



Course Code ECE-526	Course Title Optical Networks	ECTS 8
Department Engineering	Semester Fall or Spring	Prerequisites ECE-354, ECE-446
Type of Course Elective	Field Engineering	Language of Instruction English
Level of Course 2 nd cycle	Year of Study 1 st	Lecturer Dr Antonis Hadjiantonis
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

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
- Expose students to recent research articles on various optical networking issues

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
- Review current optical networking trends like optical packet, burst or label switching from research articles

Course Contents:

- 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 protection

- Control and management of optical networks
- Current trends in optical networking (OPS/OBS, optical access) through research literature

Learning Activities and Teaching Methods:

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

Assessment Methods:

Midterm exam, final exam, homework, and computer simulation projects

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Biswanath Mukherjee	Optical WDM Networks	Springer	2006	0387290559

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
T. E. Stern, G. Ellinas and K. Bala	Multiwavelength Optical Networks: Architectures, Design, and Control	Cambridge University Press	2008	0521881390
Glen Kramer	Ethernet Passive Optical Networks	McGraw-Hill Professional	2005	0071445625
Rajiv Ramaswami and Kumar N. Sivarajan	Optical Networks: a practical perspective	Morgan Kaufman	2002	1558606556

Various research papers related to Optical Communication and Networks published in prestigious journals/magazines (like the IEEE Communications Magazine, JLT and JSAC, and the OSA Journal of Optical Communications and Networks)