

# MO441 - Computação Distribuída

(also MC964A)

2nd Semester 2013

Tuesdays and Thursdays, 14:00-16:00, room CC22/IC3

**Prof. Ricardo Anido**

Room37 - IC01

## Program

In this course we will focus on a fundamental aspect of Distributed Computing: distributed algorithms. In general, distributed algorithms are more difficult to design, analyze, implement and debug than sequential algorithms. Today, they are used in a multitude of real systems, in a wide range of applications.

There exists a rich theory in distributed algorithms, comprising modelling the computing environment, types of problems, methods for analyzing correctness and complexity, and impossibility results (important because they prove that some problems cannot be solved in some models of distributed computing).

During the course we will study several classical problems, which involve communication, synchronization, resource management and consensus -- all important in solving the practical problems that arise when trying to solve some of the common jobs of today, be it indexing pages in the internet or writing collaborative tools for mobile devices.

## Grading

Grades will be determined by a combination of two exams (one and half hours), short (1-2 page) papers and class participation. Short papers will be assigned about twice a month. They will be cover material extending the classes, and will be no more that two pages in length. The weight of these will be

- Exams: 60%
- Short Papers : 35%
- Class Participation: 5%

### Exams:

- E1: 17/9 (Thursday)
- E2: 21/11 (Thursday)

### Make-up Exam:

- EF: 9/12 (Tuesday)
- You are eligible only if your frequency in class is higher than 75%

## Doubts

Tuesdays and Thursdays, 15:00-16:00, or any other time, if agreed by email (ranido at ic dot unicamp dot br)

## Bibliography

We will use (mainly) material mixed from the books below.

### Distributed Algorithms

Nancy Lynch, Morgan Kaufmann, 1996

### The Art of Multiprocessor Programming

Maurice Herlihy and Nir Shavit, Morgan Kaufmann, 2008

## Lecture Slides (PDF)

You should not expect to be able to miss class and make it up by looking at the slides for the class. This is because there will often not be any such slides, or because when I do use slides, they often don't contain all of the information that was presented in class. When there are slides, they will be posted here.

[Introduction: characterization of Distributed Computing](#)

[Introduction: some problems in Distributed Computing](#)

[The Synchronous Model](#)

[Election in the Synchronous Model](#)

[Other Algorithms in the Synchronous Model](#)

[Consensus with link failures, Synchronous Model](#)

## Extra material (PDF)

Here are some more material covering the course. Please do not distribute. Also, note that the links below are wrong, so that web robots do not access the material. To fix the link, substitute manually 'chapter' for 'chap' in the link address in your browser.

[The Synchronous Model](#)

[Election in a Ring, Synchronous Model](#)

[Synchronous Model, General Networks](#)

[Synchronous Model, Consensus with link failures](#)

## Assignments

1. (delivery on paper, Sept. 2nd) Write the code for an algorithm where a special node  $i_0$  determines the total number of processes in the system, in the style adopted in Lynch's book (states, messages, state transitions). Assume communication is bi-directional.

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*Modified 2013-08-20*