WELCOME TO
COMPUTER PROGRAMMING
Reimo Palm

Lecturer in Theoretical Informatics
Institute of Computer Science, University of Tartu

PhD in Computer Science

reimo.palm@ut.ee
Course Objectives

This is an introductory programming course.

After passing this course the student:

• knows and can use fundamental programming constructions: variables, expressions, assignments, conditionals, loops, subroutines, recursion, simple input/output

• knows basic datatypes and -structures (numeric types, booleans, strings, lists) and can use corresponding standard operations

• can analyze and explain in detail the behavior of simple programs, and modify, complement and develop them

• can design algorithms for solving simple problems, and implement, test and debug the corresponding program

• can implement projects related to programming in collaboration with teammates
Course Overview


Quizzes, homeworks, grades - https://moodle.ut.ee/
Sessions

• **Before**
  • Lecture videos
  • Quiz
  • Programming homework

• **Sessions on Mondays**
  • Review of material where needed
  • Follow-up exercises
  • New exercises
Grading

https://courses.cs.ut.ee/2019/nkp/fall

- Lecture quizzes
- Homeworks + practice sessions
- Project
- Two tests
- Exam
- Supplementary exercises
Software

• Thonny - https://thonny.org/
  • Python 3

• IDLE or Notepad++

• CMD???
Programming

• Computers want to be helpful
  – but we need to speak their language

• Programmers are people who know how to communicate with computers in a programming language
  – They know how to write programs

• A Program is a sequence of stored instructions (commands)
  – Programmers figure out the sequence and encode it
Python

• Python is a programming language developed by Guido van Rossum in 1991
• A way to communicate with computers and encapsulate our instructions
• Emphasizes readability, clarity, simplicity
• On the other hand, it supports multiple programming paradigms, is highly extensible and is suitable for programming in all scales.
Why Python?

Java:
public class HelloWorld {
   public static void main(String[] args) {
      System.out.println("Hello, world!");
   }
}

Python:
print("Hello, world!")
Advice

At the beginning, the language is new. It is hardly possible to pick up a new language overnight.

There will be lots of mistakes (e.g. *syntax errors*):

- PC is neither cruel nor making jokes
- It says: “I don’t understand what you are saying. I only know a few words. Please speak Python.”
- Be prepared that PC doesn’t correct you as teachers do. It can hardly listen or understand our awkward *Shakespearian* Python

Keep going, wondering throughout, editing, playing, understanding

- It is easier to learn Python than to make computers understand English
Interactive or script

Interactive Python

- Type directly one line at a time and Python responds
- It is good for experiments and programs of 3-4 lines

Python Script

- Enter a sequence of statements (lines) into a file using a text editor and ask Python to execute the statements in the file
- Add .py as the suffix on the end of these files to indicate they contain Python
Expressions

• **Variables**
  
  *Mnemonically* named place in the memory where the programmer can store a value and later retrieves it using the variable name
  
  • Must start with a letter or underscore _
  
  • Must consist of letters, numbers or underscore
  
  • Case sensitive

• **Constants**
  
  • Numbers, letters, and string are constants
  
  • They do not change their value
  
  
  123  98.6  'Hello, world'  "Hello, world"

• **type()**
  
  • Types
    
    int    float    str
  
  • Type conversion
    
    int()    float()    str()
Expressions

• **Assignment statement** (e.g. \( x = 2 \))
  Go and find a place called \( x \) and store there 2

• **Assignment with expression** (e.g. \( x = x + 2 \))

• **Operators**
  - Addition
  - Subtraction
  - Multiplication
  - Division
  - Power
  - Remainder
  - Integer part of division

  (result of \( 450 \mod 100 \) is 50)
  (result of \( 450 \div 100 \) is 4)

• **Order of evaluation** (operator precedence)

  \(( ) \ \ ** \ / \ % \ + \ -\) \ \ Left to right

• **Reserved words**

  e.g. print for elif while
Input, output, comments

• User input
  name = input("Enter name: ")
  weeks = int(input("Enter weeks: "))
  rate = float(input("Enter rate: "))

• Output
  print("Hello")
  print("Hello", name)
  print("Weeks: " + str(weeks))

• Comments
  # Compute the answer