Network Engineering

1. **Course number and name:** 020IDRES5 Network Engineering

2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours.

3. **Instructor's or course coordinator's name:** Melhem El Helou

4. **Instructional materials:** Course handouts; standards and white papers; research publications; lab experiments

   References:
   – Ajay R. Mishra, Fundamentals of Network Planning and Optimisation 2G/3G/4G: Evolution to 5G, 2nd edition, 2018.
   – Rajiv Ramaswami, Kumar N. Sivarajan, et Galen H. Sasaki, Optical Networks – A Practical Perspective, 3rd edition, 2010.
   – Afif Osseiran, Jose F. Monserrat, et Patrick Marsch, 5G Mobile and Wireless Communications Technology, 2016.

5. **Specific course information**
   a. **Catalog description:**
      This course covers the fundamental principles of network engineering; radio network planning; deployment considerations for mobile networks; quality of service and mobile network optimization; optical network protection and survivability; WDM network design; network virtualization; artificial intelligence in networking.

   b. **Prerequisites:** None

   c. **Required** for Telecommunication Networks option students; **Selected Elective** for Software Engineering option students

6. **Educational objectives for the course**
   a. **Specific outcomes of instruction:**
      – Perform radio network planning.
      – Analyze, evaluate, and improve the quality of service of mobile networks.
      – Evaluate and optimize optical network protection and survivability.
      – Design WDM networks.
      – Analyze network virtualization.
      – Analyze the place and challenges of artificial intelligence in networking.

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

PI	1.1	1.2	1.3	2.1	2.2	2.4	6.3	6.4
Covered	x	x	x	x	x	x		x
Assessed	x	x	x	x	x	x	x	x

7. Brief list of topics to be covered
  - Principles of network engineering (2 lectures)
  - Radio network planning (7 lectures)
  - Deployment considerations for mobile networks (1 lecture)
  - Quality of service and mobile network optimization (3 lectures)
  - Optical network protection and survivability (3 lectures)
  - WDM network design: LTD and RWA problems (2 lectures)
  - Network virtualization: SDN and NFV technologies (3 lectures)
  - Artificial intelligence in networking (3 lectures)