4: Service strategy** • Purpose and objectives. • Scope • Business value. • Key principles. • Processes. • Sample questions.	4
5	**Module 5: Service design.** • Purpose and objectives. • Scope. • Business value. • Key principles. • Processes. • Sample questions.	4
6	**Module 6: Service transition.** • Purpose and objectives. • Scope. • Business value. • Key principles. • Processes. • Sample questions.	4
7	**Module 7: Service operation.** • Scope. • Business value. • Key principles. • Processes. • Functions. • Sample questions.	4
8	**Module 8: Continual service improvement.** • Purpose and objectives. • Scope. • Business value. • Key principles. • Processes. • Sample questions.	2
9	**Module 9: Service management technology.** • Use of technology. • Service automation. • Service analytics. • Sample questions.	4
10	**Module 10: How it all fits together.** • Integration across the service lifecycle. • Specialization and coordination.	2

Detailed of Practical Contents		
No.	**Contents**	**Hours**
	• Monitoring and control. • Continual service improvement.	
11	**Module 11: Sample ITIL Foundation Examination.** • Instructions and questions.	2
Textbook	Passing your ITIL Foundation Exam: 2011, 3rd edition, publisher: The Stationary Office, 2012. ISBN-10: 0113313551.	

Textbooks	ITIL Foundation Exam Guide, 1st Edition, Liz Gallacher and Helen Morris. Sybex, 2012. ISBN-10: 1119942756.

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support							
Course Name	Graduation Project		**Course Code**	INSA 492							
Prerequisites	INSA 371 INSA 452 INSA 454 INSA 483		**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. It is recommended that students exploit the seminar course (in the previous semester) to elaborate a topic for this course.

Topics :

- 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 :

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support							
Course Name	Selected Topics		**Course Code**	INSA 481							
Prerequisites			**Credit Hours**	4			CTH	5			
			CRH	L	3	P	2	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 basic knowledge of how to maintain and operate a Huawei Unified Communications solution that is based on Huawei Unified Communications Manager, Huawei Unified Communications Manager Express.

This course provides the students with the knowledge and skills to achieve associate-level competency in Huawei Unified Communications.

Topics :

- Module 1 TDM Voice Introduction
- Module 2 Voice Theories
- Module 3 eSpace IPT Solution Introduction
- Module 4 eSpace IPT System Introduction
- Module 5 U1900 Installation and Initial Configuration
- Module 6 eSpace IAD Introduction
- Module 7 eSpace IAD Basic Configuration
- Module 8 eSpace IP Phone Introduction
- Module 9 eSpace IP Phone Basic Configuration
- Module 10 Basic Concepts on Telephone Call

Experiments:

References : HCNA – Voice , Huawei Academy

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 1: TDM Voice Introduction** • TDM Voice Overview • TDM Voice Network • TDM Protocols	3
2	**Module 2: Voice Theories** • VoIP System Network • VoIP Protocols • VoIP Technologies	3
3	**Module 3: eSpace IPT Solution Introduction** • eSpace IPT System Architecture • eSpace IPT Products • eSpace IPT Highlights and Features • eSpace IPT Typical Application Scenarios	3
4	**Module 4: eSpace IPT System Introduction** • U1900 Overview • 5U1900 System Introduction • U1900 Principles and Features	3

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
5	**Module 5: U1900 Installation and Initial Configuration** • Introduction to IPT Installation • U1900 Installation and Initial Configuration	6
6	**Module 6: eSpace IAD Introduction** • eSpace IAD Overview • eSpace IAD Product Introduction	6
7	**Module 7: eSpace IAD Basic Configuration** • Configuration Tools Introduction • IAD Basic Configuration	6
8	**Module 8: eSpace IP Phone Introduction** • Analog Phone Introduction • IP Phone Introduction	6
9	**Module 9: eSpace IP Phone Basic Configuration** • Single IP phone configuration and upgrade	6
10	**Module 10: Basic Concepts on Telephone Call** • Prefix, Office Route Selection Code, Office Route, Routing Policy and Trunk	6
Textbook	**HCNA – Voice , Huawei Academy**	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	LAB 1: U1900 Intra-Office Call	6
2	LAB 2: U1900 Inter-Office Call	6
3	LAB 3: Number Conversation Based on Prefix	6
4	LAB 4: Unified Gateway Intelligent Routing – Failure Routing	6
5	LAB 5: U1900 Unified Gateway Intelligent Routing – Load Balancing	4
6	LAB 6: Automatic Switchboard Service	4
Textbook	HCNA – Voice Labs Guide , Huawei Academy	

Department	Engineering of Computer and Information Technology	Major	Computer Network Systems Support						
Course Name	Open Source Network Systems	Course Code	INSA 444						
Prerequisites	Network Administration 1	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 :

In this course the trainees learn how to install, configure and maintain an Enterprise open source systems in a networked environment (Linux). Administrative tasks are covered such as: creating and managing users, creating and maintaining file systems, build a full server by using open source network system, and implementing security measures and performing software installation and package management.

