# IT coding, tools and security

## Prof. Daniele Tessera; Prof. Federico Accetta

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

Quantitative data analysis of complex systems in economics and social sciences require a multidisciplinary methodological training. Computer science, especially its algorithmic aspects, constitutes one of the fundamental building blocks of such preparation.

This course aims to provide students modern computational capabilities for quantitative data analyses and is organized into two modules: Basic Programming and IT concepts (30 hours) and Introduction to Cloud Computing Analytic and Cognitive Computing (30 hours).

In the first module students are introduced to computer programming, starting from the foundations of coding up to basic data structure and algorithm implementations. Programming laboratories based on the Python programming language. This module also provides a brief overview of some popular rapid prototyping and an introduction to Information Security focused to most popular security threats and basic concepts and best practices about Information Security, as well as a brief overview of cryptographic principles and techniques.

The second module focuses on cloud computing solutions for data analysis by providing both basic cloud computing programming capabilities and hands-on experience on a real cloud infrastructure. In addition, the students will be introduced to cloud-based solutions for data analytics and cognitive computing, as well as to collaborative and knowledge management techniques based on natural language processing. At the end of the course students will be able to realize simple Python coding using popular toolkits and to exploit basic cloud computing capabilities.

*Intended learning outcomes*

* Understanding the components of computer programming
* Familiarity with basic data structures and algorithm implementations
* Working knowledge of python programming language
* Knowledge of common rapid prototyping tools
* The student will be able to list and explain the basic concepts about information security and cryptography
* Knowledge of cloud computing, alongside with the tools to understand when it is best to apply a specific service model or deployment model
* Working knowledge of the steps involved in the deployment of an application on a cloud computing platform

***COURSE CONTENT***

1. Introduction to computational thinking focused to data analysis applications.
2. Basic Python programming capabilities.
3. Introduction to some very popular programming techniques.
4. Major Information Security issues and best practices.
5. Basic cryptographic principles and techniques for privacy, integrity and identity management.
6. Principles of cloud computing programming.
7. Introduction to Big Data issues and basic related data management techniques.
8. Introduction to Cognitive Computing for dealing with unstructured data.
9. Hand-on experiences on cloud infrastructures (create and develop applications and service deployment).

***READING LIST***

Textbooks

– Lecture notes and online contents

Further readings

***TEACHING METHOD***

The course will include lectures and class exercises based on traditional teaching and teach by example principles. It is strongly advised to attend to lectures for working on case studies and examples, and for revising materials.

The course also involves lectures and exercise sessions using PC-labs. Active participation, and ongoing personal study are required.

***ASSESSMENT METHOD AND CRITERIA***

The final exam is based on a written report (open answer test) on both modules. The first module accounts for 15/30 while the second module for 9/30. Studends can attened each module tests separately, at the end of classes, as well as the overall test covering both modules.

Students will be also asked to deliver a working prototype developed as a result of the laboratory lessons or an essay on a topic related to the course (within module b) that contributes to 6/30 of the final score.

***NOTES AND PREREQUISITES***

Prof. Daniele Tessera covers the first module while Prof. Federico Accetta the second one.

Very basic knowledge on computer systems is required.

Attendance is strongly recommended.

*In case the current Covid-19 health emergency does not allow frontal teaching, remote teaching will be carried out following procedures that will be promptly notified to students.
Similarly also the assessment method may vary and also in that case the students will be notified.*