

Principles of Programming S1, 2020

Course Information

COMPSCI 101 – PRINCIPLES OF PROGRAMMING

This course is an introduction to programming computers. It is the main introductory course in the School of Computer Science and is taken by students from a variety of disciplines wishing to have an understanding of computer programming as well as students wanting to continue on to further studies in Computer Science.

We teach programming using the cross-platform language Python. The main focus is on learning to understand the detailed requirements of a programming task, and writing programs that are well structured, correct, easy to read, and to maintain. In order to do this, students need to develop an understanding of how to represent information both as data and algorithms. Students also need to develop the skills of incrementally developing and testing programs.

The course covers simple variables, expressions, input and output, control structures, functions, using standard data structures such as lists and dictionaries, and using standard Python modules.

By the end of the course, students who succeed should be able to design and implement a medium-size computer program as well as have some idea of the process of program execution.

LEARNING OUTCOMES

A student who successfully completes this course will be able to: understand code, implement algorithms, test code, document code, design solutions using functional decomposition and implement those solutions. More specifically, a student who successfully completes this course will be able to:

- determine the state of the program both during and after execution, given a code listing that may include functions and parameters, loops, conditionals and sequences
- implement a given algorithm using Python
- show that a program meets given specifications by writing appropriate tests
- provide a useful level of documentation, in the form of program comments, for all programs developed
- decompose a simple problem into several smaller tasks, given a brief textual description of the problem
- compose functions that perform a specified task into a program that solves a given problem.

INSTRUCTIONAL DESIGN

Programming is traditionally viewed as a subject in which concepts build progressively, so each new concept requires a detailed understanding of the concepts learned previously. Although a number of programming concepts are interrelated, it is possible to separate many of the ideas and to introduce new concepts in a way that relies on little previous knowledge. Additionally, many texts use an approach in which each topic is explored deeply before moving onto the next topic.

This course attempts to present material using a layered approach, in which a broader range of topics is covered initially in a shallow way, then revisited in more depth at later stages. This approach provides a more gradual exposure to the core ideas and allows learning to continue when a particular topic is not well understood.

The programming concepts are introduced primarily through the use of examples. Students are strongly encouraged to practice these examples by typing them into a computer and modifying them to get some hands-on experience.

TEACHING STAFF

Below is the contact information of the four people involved with the teaching of COMPSCI 101 in Semester 1, 2020. We all have an “Open Door” policy and are more than happy to help you with any queries that you may have.

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PROPOSED LECTURE / LAB SCHEDULE

COMPSCI 101, Semester 1, 2020			
Day		Lecture Schedule	Labs
Saturday/Sunday			
Monday	2-Mar		Where is the lab
Tuesday	3-Mar	1 Introduction	
Wednesday	4-Mar	2 Variables, program execution, doing calculations, print()	
Thursday	5-Mar		
Friday	6-Mar	3 Expressions, mathematical operators, the math module	
Saturday/Sunday			
Monday	9-Mar		LAB 1
Tuesday	10-Mar	4 Strings, objects, the len() function, string slices	
Wednesday	11-Mar	5 Manipulating strings, String methods, dot notation	
Thursday	12-Mar		
Friday	13-Mar	6 Getting user input, converting between types, generating random numbers	
Saturday/Sunday			
Monday	16-Mar		LAB 2
Tuesday	17-Mar	7 Defining functions 1	
Wednesday	18-Mar	8 Defining functions 2, functions can call other functions, scope of variables	
Thursday	19-Mar		
Friday	20-Mar	9 Code tracing, divide a program into separate tasks	
Saturday/Sunday			
Monday	23-Mar		LAB 3
Tuesday	24-Mar	10 Boolean expressions, if statements, equality and floats	
Wednesday	25-Mar	11 if ... else, if ... elif statements, nested ifs	
Thursday	26-Mar		
Friday	27-Mar	12 while loops	
Saturday/Sunday			
Monday	30-Mar		LAB 4
Tuesday	31-Mar	13 The Python range() function, for ... in loops	
Wednesday	1-Apr	14 Lists, using for ... in loops to iterate through the elements of a list	
Thursday	2-Apr		
Friday	3-Apr	15 The split() function, updating the elements of a list, lists are mutable objects	
Saturday/Sunday			
Monday	6-Apr		LAB 5
Tuesday	7-Apr	16 Slicing lists, list methods	
Wednesday	8-Apr	17 List revision - Assignment 3 Help	
Thursday	9-Apr		
(Students with Friday lab streams to attend a Monday - Thursday stream)			
A2 (functions, loops)			
Mid-semester Break			

Tuesday	28-Apr	18	Online Test 1 Revision	No Labs this week
Wednesday	29-Apr		No lecture	
Thursday	30-Apr			
Friday	1-May		No lecture	
Saturday	2-May		Online Test 1	
Sunday				
Monday	4-May			LAB 6
Tuesday	5-May	19	Tuples	
Wednesday	6-May	20	Open, read, write and close files	
Thursday	7-May			
Friday	8-May	21	Maintaining a text file of information	
Saturday/Sunday				
Monday	11-May			LAB 7
Tuesday	12-May	22	Dictionaries	
Wednesday	13-May	23	More on dictionaries	
Thursday	14-May			
Friday	15-May	24	Python sequences, using the Python interpreter	
Saturday/Sunday				
Monday	18-May			LAB 8
Tuesday	19-May	25	tkinter 1 - GUI's, using the Canvas widget	
Wednesday	20-May	26	tkinter 2 - Drawing shapes using nested loops	
Thursday	21-May			
Friday	22-May	27	More on nested loops, passing mutable objects as parameters	
Saturday/Sunday				
Monday	25-May			LAB 9
Tuesday	26-May	28	Testing, docstrings for functions, doctests	
Wednesday	27-May	29	Online Test 2 Revision	
Thursday	28-May			
Friday	29-May	30	The CompSci 101 Exam (Revision)	
Monday	1-Jun			NO LECTURES OR LABS THIS WEEK
Tuesday	2-Jun			
Wednesday	3-Jun			
Thursday	4-Jun			
Friday	5-Jun			
Saturday	6-Jun		Online Test 2	A5 (GUIs)

