

WELCOME TO

COMPSCI 11

Principles of Programming

Lecture 1 - Introduction

Learning outcomes

At the end of this lecture, you will know:

- how to obtain information about CompSci 101,
 - which parts of the CompSci 101 assessment contribute to the invigilated practical mark,
 - which parts of the CompSci 101 assessment contribute to the theory mark,
 - that to pass CompSci 101, both the invigilated practical part of the course and the theory part of the course need to be passed,
- and,
- what an algorithm is.

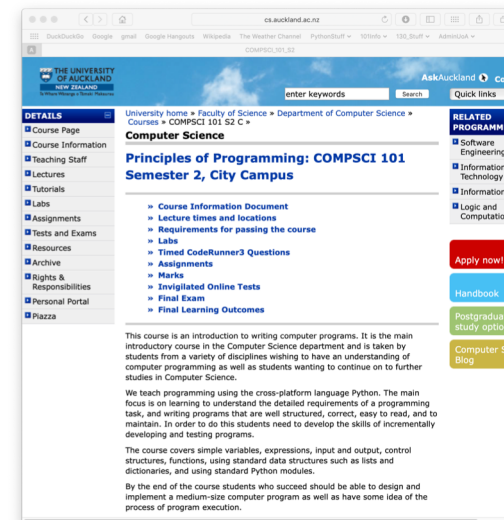
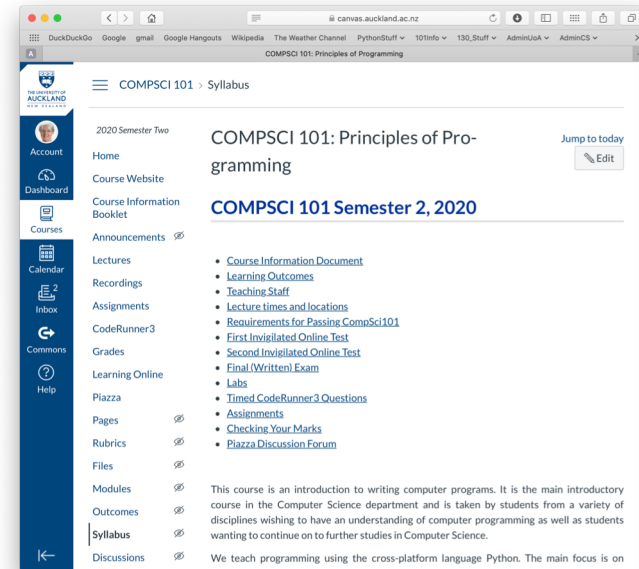
We are using Canvas

We will be using the Canvas Learning Management system.

<https://canvas.auckland.ac.nz>

As well as using Canvas, CompSci 101 has a course website. All the material on the CompSci 101 website can be accessed through Canvas.

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/>



The CompSci 101 website

The CompSci 101 website can be reached by logging onto the Canvas website:

<https://canvas.auckland.ac.nz>

OR, by going directly to the CompSci 101 website:

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/>

- Here you will find all the information about our course set up.
- Get used to looking at this website for information about lecture slides, lab documents, assignment resources, assessment, people involved in the course and lots more.

Course Information Document

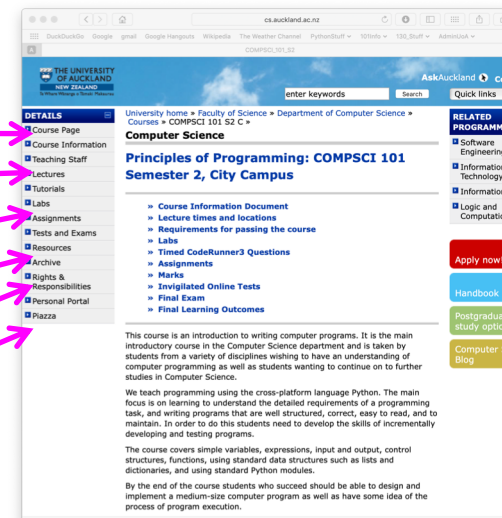
People

Lectures

Labs

Assignments

Tests, Exams



People in this course

Ann Cameron (Course Coordinator and Lab Supervisor)

Email: ann@cs.auckland.ac.nz

Phone: 9234947

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People in this course

Angela Chang (Lecturer)

Email: a.chang@auckland.ac.nz

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People in this course

Damir Azhar (Lecturer)

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People in this course

Adriana Ferraro (Lecturer)

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Office Hours

Open door policy – Visit any time



Lecture schedule

On the course information booklet there is information about the CompSci 101 course set up and a schedule of the lectures for CompSci 101.

*Course
Information
Document*

The screenshot shows the Canvas LMS interface for COMPSCI 101. The left sidebar contains navigation links: Account, Dashboard, Courses, Calendar, Inbox, Commons, and Help. The main content area displays the 'Course Information Booklet' for 'COMPSCI 101 > COMPSCI 101: Principles of Programming'. The booklet is divided into two main sections: 'Lecture Schedule' and 'Labs'.

