Program	59EC – Communications Electronic Engineering B. Eng. 59SC – Telecommunications Systems Engineering B. Eng. 59SO – Sound and Image Engineering B.Eng. 59TL – Telematics Engineering B. Eng.

Course number and name	
Number	595000020, 595000329, 595000129, 595000219
Name	Computer Networks
Semester	S6 [(February-June)]

Credits and contact hours	
ECTS Credits	4,5
Contact hours	45

Coordinator's name	Ortiz Ortiz, Óscar [oscar.ortiz@upm.es]

Specific course information
Description of course content
Thanks to this course the student will acquire the following knowledges: a) Link Layer and Local Area Networks: - To contextualize local area networks in the Internet architecture. - To list the physical means for the deployment of local area networks. - To explain the problems and classic solutions for controlling access to the shared medium. - To describe the characteristics and the mode of operation of Ethernet. - To identify interconnection devices in local area networks. b) Network layer: - To describe the protocols of the Internet network level. - To establish the relationship between the protocols of the Internet network level and the link level. - To describe the different routing algorithms and protocols on the Internet. - To indicate the structure of societies involved in the organization of the Internet. - To differentiate the interconnection elements on the Internet. - To configure the computers on an IP network. c) Transport layer: - To describe the protocols of the Internet transport layer
List of topics to be covered
1. LINK LAYER AND LOCAL AREA NETWORKS 1.1. Introduction 1.2. Physical layer 1.3. Ethernet

1.4. Link-layer switches, LANs and VLANs
2. INTERNET NETWORK LAYER
2.1. Introduction
2.2. Datagram networks
2.3. Link-layer addressing
2.4. IP: Internet protocol
2.5. Routing Algorithms
3. INTERNET TRANSPORT LAYER
3.1. Transport-layer services
3.2. Multiplexing and demultiplexing
3.3. Connectionless transport: UDP
3.4. Connection-oriented transport: TCP
3.5. Principles of congestion control
3.6. TCP congestion control
4. INTRODUCTION TO INTERNET APPLICATIONS AND SERVICES
4.1. Principles of network applications
4.2. Web and HTTP
4.3. DNS
4.4. Electronic Mail (SMTP, POP3, IMAP)

Prerequisites or co-requisites

- Telecommunication Networks and Services

Course category in the program

_X_ R (required)	**__ E (elective)** *(elective courses may not be offered every year)*

Specific goals for the course

Specific outcomes of instruction

- RA413 – To configure the components of an IP network.
- RA402 – To enumerate the physical media for the deployment of local area networks.
- RA404 – To describe the characteristics and operation of Ethernet.
- RA406 – To describe the level of Internet protocols.
- RA410 – To establish the relationship between the Internet level and the link layer protocols.
- RA900 – To describe the main Internet services and applications.
- RA899 – To differentiate the Internet networking elements.
- RA405 – To identify the local area networking devices.
- RA409 – To describe the level of Internet transport protocols.
- RA403 – To explain the problems and the classical solutions to the shared media access control.
- RA408 – To indicate the structure of bodies involved in the Organization of Internet.
- RA407 – To describe the algorithms and protocols for the Internet routing.
- RA401 – To contextualize the local area in the Internet architecture networks.

Further reading and supplementary materials
– James F. Kurose, Keith W. Ross. Computer Networking: A Top-Down Approach Pearson Addison Wesley, 2012. – Douglas E. Comer Internetworking with TCP/IP Volume One. Prentice Hall, 2013. – Andrew S. Tanenbaum, David J. Wetherall Computer Networks. Pearson Education International, 2010. – William Stallings Data and Computer Communications. Prentice-Hall International, 2007. – The Internet Engineering Task Force (IETF) Request For Comments (RFC): https://www.ietf.org/rfc.html – Moodle.