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# 0. Course Presentation

Sistemes Distribuïts en Xarxa (SDX)  
Facultat d'Informàtica de Barcelona (FIB)  
Universitat Politècnica de Catalunya (UPC)  
2024/2025 Q2

# Instructor

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- Instructor: Jordi Guitart
- E-mail: [jordi.guitart@upc.edu](mailto:jordi.guitart@upc.edu)
- Office: C6-205
- Office Hours: Arrange an appointment by mail to meet physically or virtually (e.g. Google Meet)

# Technical competences

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- Understand the *fundamental concepts* for building a distributed system
  - Communication between processes & naming
  - Time & coordination
  - Replication & consistency
- Know typical distributed systems
  - Distributed file systems
  - Distributed web-based systems
  - Large-scale distributed systems
  - Mobile and ubiquitous systems

# Transversal competences

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- G3.1. To understand and use effectively handbooks, products specifications and other technical information written in English
  - Reading comprehension strategies and discourse and genre features
    - Recognizing text structure and organization
    - Applying reading strategies effectively
    - Recognizing genre
    - Identifying the purpose and audience of a text as related to genre

# Contents

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1. Concepts underlying distributed systems
2. Interprocess communication
3. Time and ordering
4. Coordination and agreement
5. Consistency and replication
6. Name systems and services
7. Distributed file systems
8. Distributed web-based systems
9. Peer-to-peer systems
10. Distributed computing
11. Mobile and ubiquitous systems

# Course organization

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- Lecture classes (2 h/week)
  - Objective: Acquisition of theoretical knowledge
- Seminar sessions (2 h/week)
  - Objective: Apply in practice theoretical concepts
- Autonomous learning (6 h/week)

⇒ Student's work: 10 h/week !!!

- All classes planned to be face-to-face

# Course organization

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- Lecture classes
  - Slide-based lectures
  - Exercises (from previous exams)
    - Available in the Exam documentation area in the 'Racó'
  - Online quizzes: **Quizizz**
    - <https://quizizz.com/>
    - Register if you want to keep your history of quizzes
  - Preparation/Follow-up: Reading of papers
    - Elaborate a **reading report** ⇒ deadline: 1 week
      - Fill the report in ATENEA
    - Papers content WILL be requested in the exams

# Course organization

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- Seminar sessions
  - We will use **Erlang** programming language
    - <https://www.erlang.org>
  - Lab work in teams of three students
    - Answer the activity in ATENEA to fill the team members before **February, 18<sup>th</sup>**
      - <https://atenea.upc.edu/mod/choicegroup/view.php?id=4887339>
  - A number of code and experimental **milestones** must be accomplished during the sessions
  - Answer **questions** in ATENEA (deadline: 1 week)
  - Seminars content WILL be requested in the exams



# Course material

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- We have a workspace in **ATENEA**
    - Resources:
      - Lecture slides (+ videos from past course)
      - Reading assignments
      - Seminar assignments + source files
      - Erlang supporting documentation and references
      - Questionnaire for self- and peer-assessment
    - Activities:
      - Reading reports
      - Seminar reports: code review + open questions
- ⇒ <https://atenea.upc.edu/course/view.php?id=96856>

# Grading

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## A. Written mid-term exam

- Confirmed date: 07/04, 10.30h-12.30h

## B. Written final exam

- Confirmed date: 19/06, 11.30h-14.30h
  1. Evaluation of contents included in the mid-term exam, for the students that failed
  2. Evaluation of contents not included in the mid-term exam, for all the students

## C. Evaluation of readings

## D. Evaluation of seminars

# Grading

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- Final Grade for SDX =

$$0,25 \times A + 0,25 \times B2 + 0,2 \times C + 0,3 \times D$$

For the students that have passed the mid-term exam ( $A \geq 5$ ) and do not perform the B1 part of the final exam

$$0,25 \times B1 + 0,25 \times B2 + 0,2 \times C + 0,3 \times D$$

For the rest of students

# Grading

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## A. Mid-term exam

## B. Final exam

### 1. Multiple-choice test about the lectures

⇒ Closed-book: you are not allowed notes, books, or electronic devices such as mobile phones or smartwatches

### 2. Exercises about the lectures

⇒ Restricted open-book: you are allowed a **single legible double-sided cheat sheet**

### 3. Questions/exercises about the seminars

⇒ Closed-book

### 4. Questions about the readings

⇒ Restricted open-book: you are allowed **your own reading reports**

# Grading

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- C. Readings grade:  $0,5 \times \overline{R_i} + 0,5 \times \overline{RQ_i}$
- **Six** reading assignments during the course
    - $\overline{R_i}$ : average grade of readings reports
      - Delivered on time and complete: 10
      - Late delivery or missing sections: 5
      - Not delivered: 0
  - **Six** questions about the readings in the exams
    - $\overline{RQ_i}$ : average grade of questions about the readings
  - Used also for the transversal competence grading

# Grading

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D. Seminars grade:  $(0,6 \times \bar{S}_i + 0,4 \times \overline{SQ_i}) \times W$

- **Six** seminar assignments during the course
  1. Fulfill a number of code and experimental **milestones** during the sessions
  2. Answer a number of open **questions** after the sessions through ATENEA
    - $\bar{S}_i$ : average grade of seminar deliverables
- **Four** questions about the seminars in the exams
  - $\overline{SQ_i}$ : average grade of questions about the seminars
- $W$ : individual weighting resulting from self- and peer-evaluation: [0,75 ... 1]

# Academic integrity

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- We adhere to the commitment to academic integrity at the UPC
  - All the work you submit for grading, individually or as a team, must be your own work
  - Plagiarism and fraud are unacceptable, whether the source is a current/past student, or a website
  - Aiding someone else to cheat is also fraudulent
- Violations of academic integrity will be severely sanctioned as per the FIB protocol

# Bibliography

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- Basic textbooks

- A. S. Tanenbaum, M. van Steen. *Distributed Systems: Principles and Paradigms*, 4<sup>th</sup> edition, distributed-systems.net, 2023
- G. Coulouris, J. Dollimore, T. Kindberg, G. Blair. *Distributed Systems: Concepts and Design*, 5<sup>th</sup> edition, Addison-Wesley, 2011

- Additional books

- S. Ghosh. *Distributed Systems: An Algorithmic Approach*, Second Edition, Chapman and Hall/CRC, 2014
- F. Cesarini, S. Thompson. *Erlang Programming: A Concurrent Approach to Software Development*, O'Reilly, 2009
- J. Armstrong. *Programming Erlang: Software for a Concurrent World*, 2<sup>nd</sup> edition, Pragmatic Programmers, 2013
- F. Hebert. *Learn You Some Erlang for Great Good!*, No Starch Press, 2013



# Requirements

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- OS concepts (SO)
- Networks concepts (XC)