



# ESCUELA SUPERIOR POLITÉCNICA DEL LITORAL

## COURSE SYLLABUS

### DISTRIBUTED SYSTEMS

Printed by: gvsaltos

Program: Computer Science

#### 1. Course number and name

CCPG1015 - DISTRIBUTED SYSTEMS

#### 2. Credits and contact hours

3 credits and 4 contact hours

#### 3. Instructor's course or coordinator's name

CRISTINA LUCIA ABAD ROBALINO

#### 4. Text book, title, author, and year

\*Maarten van Steen y Andrew S. Tanenbaum. Distributed Systems (3era)

a. Other supplemental materials

\*Coulouris, George F. & Dollimore, Jean & Kindberg, Tim & Blair, Gordon. Distributed Systems: Concepts and Design (5th Edition) (Hardcover; 2011-05-07)

\*Mukaddim Pathan & Sitaraman, Ramesh Kumar & Robinson, Dom. Advanced content delivery, streaming, and cloud services (Hardcover ; 2014)

#### 5. Specific course information

a. Brief description of the content of the course (catalog description)

This course introduces fundamental principles of distributed and parallel computing systems, building up on the basic concepts of concurrency and parallelism, consistency in the handling of data, and latency, studied in previous courses. Concepts of communication and coordination between processes are explored, using the models of message passing and shared memory. Under this context, the concepts of atomicity, consensus and conditional waiting are studied. It emphasizes that it is essential to use parallelism and decomposition strategies to achieve performance improvements. Design and architecture of distributed systems are studied, including implementation strategies, performance analysis and improvements (tuning). The concepts of security and fault tolerance are also studied, with an emphasis on the maintenance of a replicated state, introducing concepts that provide a link with the concepts studied under the context of data networks.

b. Prerequisites

SYSTEMS PROGRAMMING - CCPG1008

DATA NETWORKS - TLMG1001

c. This course is a: Required

#### 6. Specific goals for the course

a. Specific outcomes of instruction

1.- Understand the different concepts and technologies necessary to build medium and large-scale distributed systems.

2.- Be able to use, design and implement distributed systems, as well as understand the problems that arise during the implementation of projects based on distributed and cloud technologies.

3.- Parallelize an algorithm by applying task-based or data-parallel decomposition, to reduce the



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execution time of the algorithm

4.- Explain the tradeoffs among overhead, scalability, and fault tolerance when choosing a stateful vs. stateless design for a given service

b. Explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course

#### **7. Brief list of topics to be covered**

- 1.- Introduction
- 2.- Reliability
- 3.- Parallel task decomposition and distributed computin
- 4.- Inter-process communication
- 5.- Design tradeoffs
- 6.- Distributed systems security
- 7.- Distributed systems theory