Course Syllabus

PHOT110 INTRODUCTION TO PROGRAMMING

2024 Spring

Instructor

Dr. Michaël Barbier

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Office: door on the right of Z5

Office hours: 9:00 – 17:00 (via appointment)

Teaching Assistants

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Course Schedule

Monday	13:30 – 15:15	Ali Küçük lab (computer lab first floor F building)
Thursday	09:45 – 11:30	Ali Küçük lab (computer lab first floor F building)

Course Fundamentals

Course Description

This course gives an introduction to programming with specific emphasis on scientific computing. Python will be used as the programming language within the course. Covered topics are: basic computer knowledge, elementary programming and algorithm implementations, vectors and arrays, control flow: loops and conditional, functions, input/output, plotting of 2D/3D graphs, object oriented programming, debugging and writing unit-tests.

Course Objectives (Learning Outcomes)

At the end of the course, you should be able to:

1. Understand the general structure of a computer program.
2. Create basic programs in Python from scratch.
3. Apply numerical techniques within Python using libraries such as Numpy and Scipy.
4. Plot graphs using Matplotlib.

5. Successfully inspect and debug your scripts.
6. Assess the scripts' performance (finding and removing bottlenecks).
7. Have a basic understanding of objective programming.
8. Perform unit tests.

Prerequisites

There are no official prerequisites for this course, and no previous experience with programming is assumed. However, basic knowledge of calculus and algebra is required.

Textbooks

Course Textbook:

H.P. Langtangen, **A primer on scientific programming with Python**, Springer

Supplementary Materials:

M. Pelgrim, **Dive into Python 3**, APRESS, https://diveintopython3.net/

Course website and announcements

You will find all announcements relevant to the course (homework, grades, etc.) on MS-Teams. Syllabus and course schedule may be subject to change during the semester.

Class structure

Course material will be presented on the whiteboard and on the screen. All lecture notes and class materials can be reached from Teams.

Course schedule (tentative)

Week 1	Computers and Python basics: interpreter, IDE, running a script (Ch. 1)
Week 2	Expressions, variables, variable types (Ch. 1)
Week 3	Program control flow: while-loop, for-loop, lists, and ranges (Ch. 2)
Week 4	Program control flow (ctu'd): conditional execution. Further data types: nested lists, Tuples, Arrays, (Ch. 3)
Week 5	Functions, variable scope (Ch. 3)

Week 6	Input/output and error handling (Ch. 4)
Week 7	Modules and script documentation (Ch. 4)
Week 8	Vectors, Arrays, implementation of numerical algorithms (Ch. 5)
Week 9	Plotting graphs using Matplotlib (Ch. 5)
Week 10	Dictionaries, Strings, tables with Pandas (Ch. 6)
Week 11	Object Oriented Programming (Ch. 7)
Week 12	Object Oriented Programming ctu'd (Ch. 9)
Week 13	Unit tests and integrated testing (App. F)
Week 14	Performance, benchmarking, profiling
Week 15	Programming good practices and summary

Course Policies

Attendance and class behavior

Students who attend the lecture are expected to actively participate (in listening, taking notes, understanding, problem solving sessions, etc.).

Homework assignments

Individual projects will be assigned during the term. These can be performed with help from others (fellow students, course instructors, etc.), but the solutions should have unique reports and are to be explained during the exams (this will a short oral explanation in approximately 5 minutes). Homework solutions/reports can be uploaded to Teams on the indicated due date until 23.59. Late homework may be turned in, but 25 points will be deducted from the full score (100 points) for each day that it is late.

Quizzes

Non-graded quizzes can be given during specific lectures (TBA), these do not influence your grades and scores will only be given to the individual students for him/her to understand what type of questions he/she might expect on the exam.

Examinations and Grading

To be announced according to Senate regulations.

Examination Dates

TBA

Disabilities

Students with certified disabilities requiring special accommodations are urged to contact the instructor at the beginning of the semester so that suitable arrangements may be made.

Academic Integrity

Students who violate University rules on academic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or suspension from the University. Forms of academic dishonesty include copying the reports of homework assignments (from a fellow student or internet), cheating on exams, use of unauthorized materials for exams, and changing solutions to returned assignments and exams.