



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

**Objectives of the Course:**

<p>The main objectives of the course are to:</p> <ul style="list-style-type: none"><li>• Familiarize students with the optical network evolution, from the point-to-point link to the intelligent transport</li><li>• Introduce the main elements and components of the all-optical networking solution</li><li>• Explore the capabilities and limitations of the optical network</li><li>• Expose students to recent research articles on various optical networking issues</li></ul>
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**Learning Outcomes:**

<p>After completion of the course students are expected to be able to:</p> <ul style="list-style-type: none"><li>• Identify the three generations of optical networking evolution</li><li>• Name the all-important technological issues that affect how optical networks are implemented</li><li>• Comprehend the potentialities and limitations of optical networks</li><li>• Underline how these networks fit in the more classical communication networks based on electronic time division</li><li>• Compare the performance of optical networks via computer discrete-event simulation</li><li>• Review current optical networking trends like optical packet, burst or label switching from research articles</li></ul>
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**Course Contents:**

<ul style="list-style-type: none"><li>• Review of propagation of signals in the optical fiber (attenuation, dispersion etc.)</li><li>• The three generations optical networks (point-to-point link, the single station-to-multistation multipoint network, and the any-to-any connected network</li><li>• Elements of all-optical networks: Optical Add and Drop Multiplexers (OADM), Optical Amplifiers (EDFA and SOA) and Optical Switches (OXC)</li><li>• The optical node: opaque nodes, transparent nodes translucent nodes</li><li>• The switching fabric: blocking versus non-blocking switches</li><li>• Optical amplifiers (Semiconductor Optical Amplifiers and Erbium-Doped Fiber Amplifiers</li><li>• Wavelength-Division Multi-Access (WDMA) network service provisioning</li><li>• Survivability: Protection vs. restoration, link vs. path protection, dedicated vs.</li></ul>
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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)