Lecture Schedule:

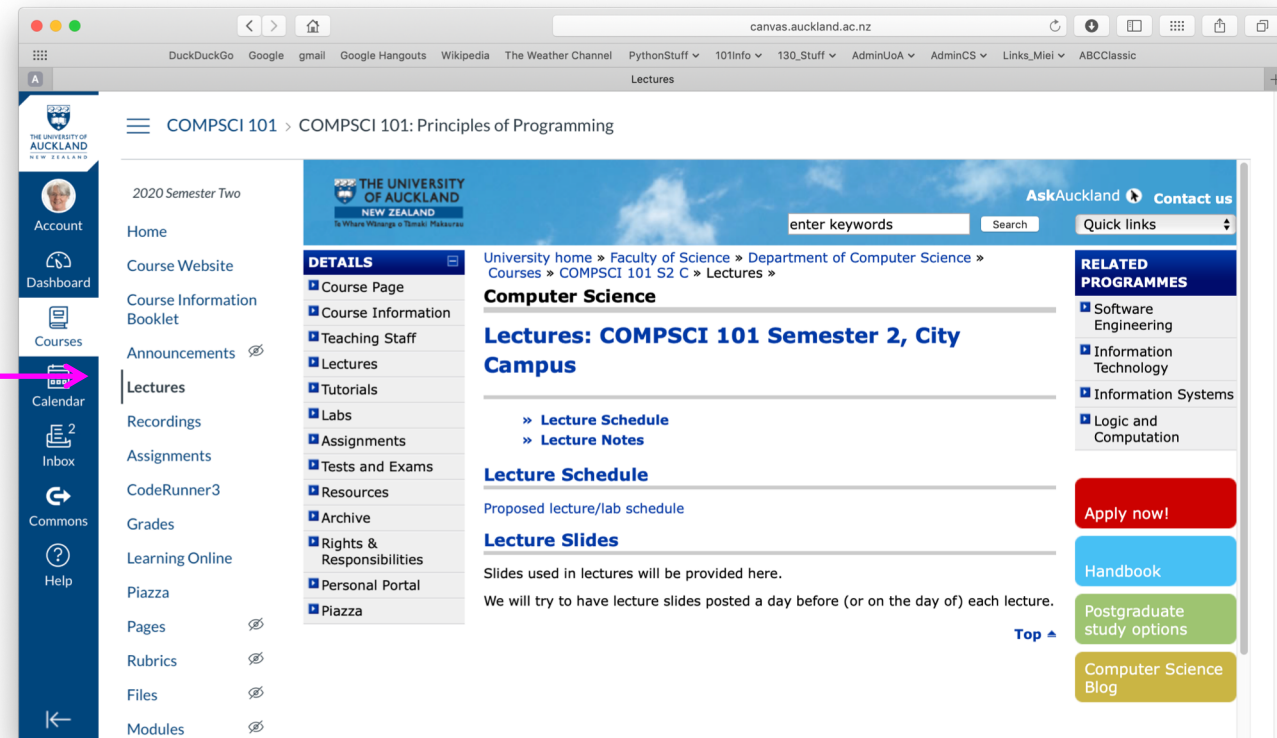
| Day | Date | Lec | Labs |
|-----------------|--------|---|-------------------------------------|
| Saturday/Sunday | | | |
| Monday | 27-Jul | 1 Introduction | No Lab Find the lab room (3035-278) |
| Tuesday | 28-Jul | | |
| Wednesday | 29-Jul | | |
| Thursday | 30-Jul | 2 Variables, program execution, doing calculations, print() | |
| Friday | 31-Jul | 3 Expressions, mathematical operators, the math module, round() | |
| Saturday/Sunday | | | |
| Monday | 05-Aug | 4 Strings, objects, the len() function, string slices | Lab 1 Variables |
| Tuesday | 06-Aug | | Calculations |
| Wednesday | 07-Aug | | |
| Thursday | 08-Aug | 5 Manipulating strings, string methods, dot notation | |
| Friday | 09-Aug | 6 Getting user input, converting between types, random numbers | |
| Saturday/Sunday | | | |
| Monday | 10-Aug | 7 Defining functions | Lab 2 5 |
| Tuesday | 11-Aug | | |
| Wednesday | 12-Aug | | |
| Thursday | 13-Aug | 8 Calling functions from other functions, scope of variables | |
| Friday | 14-Aug | 9 Code tracing, divide a program into separate tasks | |
| Saturday/Sunday | | | |
| Monday | 17-Aug | 10 Boolean expressions, if statements, equality and floats | Lab 3 |
| Tuesday | 18-Aug | | |
| Wednesday | 19-Aug | | |
| Thursday | 20-Aug | 11 if ... else, if ... elif statements, nested ifs | |
| Friday | 21-Aug | 12 while loops | |
| Saturday/Sunday | | | |
| Monday | 24-Aug | 13 The Python range() function, for ... in loops | Lab 4 |
| Tuesday | 25-Aug | | |
| Wednesday | 26-Aug | | |
| Thursday | 27-Aug | 14 Lists, using for ... in loops to iterate through the elements of a list | |
| Friday | 28-Aug | 15 Revision (Test is on all the material up to the end of Lecture 12) | |
| Saturday/Sunday | | | |
| Monday | 31-Aug | Test 1 (Tuesday 1st September) (Lectures 1-15) | |
| Tuesday | 01-Sep | NO LECTURES OR LABS THIS WEEK | |
| Wednesday | 02-Sep | | |
| Thursday | 03-Sep | | |
| Friday | 04-Sep | | |
| Saturday/Sunday | | | |
| Monday | 11-Sep | Mid-Semester break | |
| Tuesday | 12-Sep | | |
| Wednesday | 13-Sep | | |
| Thursday | 14-Sep | | |
| Friday | 15-Sep | | |
| Saturday/Sunday | | | |
| Monday | 21-Sep | 16 The split() function, updating the elements of a list, lists are mutable | Lab 5 for loops |
| Tuesday | 22-Sep | | range() function |
| Wednesday | 23-Sep | | lists |
| Thursday | 24-Sep | 17 Slicing lists, list methods | |
| Friday | 25-Sep | 18 Lists revision | |
| Saturday/Sunday | | | |
| Monday | 28-Sep | 19 Tuples | Lab 6 List methods |
| Tuesday | 29-Sep | | List slices |
| Wednesday | 30-Sep | | |
| Thursday | 01-Oct | 20 Open, read, write and close files | |
| Friday | 02-Oct | 21 Maintaining a text file of information | |
| Saturday/Sunday | | | |
| Monday | 05-Oct | 22 Dictionaries | Lab 7 File processing |
| Tuesday | 06-Oct | | Tuples |
| Wednesday | 07-Oct | | |
| Thursday | 08-Oct | 23 More on dictionaries | |
| Friday | 09-Oct | 24 Python sequences, using the Python interpreter | A5 due (late) |
| Saturday/Sunday | | | |
| Monday | 12-Oct | 25 tkinter 1 - GUI's, using the Canvas widget | Lab 8 Dictionaries |
| Tuesday | 13-Oct | | |
| Wednesday | 14-Oct | | |
| Thursday | 15-Oct | 26 tkinter 2 - Drawing shapes using nested loops | |
| Friday | 16-Oct | 27 More on nested loops, passing mutable objects as parameters | |
| Saturday/Sunday | | | |
| Monday | 19-Oct | 28 Testing, docstrings for functions, doctests | Lab 9 Nested for loops |
| Tuesday | 20-Oct | | Thinter - drawing shapes |
| Wednesday | 21-Oct | 29 Revision for test and exam | |
| Thursday | 22-Oct | | |
| Friday | 23-Oct | | A5 due (dictionaries) |
| Saturday/Sunday | | | |
| Monday | 26-Oct | Test 2 (Tuesday 27th October) | |
| Tuesday | 27-Oct | NO LECTURES OR LABS THIS WEEK | |
| Wednesday | 28-Oct | | |
| Thursday | 29-Oct | | |
| Friday | 30-Oct | A5 due (thinter) | |