Topics :

- Module 1: Linux Basics
- Module 2: Users and Groups
- Module 3: Networking and Firewalls
- Module 4:Storage Management and Disaster Recovery
- Module 5:Infrastructure Services: NTP, DNS, DHCP, and SSH
- Module 6: Mail Services
- Module 7: Web and SQL Services
- Module 8: File and Print Sharing
- Module 9: Directory Services

Experiments:

Red Hat Enterprise Linux 6 Administration : Real World Skills for Red Hat Administrators, By Sander Van Vugt

References :

Pro Linux System Administration, By JamesTurnbull, Peter Lieverdink, and Dennis Matotek

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1	**Module 1: Linux Basic** • 1.1 Getting Started • 1.2 Remote Access • 1.3 Files and File Systems • 1.4 Working with Files	2
2	**Module 2: Users and Groups** • 2.1 Working with Users and Groups • 2.2Controling Access to your Host • 2.3 More About Sodu	2
3	**Module 3: Networking and Firewalls** • 3.1 Introduction to Networks and Networking • 3.2 General Network Trubleshooting • 3.3 Netfilter and Iptables	4
4	**Module 4: Storage Management and Disaster Recovery** • 4.1 Storage Basics • 4.2 Using You File System	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
	• 4.3 RAID • 4.4 Logical Volume Management • 4.5 Recovery from Failure	
5	**Module 5: Infrastructure Services: NTP, DNS, DHCP, and SSH** • 5.1 Network Time Protocol • 5.2 Domain Name System • 5.3 Dynamic Host Configuration Protocol • 5.4 Secure Shell	4
6	**Module 6: Mail Services** • 6.1 How Does E-Mail Work? • 6.2 Configuring E-Mail • 6.3 Extending Postfix Configuration • 6.4 Combating Viruses and Spam • 6.5 Configuring IMAP and POP3 • 6.6 Virtual Domains and Users	4
7	**Module 7: Web and SQL Services** • 7.1 Apache Web Server • 7.2 MySQL Database • 7.3 Installing Websites • 7.4 Squid Cache	4
8	**Module 8: File and Print Sharing** • 8.1 Samba • 8.2 NFS Shares: Linux o Linux • 8.3 Managing Documents • 8.4 Print Servers	4
9	**Module 9: Directory Services** • 9.1 Implementation and Installation LDAP • 9.2 Configuration LDAP • 9.3 LDAP Management and Tools • 9.4 Integration with Other Services	4
Textbook	Pro Linux System Administration, By JamesTurnbull, Peter Lieverdink, and Dennis Matotek.	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	LAB 1: Finding Your Way on the Command Line	2
2	LAB 2: Working with Users, Groups, and Permission	2
3	LAB 3: Securing Your Server with iptables	4
4	LAB 4: Configuring and Managing Storage	4

Detailed of Practical Contents		
No.	**Contents**	**Hours**
5	LAB 5: Configuring DNS and DHCP	4
6	LAB 6: Setting Up a Mail Server	4
7	LAB 7: Configuring Apache on Red Hat Enterprise Linux	4
8	LAB 8: Configuring Your Server for File Sharing	4
9	LAB 9: Configuring Open LDAP	4
Textbook	Red Hat Enterprise Linux 6 Administration : Real World Skills for Red Hat Administrators, By Sander Van Vugt.	

Textbooks	Pro Linux System Administration, By JamesTurnbull, Peter Lieverdink, and Dennis Matotek.
	Red Hat Enterprise Linux 6 Administration : Real World Skills for Red Hat Administrators, By Sander Van Vugt.

Department	Engineering of Computer and Information Technology		**Major**	Computer Network Systems Support						
Course Name	Internet of Things		**Course Code**	INSA 485						
Prerequisites			**Credit Hours**	3			CTH		4	
			CRH	L	2	P	2	T	0	

CRH: **Credit Hours** L: **Lecture** P: **Practical** T: **Tutorial** CTH: **Contact Hours**

Course Description:

Internet of Things is a new revolution of the Internet that is rapidly gathering momentum driven by the advancements in sensor networks, mobile devices, and wireless communications, networking and cloud technologies. In this specialized course, students will learn the importance of IoT in society, current components of typical IoT devices and trends for the future. IoT design considerations, constraints and interfacing between the physical world and devices will also be covered. In addition, it also covers key components of networking to ensure that students understand how to connect their devices to the Internet.

