FACULTY OF **ENGINEERING**

DEGREE COURSE: **COMPUTER AND CONTROL ENGINEERING BS**

SUBJECT: COMMUNICATION NETWORKS

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OBJECTIVES

The course is aimed at:

1) introducing the basic concepts of communication networks (students will deal with network architectures and protocols, as well as communication models, e.g., client-server and peer-to-peer, and corresponding functionalities)
2) analyzing the main standards for Local Area Networks (LANs) and the Internet, focusing on security aspects.

CONTENTS

- Introduction to communication networks: models, networks topologies, types of information, delay and losses, standardization organizations.
- Architecture protocols: layers, protocols, communication and interconnection, the ISO/OSI and Internet models.
- Communication models: models and interactions.
- Main functions and corresponding protocols: delimitation, sequence control, fragmentation, multiplexing, addressing, multiple access, switching and routing, error control, flow control, congestion control, mobility management, other functions.
- Physical layer functions and protocols: communication media, typical functions, and examples of protocols.
- Datalink layer functions and protocols: examples.
- Local Area Networks (LANs): the IEEE 802 standard, the Ethernet standard (IEEE 802.3), Virtual LAN (VLAN), Wireless LAN (WLAN, IEEE 802.11 standard).
- Internet: introduction, general architecture, Internet Protocol (IP), Address Resolution Protocol (ARP), Internet Control Message Protocol (ICMP), Dynamic Host Configuration Protocol (DHCP), User Datagram Protocol (UDP) and Transmission

Control Protocol (TCP), Network Address Translation (NAT), Domain Name System (DNS), IP multicast, mobile IP, and IPv6.

- Network security: IP Security (IPSec), Transport Layer Security (TLS), Firewall and Intrusion Detection System (IDS).

LEARNING OUTCOMES

At the end of the course, students will:

- be familiar with the key aspects of communication networks, architectures, and protocols;
- be able to understand and analyze the main network protocols, as well as the corresponding standards for LANs and Internet.

ASSESSMENT

Written exam: multiple choice and open questions

RECOMMENDED TEXTBOOKS

S. Tanenbaum, *Computer Networks*, 4th Edition. Boston, MA, USA: Prentice Hall, 2003.
J. F. Kurose and K. W. Ross, *Computer Networking: A Top-Down Approach*, 6th Edition. Boston, MA, USA: Addison-Wesley, 2013.
E. Comer, *Internetworking with TCP/IP Volume 1: Principles Protocols, and Architecture,* 6th Edition. Boston, MA, USA: Prentice Hall, 2006.