



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Formal Methods

1920-3-E3101Q121

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#### Aims

At the end of the course, the student will be able to model, at several levels of abstraction, simple concurrent systems and to specify their requirements by means of a logic; the student will know the main techniques to prove the system's behavioral properties, and will be able to use some software tools for the design and analysis of concurrent systems.

#### Contents

Role and scope of formal methods in software design and analysis, particularly for concurrent systems. Techniques for defining the semantics of concurrent programs and systems; formal tools for specifying concurrent systems, requirements and properties; algorithms and software tools for the design and analysis of concurrent systems. In particular, the theory of Petri nets will be introduced.

#### Detailed program

- 1 Survey of formal methods in computer science. Concurrent systems and programs.
- 2 Modeling tools for concurrent systems: transition systems, other formal notations.
- 3 Analysis of concurrent systems: liveness and safety properties, modal and temporal logics, model checking.
- 4 Petri nets: conceptual foundation, applications, types, analysis techniques.
- 5 Theory of systems: basic notions of dynamical systems and cellular automata.

#### Prerequisites

Basic notions of propositional logic. Basic notions of mathematical analysis and of discrete mathematics (as presented in the course of Fundamentals of Computer Science).

## **Teaching form**

Lectures, practical exercises, laboratory activity. Language: Italian.

## **Textbook and teaching resource**

Handouts, research and survey papers.

## **Semester**

Second semester

## **Assessment method**

Written and oral exam. The written exam consists in the execution of some exercises. In the oral exam the solution of such exercises will be discussed and some questions on the developed arguments will be done. Moreover, the solution of some exercises on modeling and verification developed during the lab could be also discussed.

No score is given to the written exam, the score is defined at the interview.

## **Office hours**

On appointment

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