Topics :

- Module 1: Introduction to IoT.
- Module 2: Domain Specific IoT.
- Module 3: IoT and M2M.
  Module 4: IoT System Management.
- Module 5: IoT Platform Design Methodology.
- Module 6: IoT Systems – Logical Design Using Python.
- Module 7: IoT Physical Devices and Endpoints.
- Module 8: IoT Physical Servers & Cloud Offerings.

Experiments: : If applicable, it will support the course topics.

References : Arshdeep Bahga, Vijay Madisetti, Internet of Things – A Hands-On Approach, 2014, ISBN: 978-0996025515.

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
1-2	**Module 1: Introduction to IoT.** • Introduction to IoT, • What is IoT, • Physical Design of IoT, • Logical Design of IoT, • IoT Enabling Technologies	4
3	**Module 2: Domain Specific IoT.** • Domain Specific IoT, • Home Automation, • Cities, Environment, • Energy, Retail, Logistics, • Agriculture, Industry, Health & Lifestyle.	2
4-5	**Module 3: IoT and M2M.** • IoT and M2M , • M2M, • Difference between IoT and M2M, • Network Function Virtualization for IoT, • Software Defined Networks for IoT.	4

Detailed of Theoretical Contents		
No.	**Contents**	**Hours**
6-7	**Module 4: IoT System Management.** • IoT System Management, • Need for IoT System Management, • SNMP and Limitations, • Network Operator Requirements, • NETCONF, YANG, • IoT System Management with NETCONF-YANG, NETOPEER.	4
8-9	**Module 5: IoT Platform Design Methodology.** • IoT Platform Design Methodology, • IoT Design Methodology, • Case Study on IoT System for Weather Monitoring, • Motivation for Using Python.	4
10	**Module 6: IoT Systems – Logical Design Using Python.** o IoT Systems Logical Design Using Python, o Introduction to Python Programming, o Python Packages of Interest for IoT.	2
11-12	**Module 7: IoT Physical Devices and Endpoints**. • IoT Physical Devices and Endpoints, • What is an IoT Device, • Exemplary Device: Raspberry Pi, • Raspberry Pi Interfaces, • Programming Raspberry Pi with Python.	4
13-14	**Module 8: IoT Physical Servers & Cloud Offerings**. • IoT Physical Servers & Cloud Offerings, • Cloud Storage Models and Communication APIs, • Python Web Application Framework,	4
15-16	**Module 8: IoT Physical Servers & Cloud Offerings.** • Amazon Web Services for IoT, • SkyNet IoT Messaging Platform.	4
Textbook	Arshdeep Bahga, Vijay Madisetti, Internet of Things – A Hands-On Approach, 2014, ISBN: 978-0996025515.	

Detailed of Practical Contents		
No.	**Contents**	**Hours**
1	**LAB 1: What is IoT?** • Technology overview. • Architecture • Smart device gatewary	2
2	**LAB 2: Data flow.** • Smart device to the apps App to the smart device. • Local installation using mLab.	6
3	**LAB 3: setting up Raspberry Pi Raspberry Pi MQTTS client.** • Setting up the app Project structure App module Web app services Web app components Launching the app	6
4	**LAB 4: Smart Agriculture**	6

Detailed of Practical Contents		
No.	**Contents**	**Hours**
5	**LAB 5: Smart wearable and IFTTT.**	6
6	**LAB 6: Smart Surveillance.**	6
Textbook	Practical Internet of Things with JavaScript: Build standalone exciting IoT projects with Raspberry Pi3 and JavaScript (ES5/ES6), Arvind Ravulavaru, Packet Publishing , **ISBN-10:** 1788292944, 2017.	

Appendix Laboratory Equipment, Workshops and Laboratories

No.	Laboratory name / workshop	Capacity of training	Human Resources	Training courses benefiting from the laboratory / workshop / lab
1	Network Technologies	**20**	**Qualified trainer with CCNA certificate**	Network Technologies -1 Network Technologies -2 Network Analysis and Design
2	Networks Systems Administration	**20**	**Qualified trainer with MCSA 2012 certificate**	Basic Networks Systems Administration Advanced Network Administration
3	Computer Programming	**20**	**Computer Trainer**	Problems Solving Strategies Internet of Things
4	Data Center Operation -1	**20**	**Qualified trainer with CCNA certificate**	Data Center Operation -1
5	Data Center Operation -2	**20**	**Qualified trainer with MCSE- Exchange Server certificate + MCSE- Cloud Platform and Infrastructure**	Data Center Operation -2
6	Selected Topics	**20**	**Qualified trainer with HCNA- UC certificate**	Selected Topics
7	Open Source Network Systems	**20**	**Qualified trainer with Red Hat certificate**	Open Source Network Systems