ASSESSMENTS

Pass Requirements

Your final grade will consist of 2 invigilated computer-based tests worth 45% in total, a final (written) exam worth 25%, 9 labs worth 9% in total, 9 timed CodeRunner questions worth 6% in total (each is worth 1% but only the best 6 are counted towards your final grade) and 5 assignments worth 15% in total. To pass the course, as well as obtaining at least 50% overall, you must obtain at least 50% of the total mark for the invigilated computer-based tests and at least 50% of the total mark for the final written exam.

Laboratories

The laboratories are worth 9% of your final mark. You will attend 1 lab every week starting from the second week of semester. Attendance at the labs is compulsory. Every laboratory session contributes towards your final grade. Please keep your signed lab sheet as proof of lab attendance.

The labs are designed to give you practical experience with the basic concepts which you have learnt in lectures. They will include activities to be completed during the laboratory session. CodeRunner will be used for some of the exercises to check for correctness but tutors will be checking your code for good style also.

Each week you should make sure you have read through the lecture slides and have done any other preparation required before you attend the laboratory.

Assignments

Assignments are designed to give you practical experience with the concepts that you have learnt in lectures and labs. Assignments are worth a total of 15% of your final mark. There are five assignments worth 3% each. Here are the tentative due dates (but may be subject to change):

Assignment 1: due 4:30pm on Tuesday, 24th March

Assignment 2: due 4:30am on Thursday 9th April

Assignment 3: due 4:30pm on Monday 11th May

Assignment 4: due 4:30pm on Tuesday 26th May

Assignment 5: due 4:30pm on Friday 5th June

For assignments where you are writing complete programs, you will submit your programs to the assignment dropbox:

<https://adb.auckland.ac.nz/Home/>

For other assignments you will use the CodeRunner tool to submit your assignment. Submissions are marked by CodeRunner running a series of test cases of the code in a sandbox and comparing the output with the expected output.

Timed CodeRunner Questions

After everyone has had their lab, there will be a timed CodeRunner exercise (or set of exercises) for you to do. These exercises will be closely aligned to the lab you have just completed. The exercises will be timed - which means that you will have to develop and implement your solution within a certain amount of time. The main purpose of these timed exercises is to give you practice for the 2 invigilated computer-based tests. Each of these exercises (or sets of exercises) will be worth 1 mark but only your best 6 will be counted towards your final grade. Submissions are graded by running a series of test cases on your code in a sandbox and comparing the output of your code with the expected output.

Invigilated Computer-based Tests

There will be 2 compulsory invigilated computer-based tests for this course. The first test contributes 20% towards your final grade and the second test contributes 25% towards your final grade. The first test will be held on the morning of Saturday 2nd May and the second test will be held on the morning of Saturday 6th June. The location of the tests will be announced closer to the date. These 2 invigilated computer-based tests are practical tests and **all** the questions are answered and validated using CodeRunner3.

Final Exam (paper-based)

The final exam is worth 25% of your final mark and your answers will be hand-written in a Question/Answer booklet. Closer to the exam time you will be able to check Student Services Online for the exam time and date. The exam is closed book, and calculators are not permitted. Provisional results can be obtained from Student Services Online.

OTHER INFORMATION

How to seek assistance

In the labs, there are always tutors and demonstrators available to help you. If you have an administrative problem (e.g. you have been ill, you have a timetable clash with your lab or test, your marks have been incorrectly recorded, etc.), or any other sort of problem that you need help with, please see the course coordinator. Students are asked to discuss privately any impairment related requirements face-to-face and/or in written form with the course coordinator or lab supervisor. If you need extra help with understanding the course material, or preparing for the tests or exam, you are very welcome to visit any of the teaching staff either during their office hours or at some other time when they are available.

There are many other resources available within the University, e.g. the Student Learning Centre, the library, DELNA (to identify where you may need help with your academic English) and ELE (English Language Enrichment - a set of resources to help you improve your English).

Piazza

The Piazza discussion forum within Canvas is regularly monitored by teaching staff. Please make use of the forum to ask any questions that you think might be of interest to other students. If your question is of a personal nature, or relates to a unique situation that will be of little interest to others, then please contact the teaching staff directly.

Your first lab

Your first lab will be held in the week starting Monday the 9th of March. Please attend the lab stream that you have enrolled in. When you arrive at the lab, you should sign next to your name on the lab noticeboard. There will be tutors and lab demonstrators available throughout all the labs to help you. In order to use any of the computers you will need to log into the system. This will be the username and password which you use to log into Student Services Online.

Please bring a pen and a USB Flash drive to every lab.

Label all your flash drives on the outside. It is also a good idea to have a file called "MyContactDetails.txt" with your contact details stored on your flash drive. Several flash drives are left in the lab each week. We will email you if your flash drive is found in the lab, providing it has your name and email address inside (or written on the outside).

Enjoy the course!