Course Manual CoTaPP

31 October 2022, updated 2023-02-23

# Learning Outcomes

After finishing the course successfully, you will be able to:

* express data analysis problems/solutions in a way a computer could execute,
* identify individual steps needed to solve a computational problem,
* describe the analysis process in the form of UML diagrams,
* find and use existing Python tools/libraries to implement the individual steps,
* validate Python programs for correct functioning, and
* develop tested, documented and maintainable Python programs and notebooks.

# Assessment

You will do a midterm and a final exam. You must bring your own laptop computer for the final exam, including all necessary Python packages that we will install throughout the course.

You will work on four two-week group projects during the course. Groups will consist of four students from the same seminar group.

Master students will have slightly different requirements for the group projects, in accordance with the different expectations for master students as outlined in the university’s [educational model](https://www.uu.nl/en/education/education-at-uu/the-educational-model).

The grade for the course will be the weighted average of the grades for:

* Midterm (20%, individual)
* Final exam (40%, individual)
* Projects (4 x 10%, group work)

You will also be provided with homework exercises for every lecture. To be admitted to the exam, you must have completed (submitted) at least 50% of the homework exercises.

To pass the course, all three parts (midterm, final exam and average project grade) need to be graded with 4 or better, the weighted average of all parts has to be 6 or better, and you must have completed all four projects.

# Pre-requisites

* Completed NONE of these: INFOIMP, INFOB1CODE, INFOB1GP, INFOB1MOP
* (INFOMCTH only) Assigned study entrance permit for the master
* Do NOT register for this course if you already have experience with Python or another imperative programming language.
* Students from the following Bachelor programs are **NOT** allowed to take this course as it overlaps too much with their mandatory courses: Computer Science, Information Science, Artificial Intelligence, Natuur- en Sterrenkunde
* You are also not allowed to take this course if you have already done a similar course in a different context.

# Content

The course is an introduction to computational thinking about data analysis and processing problems, and the implementation of corresponding programs in Python. It starts at the very basics and is explicitly intended for students who have no programming experience.

Computational thinking is about expressing problems and their solutions in ways that a computer could execute. It is considered one of the fundamental skills of the 21st century.

Programming is the process of designing and building an executable computer program for accomplishing a specific computing task. The course introduces you to programming with Python, which is currently one of the most popular programming languages in data science. After familiarization with the basics (*i.e.,* input and output, variables, data types, data structures, conditional branching, loops, functions, etc) the course addresses more advanced topics, such as statistical analyses, data visualization, Jupyter notebooks, and graphical user interfaces.

# Course form

The lecture notes and a set of exercises to practice the new concepts will be made available digitally. You are expected to solve these exercises individually within one week after the respective lecture. To be admitted to the exam, you must have completed and submitted on time at least 50% of the homework exercises.

Each seminar (werkcollege) group has a tutor who facilitates the sessions and is available for any questions on the exercises and group projects. The seminar sessions all take place at the same time.

Additionally, each of the tutors is available at a specified time (see schedule) for live consultations via video chat.

# Study materials

You need to have a laptop that you can use throughout the course. Any operating system (Windows, Mac OSX, Linux) is fine, as long as new software can be installed on the machine. We assume that you have elemental computer skills such as browser usage, storing files, installing programs, etc.

All course literature will be provided in digital form.