

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
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Course Definition:

1- Basic Information:

Course Name	Network Services
Course ID	NS
Contact Hours (Registered Sessions)	20
Contact Hours (Synchronized Sessions)	20
Mid Term Exam	-
Exam	75 min
Registered Sessions Work Load	40
Synchronized Session Work Load	20
Credit Hours	4

2- Pre-Requisites:

Course	ID
Computer Network	CN
Computer Programming 1	CP1

3- Course General Objectives:

This course is intended to study some of basic network protocols used on the internet and belong to the application layer in the TCP/IP Model and to present the essential Internet Services based on this protocols using client/server model.

4- Intended Learning Outcomes (ILO):

Code	Intended Learning Outcomes
ILO1	Understand Client/Server Model
ILO2	Understand how the Domain Name Service works and what its main functions are
ILO3	Explain the general specifications of the DNS protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO4	Understand how the remote login service works and what its main functions are
ILO5	Explain the general specifications of the TELNET protocol and understand how it works and identifying the structure of the exchanged data between the client and the

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	server
ILO6	Understand how the e-mail service works and what its main functions are
ILO7	Explain the general specifications of the e-mail message as defined by RFC822 and MIME
ILO8	Explain the general specifications of the SMTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO9	Explain the general specifications of the POP3 protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO10	Explain the general specifications of the IMAP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO11	Understand how the file transfer service works and what its main functions are
ILO12	Explain the general specifications of the FTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO13	Explain the general specifications of the TFTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO14	Understand how the web service works and what its main functions are
ILO15	Explain the general specifications of the HTTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO16	Understand how the Remote Authentication service works and what its main functions are
ILO17	Explain the general specifications of the RADIUS protocol and understand how it works and identifying the structure of the exchanged data between the client and the server
ILO18	Analyzing the data passed through the networks and identifying the application layer protocols it belong to.

5- Course Syllabus (18 hours of total synchronized sessions)

- **RS:** Recorded Sessions; **SS:** Synchronized Sessions;

ILO	Course Syllabus	RS	SS	Type	Additional Notes
ILO1	<ul style="list-style-type: none"> • Protocol Concept • Review of OSI and TCP/IP Model • TCP Connection and port number 	1.5	1		Exercises

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	<ul style="list-style-type: none"> Client/Server Model Concept 				
ILO2	<ul style="list-style-type: none"> Domain Name System Domain Tree Zones Type of Name Servers Name Server's database and different record types 	1.5	1.5	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> DNS Configuration DNS tools (nslookup, dig) Simulation of the work of name server to resolve dns query
ILO3, ILO13	<ul style="list-style-type: none"> The general specifications of the DNS protocol and how it works Structure of the exchanged data between the client and the server 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Sending requests to dns server Capture and analyze requests and their replies using Wireshark
ILO4, ILO5, ILO18	<ul style="list-style-type: none"> Historic review of remote login service Network Virtual Terminal Negotiation 	1.5	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Using telnet command and putty Capturing TELNET connections and analyzing them using wireshark
ILO6	<ul style="list-style-type: none"> e-mail service main components of email systems and how it works 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Configuring outlook and thunderbird Sending and receiving emails
ILO7	<ul style="list-style-type: none"> the general specifications of the e-mail message as defined by RFC822 MIME standard <ul style="list-style-type: none"> Content types Encoding 	1.5	1.5	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Viewing email message source code Viewing source code of MIME messages
ILO8, ILO18	<ul style="list-style-type: none"> The general specifications of the SMTP protocol and how it works Main commands and their functions Replies and Status code EMSTP and the new functionalities <ul style="list-style-type: none"> Authentication 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Capturing SMTP connections and analyzing it using wireshark Making SMTP sessions using telnet

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	○ Secure Connection SSL				
ILO9, ILO18	<ul style="list-style-type: none"> The general specifications of the POP3 protocol and how it works Main commands and their functions Replies and Status code 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Capturing POP3 connections and analyzing it using wireshark Making POP3 sessions using telnet
ILO10, ILO18	<ul style="list-style-type: none"> The general specifications of the IMAP protocol and how it works Main commands and their functions Replies and Status code Comparing IMAP with POP3 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Capturing IMAP connections and analyzing it using wireshark Making IMAP sessions using telnet
ILO11	<ul style="list-style-type: none"> File sharing and file transfer service Different methods for accessing the service Command line interface <ul style="list-style-type: none"> Browsers File managers Special software 	1.5	1.5	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Exercises for using: <ul style="list-style-type: none"> ftp command internet browsers windows explorer FileZilla
ILO12, ILO18	<ul style="list-style-type: none"> The general specifications of the FTP protocol and how it works Main commands and their functions Replies and Status code Overview of FTPS and SFTP 	1	1.5	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Capturing FTP connections and analyzing it using wireshark Making FTP sessions using telnet
ILO13, ILO18	<ul style="list-style-type: none"> Historic overview of TFTP use The general specifications of the TFTP protocol and how it works Structure of the exchanged messages between the client and the server <ul style="list-style-type: none"> File Transfer 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Transferring file using tftp command Capturing file transferring and analyzing it using wireshark