List of Detailed Equipment for Each Laboratory, Workshop or Lab

Network Technologies		
No.	**Product's Name**	**Quantity**
1.	Computer	21
2.	RoutersK9/CISCO1941	6
3.	SwitchesWS-C2960-24TT-L Cisco Catalyst	6
4.	WS-C2960-24TT-L Cisco Catalyst	3
5.	Cisco Adaptive Security Applicance (ASA)	3
6.	Router EA Linksys	6
7.	Wireless Routers	6

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

Computer Programming		
No.	**Product's Name**	**Quantity**
1.	Computer (with Java Script and Python Programming Languages)	21
2.	Raspberry Pi 3	21

Data Center Operation -1		
No.	**Product's Name**	**Quantity**
1.	Computers	21
2.	Routers	6
3.	Switches	6
4.	Cisco Nexsus	6
5.	Cisco MDS Switches	6
6.	Cisco Nexsus 200 Series Fabric Extenders	6

Data Center Operation -2		
No.	**Product's Name**	**Quantity**
1.	Computer (with Virtual Machines (20341 - 20246))	21

Selected Topics		
No.	**Product's Name**	**Quantity**
1.	Huawei Unified Gateway , U1900	8
2.	Huawei Integrated Access Device (IAD)	8
3.	Huawei IP Phone 7900 Series	21
4.	Computer	21

Open Source Network Systems		
No.	**Product's Name**	**Quantity**
1.	Computer (with Linux Operating System)	21

References

Textbooks	1.	The Material is collected from many courses as the following: 1.Introduction to Networks Companion Guide ,Version 6, By Cisco Networking Academy (Chapter 1 , Chapter 7 , and Chapter 8) 2. Routing and Switching EssentialsCompanion Guide,Version 6, By Cisco Networking Academy (Chapter 1, Chapter 2, Chapter 3, and Chapter 6) 3. Scaling Networks Companion Guide, Version 6, By Cisco Networking Academy (Chapter 3 and Chapter 8)
	2.	1. 20409B-Server Virtualization with Windows Server Hyper-V® and System Center. 2. 20410C - Installing and Configuring Windows Server® 2012 3. 20411C - Administering Windows Server® 2012
	3.	Principles of Program Design, Problem Solving with JavaScript, Paul Addison, Course Technology; 1 edition (February 22, 2011), ISBN: 13: 978-1111526504
	4.	The Material is collected from many courses as the following: 1. Routing and Switching EssentialsCompanion Guide,Version 6, By Cisco Networking Academy (Chapter 8 and Chapter 9) 2. Connecting Networks Companion Guide,Version 6, By Cisco Networking Academy.
	5.	1. 20411C - Administering Windows Server® 2012 2. 20412C - Configuring Advanced Windows Server® 2012 Services
	6.	Ethics for the information age – Author \ Michael J Quinn
	7.	Cisco Networking Academy – Implementing Cisco Data Center Infrastructure (DCII)
	8.	Cisco Networking Academy – CCNA Security 2.0; LABs Chapter 1 to Chapter 6.
	9.	Cisco Design Fundamentals, Multilyered Design Approach for Network Engineers, Shaun L. Hummel, www.cisocnetsolutions.com, 2015
	10.	ITIL Exam Prop. Questions, answers & Explanations, Christopher Scordo, ISBN: 13-978-0-9825768-1-6, 2012
	11.	1. How to write a research proposal and a thesis, a manual for students and researchers, Mohamed E. Hamid, 2nd edition, Create Space Independent Publishing Platform; 2nd edition (March 8, 2013), ISBN: 13: 978-1482675054. 2. Speech Communication made Simple 2, Pearson Education ESL; 4th edition, 2013, ISBN: 978-0132861694. 3. Amazing Interview Answers, 44 Tough JOB Interview Questions with88 Winning Answers, Richard Blazevich, Signal Tower Publishing (July 2, 2017), SIN: B073P38SX9. Ultimate IQ Tests: 1000 practice test questions to boost your brainpower, 3rd edition, Philip Carter, Ken Russell, Kogan Page; 3 edition (August 28, 2015), 13: 978-0749474300.
	12.	1. 20341B-Core Solutions of MicrosoftExchange Server 2013 2. 20246D-Monitoring and Operating a Private Cloud
	13.	1. Pro Linux System Administration, By JamesTurnbull, Peter Lieverdink, and Dennis Matotek. 2. Red Hat Enterprise Linux 6 Administration : Real World Skills for Red Hat Administrators, By Sander Van Vugt.
	14.	Cisco Networking Academy – CCNA Security 2.0; LABs Chapter 7 to Chapter 11.