

# Course information

TNK125 Fundamental programming for data  
analytics, 6hp

# 1 Course content

## 1.1 Learning outcomes

In this course, you will learn how to use programming for problem solving and analysis of data.

After completing the course, the student should be able to:

- Write scripts for data analysis using Python
- Use basic data structures for problem solving in Python
- Apply tools available in some commonly used Python packages
- Generalize programming skills in Python to other script languages, specifically Matlab

For more information on the content covered, see the course plan accessible through <https://studieinfo.liu.se>.

## 1.2 Prerequisites

Admission requirements for master level studies

## 1.3 Course literature

The course literature consists of:

- [Downey, A. B. \(2015\). Think Python: How to Think Like a Computer Scientist. O'Reilly Media.](#)
- [Attaway, D. C. \(2022\). MATLAB: A Practical Introduction to Programming and Problem Solving. Elsevier Science.](#)
- Additional material linked in the teaching plan on Lisam

The course material includes besides the course literature also other documents uploaded to Lisam (lecture slides, lab instructions, etc.).

## 2 Organisation

### 2.1 Lisam

Lisam is used to distribute all information and documents within the course, and it is your responsibility to periodically check for updates. Emails to all students are used in urgent cases only. Also, student submissions are handed in using the submission function on Lisam.

### 2.2 Teaching plan

A detailed teaching plan is made available on Lisam. The teaching plan contains more information about each session in the course. It also contains the deadlines for submissions. The teaching plan will be kept up to date during the course.

### 2.3 Lectures

The purpose of lectures is to give an overview about the topics covered in the course. However, not all knowledge needed to pass the labs and exam is covered in the lecture. For each lecture there is additional material in the form book chapters. Students are expected to prepare *before* the lectures by studying the material. During each lecture there will be time to ask questions about the topic covered in the material and in the lecture.

### 2.4 Labs

During the labs you will apply the knowledge gained from the lectures and other material to solve practical problems. The labs should normally be solved in groups of two students. If you cannot find a lab partner, you may work on the labs on your own.

The labs are held in a computer room. There is a set of lab assignments for each lab distributed on Lisam. LAB2 to LAB6 are examined by a submission on Lisam at latest the day before the next lab. Lab sessions LAB2 to LAB7 start with time for oral examination of the previous lab (see more information in Section 3).

## 2.5 Teachers

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## 3 Examination

### 3.1 DAT1 – Computer exam Python, 3hp

The examination *DAT1* is graded U, 3, 4, 5. The same rules as for written exams apply, but the exam will take place in a computer room.

During the computer exam, you will have access to the same programming environment as during the computer labs. However, during the exam you will have **no access to the internet** and **no access to your private folder**. The following files will be provided in a folder on the computer:

- Exam PDF including instructions and the exam questions.
- Downey, A. B. (2015). Think Python: How to Think Like a Computer Scientist. O'Reilly Media. (PDF-version)
- Python 3.11 documentation (HTML-version)

More practical information on the computer exam is provided during the final lecture (FÖ7).

### 3.2 LAB1 – Laboratory work in Python, 1,5hp

The examination module *LAB1* is graded pass or fail. The labs are to be done in groups of at most two students. No collaboration between different groups is allowed. The examination module is passed when for the each of Python lab assignments (LAB2–LAB4)

- the written submission has been approved and
- the solutions have been successfully examined orally.

Students are expected to be prepared for the oral examination in the beginning of the next lab session. No presentation is needed but students should be able to show, explain and motivate their submitted solution. The oral examination is expected to around 10 minutes per group.

It is your responsibility to contact the responsible lab assistant to plan a re-examination if your whole group or one group member missed a regular oral examination during the lab session or if an oral examination was not approved.

Re-examination will be booked during a coming lab session, preferably the last session (LAB7).

### 3.3 LAB2 – Laboratory work in Matlab, 1,5hp

The examination module *LAB2* is graded pass or fail. The examination module is passed when for the each of Matlab lab assignments (LAB5 and LAB6)

- the written submission has been approved and
- the solutions have been successfully examined orally.

Otherwise, the same rules as for *LAB1* apply.

### 3.4 Grading criteria

The following table shows the minimum criteria that a student need to able to fulfil to achieve grade 3 and grade 5 in the course. Grade 4 is given when the requirements for grade 3 and significant parts of the requirements for grade 5 are fulfilled.

Outcome	Grade 3	Grade 5
Write scripts for data analysis using Python	Write and explain scripts to solve simple data analysis tasks in a mostly correct way	Write and explain scripts to solve given simple and more advanced data analysis tasks in a correct and efficient way
Examination	LAB1, DAT1	DAT1
Use basic data structures for problem solving in Python	Use and understand lists, dictionaries, iterators with some confidence	Use and understand lists, dictionaries, sets, iterators, generators with good confidence
Examination	LAB1, DAT1	DAT1
Apply tools available in some commonly used Python packages	Solve simple tasks by applying Python packages with some confidence	Solve simple and more advanced tasks by applying Python packages with good confidence
Examination	LAB1, DAT1	DAT1
Generalize programming skills in Python to other script languages, specifically Matlab	Write scripts in Matlab that solve simple data analysis problems	-
Examination	LAB2	

### 3.5 Course grade

All examination modules must be passed before a course grade is given. The course grade is equal to the grade for the computer exam (*DAT1*).

### 3.6 Completions and alternative examination

It is generally not possible to deviate from the form of examination as described above and in the course plan. Exceptions apply only if you have been approved special support by the coordinators for students with disabilities. In that case you need to inform the examiner when the course starts.

For completions and re-examination these rules apply if nothing else is stated:

- Re-examination is possible at most two times for the same written submission or oral examination.

- Written completions after the regular end of the course will only be graded during the re-exam periods. Submissions handed-in no later than **5 January 2024** will normally be graded within 3 weeks after this date. Submissions handed-in no later than **30 August 2024** will normally be graded within 3 weeks after this date.
- After the end of the course, oral re-exams are normally only possible during re-exam periods. Contact the lab assistant to schedule a re-exam.
- If an examination module has not been approved after the last re-exam period, the whole module (*LAB1* respectively *LAB2*) must be repeated the next time the course is given. If you have for example passed all labs expect one Python lab, you must redo **all** Python labs the next time the course is given (even those that you have passed earlier).
- For re-examination of the computer exam (*DATI*) the general rules for written exams apply. Two re-exams are offered in-between the regular exam. Make sure to register if you want to participate in the re-exam.
- While re-examination is possible, do not expect further supervision after the regular end of the course.

### 3.7 Plagiarism and cheating

For the lab assignments, no cooperation between lab groups is allowed. It is strictly forbidden to copy answers or parts of answers including code between groups or from other sources. It is possible to use information from books and other sources (use references if possible). References are not needed if you are using the course material and course lecture unless you are literally quoting pieces.

You may use AI-tools/chatbots for inspiration and help when debugging but be aware that you must check every answer for correctness, for example using other sources. It is strictly forbidden to directly copy code from an AI-tool/chatbot or elsewhere. The code and answers you submit need to be written only by your group, otherwise the case will be reported to the discipline board.

Keep in mind that you need to be able to explain your code in the oral examination and that you will have no access to the internet (including AI-tools) during the computer exam!