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	○ Sorcerer's apprentice syndrome				
ILO14	<ul style="list-style-type: none"> The difference between Internet and the Web The Web Service Historic overview 	0.5	0	<input type="checkbox"/>	Exercises
ILO15, ILO18	<ul style="list-style-type: none"> The general specifications of the HTTP protocol and how it works Main commands and their functions Replies and Status code Headers and the functions 	1.5	1.5	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Capturing HTTP connections and analyzing it using wireshark Making HTTP sessions using telnet
ILO16	<ul style="list-style-type: none"> Remote access to company's or ISP's networks. Authentication and authorization service Accounting service RADIUS Solution 	1.5	0.5	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Viewing server configurations
ILO17, ILO18	<ul style="list-style-type: none"> The general specifications of the RADIUS protocol and how it works Structure of the exchanged messages between the client and the server 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments <input type="checkbox"/> assignments	<ul style="list-style-type: none"> Sending requests to RADIUS server Capture and analyze requests and their replies using Wireshark
-	<ul style="list-style-type: none"> Installation and configuration of the Lab platform 	1	1	<input type="checkbox"/> exercises <input type="checkbox"/> experiments	<ul style="list-style-type: none"> Testing the Lab platform exercises
-	<ul style="list-style-type: none"> Assignments solving 		2	<input type="checkbox"/>	

6- Assessment Criteria (Related to ILOs)

ISC	Interactive Synchronized Collaboration	Ex	Exams	Rpt	Reports
PF2F	Presentations and Face-to-Face Assessments	PW	Practice Work		

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ILO Code	ILO	Intended Results	Assessment Type				
			ISC	PW	Ex	PF2F	Rpt
ILO1	Understand Client/Server Model				✓		✓
ILO2	Understand how the Domain Name Service works and what its main functions are		✓	✓	✓		✓
ILO3	Explain the general specifications of the DNS protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO4	Understand how the remote login service works and what its main functions are		✓	✓	✓		✓
ILO5	Explain the general specifications of the TELNET protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO6	Understand how the e-mail service works and what its main functions are		✓	✓	✓		✓
ILO7	Explain the general specifications of the e-mail message as defined by RFC822 and MIME		✓	✓	✓		✓
ILO8	Explain the general specifications of the SMTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO9	Explain the general specifications of the POP3 protocol and understand how it		✓	✓	✓		✓

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	works and identifying the structure of the exchanged data between the client and the server						
ILO10	Explain the general specifications of the IMAP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO11	Understand how the file transfer service works and what its main functions are		✓	✓	✓		✓
ILO12	Explain the general specifications of the FTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO13	Explain the general specifications of the TFTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO14	Understand how the web service works and what its main functions are		✓		✓		
ILO15	Explain the general specifications of the HTTP protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO16	Understand how the Remote Authentication service works and what its main functions are		✓		✓		

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ILO17	Explain the general specifications of the RADIUS protocol and understand how it works and identifying the structure of the exchanged data between the client and the server		✓	✓	✓		✓
ILO18	Analyzing the data passed through the networks and identifying the application layer protocols it belong to.		✓	✓	✓		✓

7- Practice Tools:

Tool Name	Description
Linux RedHat VM	A virtual machine with Linux RedHat 7.2 and has all services needed for the Labs prepared on it and ready to use
Vmware Player	virtual machine player needed to play the Linux RedHat VM
Wireshark	Open source network protocol analyzer
Personal Computer with Microsoft windows	Personal Computer with Microsoft Windows installed on it (including all network applications and commands)
ThunderBird	Open source software for sending and receiving emails
winradius	A free software package including radius server (we will use only the client tool included with the package)

8- Main References:

- Course handbook available on the course's page on the LMS
- PPT Presentations available on the course's page on the LMS

9- Additional References

- 1) RFCs (Request For Comments) for all Studied protocols:
 - <http://www.ietf.org/rfc.html>
 - <http://www.rfc-editor.org/cgi-bin/rfcsearch.pl>
 - <http://community.roxen.com/developers/idocs/rfc/>
- 2) TCP/IP Illustrated: The Protocols, Vol. 1, W. Richard Stevens.