Lok Jagruti Kendra University
University with a Difference

Diploma in Artificial Intelligence & Machine Learning

LJ Polytechnic

Course Code: 025090503

Network Security & Management

Programme / Branch Name			Diploma in Artificial Intelligence & Machine Learning			
Course Name	Network Security & Management				**Course Code**	025090503
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week / Credits				**Evaluation Scheme**			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
2	0	4	4	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Basic computer networking
- ✓ Data Communication Technologies

3. Rationale

The current era of communication is based on internet and hence, networking is an essential part of it. Current advanced digital world needs a very keen knowledge on various security threats that are increasing day by day posing problems to data. To access remote programs, data and hardware resources, which are lying either on the same organization's computers or at other enterprises or public sources for resource sharing, e-commerce, use of social network etc. connecting the IT resources is the prime requirement of today. So, the threats that are harmful to individual computers will affect the whole organization's computer network as well, which may cause communication delay or lessen the network performance by affecting the server as well as the clients of the organization. This course aims at learning basic cryptography techniques and applying security mechanisms for operating systems as well as private and public network to protect them from various threats by introducing students to the fundamentals of network management, primarily for TCP/IP networks. The students of this course will be able to design, install, configure and experience hands-on management of typical network components.

4. Objectives

- ✓ Acknowledging the role of network administration in current social web.
- ✓ To help students to become a competent and confident user who can use the basic knowledge and skills to manage and administrate the computer network.
- ✓ Prepare students for the upcoming and enhanced version of network threats and its competencies.
- ✓ Identifying the main differences between administration and management of a network from various threats.

5. Contents

Unit No.	Topics	Sub-Topic	Learning Outcomes	% Weightage	Hours
1	**Introduction to Security Mechanisms**	1.1 Various security terms 1.2 Security Basics 1.3 Various types of computer and network attacks 1.4 Types of cryptography	• Understand basic security. • To get knowledge about various attacks in network. • To understand cryptography	20	4
2	**Cryptography in Network**	2.1 Introduction to Symmetric Encryption & Asymmetric Encryption 2.2 Substitution Techniques Encryption and Decryption using: Caesar's cipher, Playfair cipher, Shift cipher, Vigenere cipher, One Time Pad (Vernam cipher), Hill cipher 2.3 Transposition technique: Rail fence cipher 2.4 Asymmetric Encryption: Digital Signature	• To understand basics of cryptography • Understand about cryptography techniques • Knowledge of digital signature	20	6
3	**Network Security**	3.1 Working principle of FIREWALLs 3.2 Internet Protocol Security (IPsec) and its use in secure communication 3.3 Various types of IDSs 3.4 Distinguish Host-based IDS & Network-based IDS 3.5 HIDS and NIDS components 3.6 Advantages and disadvantages of HIDS, NIDS	• Overview of IP security • Understand different types of IDSs. • Understand the HIDS and NIDS.	15	6

4	**Network Administration Protocols and Services**	4.1 Directory Service 4.2 Different Directories Access Protocols 4.3 Active Directory 4.4 VPN and its protocols 4.5 DHCP architecture, RARP and BOOTP 4.6 Introduction to DNS and its Objectives	• To know directory services • Understand directories protocols. • Set-up and configure VPN • List VPN Protocols. • Understand IP protocols. • To know List DNS objects.	25	6
5	**Network Planning and Implementation**	5.1 Network needs 5.2 Install and Configure Windows Server 5.3 Steps to create Domain controller 5.4 Adding file server and print server	• Design a small network • Preparing for installation and configuration server • Install ADDS server. • Understand web base administration process.	20	6
				Total Hours	**28**

6. List of Practicals / Exercises

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

Sr. No.	Practicals /Exercises	Key Competency	Hours
1	Execute Basic TCP/IP utilities and commands. (Eg: ping, ipconfig, tracert, arp, host, netstat, nslookup, ftp, telnet)	Understand the network commands	2
2	Configure a system for various security experiments like: a) Setting up password in every user account. b) Make some standard users and restrict other users for accessing the new users.	To get knowledge of user account configuration	2
3	Configure Web browser security settings for: a) Performing various security settings on Google Chrome. b) Set up double password on account's synced data, and setting up the browsing to a secured condition.	To understand the Web browser security	4
4	Installing and Configuring Virtual Machine VMware.	To understand the VMware	4

5	Create a Windows Server Boot Disk.	To understand the operating system boot disk	4
6	Perform installation of Windows Server 2012 R2 on VMware.	To understand the Windows server 2012	2
7	Configure Windows Server 2012 R2 on VMware.	To understand the server configuration	2
8	Perform installation of Windows 7 or Windows 10 Operating System on VMware.	To understand the Windows 7	2
9	Configure Windows 7 or Windows 10 Operating System on VMware.	To understand the Windows configuration	2
10	Installing Active Directory Using Server Manager on Windows server.	To understand the ADDS services	2
11	Promoting Server to Domain Controller.	To understand the domain controller	2
12	Creating Active Directory Objects.	To understand the AD object	2
13	Configure following services on Windows server: a) Create new Users & assign privileges/ permission. b) Modify/ Delete/Deactivate Users and groups.	To understand configuration services	4
14	Install and Configure DHCP on Server 2012.	To understand the DHCP server	4
15	Install and Configure DNS on Server 2012.	To understand the DNS server	4
16	Setting up and configuring local print device.	To learn local printer setup	4
17	Setting up and configuring network print device.	To learn network printer setup	2
18	Implementing Group Policy in Windows Server 2012 R2.	To understand the group policy	2
19	Install and Configure a Backup Server on Windows Server.	To understand the backup server	2
20	Demonstrate traffic analysis of different network protocols using tool. i.e. Wire-shark. (At least one of them should be recorded and included in term work.)	To learn the network protocol tools	4
		Total Hours	**56**

7. Suggested specification table with hours

Unit No.	Chapter Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1	Introduction to Security Mechanisms	60	20	10	-	10	-
2	Cryptography in Network	20	50	20	-	-	10
3	Network Security	10	30	20	10	20	10
4	Network Administration Protocols and Services	40	40	10	-	-	10
5	Network Planning and Implementation	5	25	50	5	10	5

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Text Books

1) Computer Security Basics by Deborah Russell G.T. Gangenisr, O'Reilly publication.
2) Networking A Beginner's Guide by Bruce Hallberg, Tata McGrow Hill publication.
3) Cryptography and Network Security by William Stallings, Pearson Education, Third Edition

9. Reference Books

1) The Complete Reference Networking by Craig Zacker, Tata McGrow Hill publication.
2) Introduction to Networking by Bruce Hallberg, Tata McGrow Hill publication.
3) Computer Networks by Andrew S. Tanenbaum, Prentice Hall India.
4) Cryptography and Network Security Principles and Practices by William Stallings, Pearson Publication Third Edition.

10. Open Sources (Website, Video, Movie)

1) Software: Wireshark Traffic Analysis/Packet Sniffing Tool, Snort Packet Sniffing tool