<u>Course Syllabus</u>

PHOT110 INTRODUCTION TO PROGRAMMING
2025-2026 Spring

<u>Instructor</u>

Dr. Michaël Barbier

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Office: door on the right of Z-5

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

<u>Teaching Assistants</u>

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Office hours: TBA	Office hours: TBA

<u>Course Schedule</u>

Thursday	10:45 – 12:30 (Theory)	Ali Küçük lab (computer lab first floor F building)
Thursday	13:30 – 15:15 (Practice)	Ali Küçük lab (computer lab first floor F building)

Course Fundamentals

<u>Course Description</u>

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.

<u>Course Objectives (Learning Outcomes)</u>

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.

<u>Prerequisites</u>

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.

<u>Textbooks</u>

<u>Course Textbook</u>:

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

<u>Course website and announcements</u>

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.

<u>Class structure</u>

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

<u>Course schedule (tentative)</u>

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	Midterm exam (Thursday, April 9)	
Week 8	Modules and script documentation	Ch. 4

Week 9	Vectors, Arrays, implementation of numerical algorithms	Ch. 5
Week 10	Plotting graphs using Matplotlib	Ch. 5
Week 11	Dictionaries, Strings, tables with Pandas	Ch. 6
Week 12	Object Oriented Programming	Ch. 7
Week 13	Object Oriented Programming ctu'd	Ch. 9
Week 14	Unit tests, integrated testing performance, benchmarking, profiling	App. F

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

Midterm exam: Thursday, April 9, at 10:45

Final exam: TBA

<u>Disabilities</u>

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.

<u>Academic Integrity</u>

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.

Please also take the new university rules on the usage of artificial intelligence into account, in particular, when preparing reports, presentations, doing homework, etc.