

## FUNDAMENTALS OF SIGNALS, SYSTEMS AND NETWORKS

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CdS INFORMATICA E NETWORKING  
Codice 580II  
CFU 12

Moduli	Settore	Tipo	Ore	Docente/i
FONDAMENTI DI SEGNALI, SISTEMI E RETI	ING-INF/03	LEZIONI	100	GIANCARLO PRATI LUCA VALCARENGHI

### Obiettivi di apprendimento

#### *Conoscenze*

This course introduces the fundamentals of signal theory, of stochastic processes, the fundamentals of queueing theory, some basic elements of electromagnetism and some calculus. The course will also cover the main network architectures for access, metropolitan and core segments.

#### Indicazioni metodologiche

Lectures

#### Programma (contenuti dell'insegnamento)

- Signal Theory, basic calculus
  1. Finite energy and finite power discrete and continuous signals
  2. Periodic signals
  3. Time invariant linear systems
  4. Description of signals and systems in the frequency domain
  5. Advanced calculus
- Stochastic processes and queueing theory
  1. General concepts
  2. Probability and random variables
  3. Stochastic processes
  4. Markov chain and process
  5. Elements of queueing theory
- Design of networks
  1. Network hierarchy
  2. Access segment
  3. Metropolitan segment
  4. Core segment
  5. Future architectures
- Network hierarchy
- Access segment
  1. Introduction and challenges
  2. Broadband access networks
  3. Active optical networks
  4. TDM/WDM passive optical networks
- Metro segment
  1. Introduction and legacy technologies
  2. Emerging technologies (PoS, Carrier Ethernet)
  3. WDM metro networks
- Core segment
  1. Introduction and optical transport technologies
  2. Wavelength switched optical networks
  3. WDM network design
  4. Optical network control plane: GMPLS
  5. Photonics in switching: optical burst/packet switching

- Summary and outlook

#### Bibliografia e materiale didattico

G. Prati and L. Prati, "Introduction to Stochastic Processes and Queuing Theory", Edizioni ETS, 2014, ISBN 978-884674059-5  
Slides from the teacher.

#### Modalità d'esame

Exam consists of a written test concerning course concepts and a possible discussion of a project assigned to the student.

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