

## **Introduction to Data Networks**

- 1. Course number and name:** 020INRES1/020IDNES1 Introduction to Data Networks
- 2. Credits and contact hours:** 6 ECTS credits, 3x1:15 contact hours
- 3. Name of course coordinators:** Marc Ibrahim, Nathalie Aouad
- 4. Instructional materials:** Powerpoint slides; Cisco CCNA R&S online material; exercises

### **5. Specific course information**

#### **a. Catalog description:**

This course introduces the basic principles and the various techniques governing the operation of data networks and the Internet, with particular focus on the TCP / IP stack protocols. It covers the architecture of data networks and the Internet; Circuit and packet switching; Protocols and standardization bodies; OSI and TCP / IP layers; Access mechanisms and Ethernet/Wifi technologies in local area networks; The switched architecture of local area networks; IP (IPv4 and IPv6); Routing; Designing IP addressing; Transport protocols (TCP and UDP) and their reliability mechanisms, WEB, mail, DNS and DHCP services; Socket programming, the basic concepts of security. On a more practical level, this teaching unit offers a set of practical exercises that introduces the student to the implementation of a network and configuration of the switching equipment; The use of network simulation tools and protocol analysis; Socket programming. This is a blended course offering the Semester 1 of Cisco CCNA Routing & Switching online material.

#### **b. Prerequisites:** None

#### **c. Required** for CCE students

### **6. Educational objectives for the course**

#### **a. Specific outcomes of instruction:**

- Recognize communication mechanisms and protocols implemented in data networks.
- Develop and implement an IP addressing plan in an enterprise network.
- Understand and use basic network services and applications in IP networks (WEB, mail, DNS, DHCP, etc.).
- Design and implement an enterprise network with basic services.
- Analyze and diagnose the operation of an IP network.
- Use sockets to program applications that can communicate over the network.
- Understand the basic concepts of network security.

#### **b. PI addressed by the course:**

<b>PI</b>	1.3	2.3	6.1	6.2	6.3	6.4
<b>Covered</b>	x	x	x	x	x	x
<b>Assessed</b>	x	x	x	x	x	x

## 7. Topics and approximate lecture hours

- Introduction (1 lecture)
- Networking fundamentals (3 lectures)
- Network access (2 lectures)
- Networking equipment (routers and switches) configuration (1 lecture)
- Diagnosis and simulation tools: Wireshark and Packet Tracer (1 lecture)
- Ethernet (2 lectures)
- Building my first network (2 lab session)
- Network layer (5 lectures)
- IP addressing and routing case study using simulation (3 lab sessions)
- Transport layer (3 lectures)
- Application layer (3 lectures)
- Application and transport layer analysis on Wireshark (2 lab sessions)
- Introduction to Socket programming under Python (4 lab sessions)
- Case study: building an enterprise network (2 lab sessions)
- Introduction to network security (2 lectures)