



Course Syllabus

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| 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: Architectures, Design, | T. E. Stern, G. Ellinas and K. Bala | Cambridge University Press | 2008 | 0521881390 |

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|-----------------------------------|-------------|--------------------------|------|------------|
| and Control | | | | |
| Ethernet Passive Optical Networks | Glen Kramer | McGraw-Hill Professional | 2005 | 0071445625 |