Introduction to Data Networks

1. **Course number and name:** 020INRES1 Introduction to Data Networks

2. **Credits and contact hours:** 6 ECTS credits, 3x1:15 contact hours

3. **Name(s) of instructor(s) or course coordinator(s):**
   Marc Ibrahim (coordinator), Nathalie Aouad (Instructor), Joseph Fares (Instructor)

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:

PI	1.3	2.3	6.1	6.2	6.3	6.4
Covered	x	x	x	x	x	x
Assessed	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)