Teaching plan of the Computer Science Area

Academic Year 2024/2025

The main teaching activities of the course in Computer Science are allocated in the first year; students have to obtain 60 CFUs (after Crediti Formativi Universitari, corresponding to the European Credit Transfer and Accumulation System) to progress to the second year. The taught part of the course —worth 47 CFUs— is divided in three terms scheduled as follows:

- Term 1: Immigration (from November 4 to December 12 2024; total CFUs 15)
- Term 2: Core (from January 13 to April 17 2025; total CFUs 20)
- Term 3: Advanced (from May 5 to July 31 2025; total CFUs 12)

The remaining 13 CFUs are awarded if the thesis proposal is approved by the academic board.

Immigration

The modules in the first term are designed to provide students with basic and general knowledge in Computer Science with a focus on algorithms, formal methods, and software engineering —the three main research themes of the Computer Science group.

The modules, consisting of 30 hours of lectures worth 5 CFUs, are as follows:

1. Design and Analysis of Algorithms (Lecturers: Balliu, Flammini, Olivetti)
2. Introduction to Formal Methods (Lecturers: Raimondi, Trubiani, Tuosto)
3. Introduction to Software Engineering (Lecturers: Basciani, De Sanctis, Di Salle, Iovino, Pelliccione, Scoccia)

Moreover, students also attend the modules

1. How To (Lecturer: Trubiani)
2. Induction into CS@GSSI (Lecturer: Tuosto)

respectively 10- and 2-hours long; the "How To" module is about transferrable skills in research and the other module gives an overview of the taught part of the course and the support the group offers to students. These modules does not have exam and do not award CFUs.

Core

In the second term students are offered a number of 14-hours long modules, each one worth 4 CFUs. The core modules are:

Algorithms

1. Algorithmic Game Theory (Lecturer: Flammini)
2. Distributed Graph Algorithms (Lecturers: Balliu, Olivetti)
3. ??? (Lecturer: D'Angelo)

Formal Methods

1. Formal Methods at Work (Lecturer: Trubiani)
2. Introduction to Blockchain and Smart Contracts (Lecturer: Murgia)
3. Model Checking (Lecturers: Grabmayer, Tuosto)
4. Satisfiability Problems and Applications (Lecturer: Raimondi)

Software Engineering

1. Autonomous and Self-Adaptive Systems (Lecturers: De Sanctis, Pelliccione)
2. Continuous Evolution of Software and Artifacts (Lecturers: Di Salle, Pelliccione, Raimondi)
3. Engineering of Human-centric and Smart Systems (Lecturers: De Sanctis, Inverardi, Pelliccione, Scoccia, Troquard)

4. Theory and Applications of Model-Driven Engineering (Lecturers: Basciani, Iovino)

Besides the modules above, designed to introduce students to background topics relevant to the research developed by the Computer Science group, students are offered interpillar modules designed to provide cross-cutting technical skill applicable in more than one pillar. These modules are

- Data processing and visualisation with Python (Lecturer: Compagnucci)
- Knowledge Representation and Ontology Engineering (Lecturer: Troquard)

Core modules have final exams and are optional; students make their choice at the end of term 1 after a presentation of each module given by lecturers. Students must attend and pass the examination of at least five core modules.

Advanced

Advanced modules span specific topics for which there is an active ongoing research activity in the scientific community. Advanced modules are meant to provide students with a broad view of a current research topics in Computer Science. Each advanced module is worth 1 CFU and consists of 6-10 hours of lectures.

1. Mining Software Repositories (Lecturer: Scoccia)
2. Static Analysis for Software Security (Lecturer: Inverso)
3. Experimental Algorithmics and Algorithm Engineering (Lecturer: D'Angelo)
4. Parameterized Complexity (Lecturer: Grabmayer)
5. Models of computation (Lecturer: Grabmayer)

Several other modules are delivered by guest lectures, expert of the topics. Such modues will be scheduled in due course.

Advanced modules do not have examination; students must attend at least 12 advanced modules.

Summary

The table below summarises the courses offered in the Computer Science PhD program for the academic year 2024/2025.

Course	Term	Hours	CFUs	Lecturer(s)
Design and Analysis of Algorithms	1	30	5	Basciani, Grabmayer, Pelliccione
Introduction to Formal Methods	1	30	5	Scoccia, Tuosto
Introduction to Software Engineering	1	30	5	Compagnucci, Di Salle, Flammini, Murgia, Raimondi, Troquard
How To	1	10	0	Tuosto
Induction into CS@GSSI	1	2	0	
Algorithmic Game Theory	2	14	4	Grabmayer
	2	14	4	De Sanctis
Data processing and visualisation with Python	2	14	4	D'Angelo
Distributed Graph Algorithms	2	14	4	Basciani, Pelliccione
Formal Methods at Work	2	14	4	Tuosto
Introduction to Blockchain and Smart Contracts	2	14	4	Olivetti
Model Checking	2	14	4	Inverardi
Satisfiability Problems and Applications	2	14	4	Scoccia
Autonomous and Self-Adaptive Systems	2	14	4	Di Salle, Raimondi
Continuous Evolution of Software and Artifacts	2	14	4	Flammini, Raimondi, Scoccia
Engineering of Human-centric and Smart Systems	2	14	4	Di Salle, Inverso, Raimondi, Troquard, Trubiani
Theory and Applications of Model-Driven Engineering	2	14	4	Compagnucci, Murgia
Knowledge Representation and Ontology Engineering	2	14	4	Trubiani
Mining Software Repositories	3	6	1	Troquard
Static Analysis for Software Security	3	10	1	Iovino
Experimental Algorithmics and Algorithm Engineering	3	6	1	De Sanctis
Parameterized Complexity	3	10	1	Inverardi
Models of computation	3	10	1	Inverardi

The table below summarises the teaching load for the academic year 2024/2025 of full and associate professors of the Computer Science area:

Name	Reduction	Teaching
Aceto	1	0
Balliu		30
Basciani	0.5	16
Compagnucci	1	28
D'Angelo	0.5	40
De Sanctis		32
Di Salle	0.5	28
Flammini	0.5	56
Grabmayer		60
Inverardi	1	8
Inverso		20
Iovino	0.5	32
Murgia		28
Olivetti		30
Pelliccione	0.5	36
Raimondi	0.5	52
Scoccia		24
Troquard		32
Trubiani		68
Tuosto	0.5	32