



Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-426	Optical Networks	6
Prerequisites	Department	Semester
ECE-354, ECE-446	Engineering	Fall, Spring
Type of Course	Field	Language of Instruction
Elective	Engineering	English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Dr Antonis Hadjiantonis	4 th
Mode of Delivery	Work Placement	Corequisites
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Familiarize students with the optical network evolution, from the point-to-point link to the intelligent transport
- Introduce the main elements and components of the all-optical networking solution
- Explore the capabilities and limitations of the optical network

Learning Outcomes:

After completion of the course students are expected to be able to:

- Identify the three generations of optical networking evolution
- Name the all-important technological issues that affect how optical networks are implemented
- Comprehend the potentialities and limitations of optical networks
- Underline how these networks fit in the more classical communication networks based on electronic time division
- Compare the performance of optical networks via computer discrete-event simulation.

Course Content:

- Review of propagation of signals in the optical fiber (attenuation, dispersion etc.)
- The three generations optical networks (point-to-point link, the single station-to-multistation multipoint network, and the any-to-any connected network).
- Elements of all-optical networks: Optical Add and Drop Multiplexers (OADM), Optical Amplifiers (EDFA and SOA) and Optical Switches (OXC).
- The optical node: opaque nodes, transparent nodes translucent nodes.
- The switching fabric: blocking versus non-blocking switches
- Optical amplifiers (Semiconductor Optical Amplifiers and Erbium-Doped Fiber Amplifiers).
- Wavelength-Division Multi-Access (WDMA) network service provisioning.
- Survivability: Protection vs. restoration, link vs. path protection, dedicated vs. Shared
- Control and management of optical networks
- Discussion of current trends in optical networking (like optical packet and burst switching, and optical access using passive networks)

Learning Activities and Teaching Methods:

Lectures, in-class exercises and examples, and computer simulations

Assessment Methods:

Midterm exam, final exam, homework and a computer simulation project

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Optical WDM Networks	Biswanath Mukherjee	Springer	2006	0387290559

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Optical Networks: a practical perspective	Rajiv Ramaswami and Kumar N. Sivarajan	Morgan Kaufman	2002	1558606556
Multiwavelength Optical Networks:	T. E. Stern, G. Ellinas	Cambridge	2008	0521881390

Architectures, Design, and Control	and K. Bala	University Press		
Ethernet Passive Optical Networks	Glen Kramer	McGraw-Hill Professional	2005	0071445625