

Network Engineering

1. **Course number and name:** 020IDRES5/020NENES5 Network Engineering
2. **Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours.
3. **Name of course coordinator:** 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 CCE Telecommunication Networks Option students; **Selected Elective** for students in the CCE Artificial Intelligence and Software Engineering Options.

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)