



# Computer aided simulation and performance evaluation

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<http://www.telematica.polito.it/>



# General Info

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- Paolo Giaccone and Emilio Leonardi
  - DET - Dept. of Electronics and Telecommunications
  - Entrance to the department: first floor above classroom 12
  - [paolo.giaccone@polito.it](mailto:paolo.giaccone@polito.it), [emilio.leonardi@polito.it](mailto:emilio.leonardi@polito.it)
  - Assistance either in the office or remotely
- Class web site
  - Linked from the Politecnico portal [didattica.polito.it](http://didattica.polito.it)
- Teaching material
  - Slides, papers, notes, ... provided during the course
  - Pay attention during lectures and take notes



# Objectives of the course

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- Acquire basic knowledge and skills on performance evaluation of dynamic systems with the support of a computer
- Focus on methodologies that are fundamental for
  - Design of smart systems
  - ICT support to new services
  - Understanding complex phenomena in dynamic systems
  - Advanced data structures
  - Production systems
  - Epidemiological studies
  - ...



# Objectives of the course

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- Two complementary approaches are discussed to study complex discrete systems such as computer networks and data processing systems
  - analytical modeling based on probability theory, queuing theory and stochastic processes
  - simulation techniques
- Lab activities to consolidate knowledge through experience on case studies



# Outcomes

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- Knowledge of
  - main elements of a simulator
  - main methodological tools for design and performance evaluation of dynamic discrete systems
  - basic analytical tools
- Ability to
  - evaluate the performance of a dynamic discrete system through simulation
  - understand the fundamental behavior of a dynamic discrete system in terms of its stability, performance characteristics and limits, bottlenecks
  - compare in a quantitative way two dynamic discrete systems



# Background and preliminary notions

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- As a background, we expect basic notions of
  - information technologies
  - probability theory
- As skills, we expect
  - basic programming skills
  - knowledge of python



# Organization

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- Two lectures
  - Monday 8:30-10:00 (classroom 3I)
  - Wednesday 11.30-13.00 (classroom 9T)
  - Friday 8:30-11:30 (classroom 7I)
    - mostly devoted to labs
- streaming on BBB/zoom + recorded version + last year video
  - during lab hours, the interaction will be within the classroom and the streaming/recorded version could be less effective
  - participation in presence is not mandatory but **strongly** recommended



# Organization

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- All teaching materials will be uploaded on the portal
  - Some material for the labs is under preparation: be patient with last minute material upload, possible inconsistencies, typos, ...
  - Provide feedbacks, comments and suggestions
- We appreciate questions and comments during lectures





# Organization

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- The course mixes lectures, problem solving and activities on the computer
- Lab activities
  - What we intend with lab activities is the design, coding, experimenting of simulations with your computer
  - Work will be individual
  - Discussions, brainstorming, problem solving among students are welcome
  - Simulations will be developed in python



# Exam

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- Examination

- Lab reports (30%)
- Bonus points for homework (20% )
- Oral discussion (50%)
- You have to deliver all Lab reports: otherwise they will be not evaluated



# Grade expiration

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- Lab reports are valid until Dec. 2023.
- *it is not possible to “freeze” the grade for the future*



# Rejection of an (oral) exam

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- the evaluation of the oral exam can be rejected and it can be taken again
- the lab report/code cannot be revised
  - no preliminary evaluation of the report before the report delivery
  - assistance on the code only during lab hours



# Registration for an exam

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- lab report + code
  - delivery by the end of the semester
    - upload on the portal (under “Elaborati”)
- oral exam
  - Register by the official registration deadline on an online form that will be published on the portal
- note that the registration deadline is typically few days before the exam date

- “bring/use your own laptop” mode
  - just needed a python interpreter/IDE
    - jupyter notebook, PyCharm, Visual Studio Code, etc.
  - linux-like OS is recommended, but not required
- attending introductory classes before each lab is recommended
  - lab hours are aimed at implementing the solution, not at discussing the problem



# Lab homeworks and reports

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- weekly homeworks on the labs
  - with informal evaluation
    - based on peer grading
- participation to homeworks gives bonus points
  - to be defined
- report for some labs evaluated at the end of the course