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/info/CourseInformation.pdf>

Lecture Slides

Lecture slides will be available on the web before each lecture.

Lectures



The screenshot shows the Canvas LMS interface for the course COMPSCI 101: Principles of Programming. The left sidebar contains a navigation menu with the following items: Account, Dashboard, Courses, Calendar, Inbox, Commons, Help, Pages, Rubrics, Files, and Modules. The 'Lectures' link in the 'Courses' section is highlighted with a pink arrow. The main content area displays the course details, including the course name, a search bar, and a list of links. The 'Lectures' link is highlighted in the 'DETAILS' section. The 'Lecture Slides' link is also visible in the 'Lecture Slides' section. The 'Lecture Slides' section contains the text: 'Slides used in lectures will be provided here. We will try to have lecture slides posted a day before (or on the day of) each lecture.'

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/lectures>

There is no textbook for CompSci 101

There is **no textbook** but we do have an online reference book,

Think Python – How to think like a computer scientist.

- Please be aware that we are teaching the CompSci 101 material in a different order to the ordering in this book. This book is a reference book, not a textbook for this course.

The screenshot shows the course website for COMPSCI 101: Principles of Programming. The page has a blue header with the University of Auckland logo and navigation links. A left sidebar contains a menu with items like Account, Dashboard, Courses, Calendar, Inbox, Commons, and Help. The main content area is titled 'COMPSCI 101 > COMPSCI 101: Principles of Programming' and includes a 'DETAILS' sidebar with links to Course Page, Course Information, Teaching Staff, Lectures, Tutorials, Labs, Assignments, Tests and Exams, Resources, Archive, Rights & Responsibilities, Personal Portal, and Piazza. The main content area has a search bar and a 'Resources: COMPSCI 101 Semester 2, City Campus' section. This section lists links for Python, Reference Book, and Miscellaneous. The 'Reference Book' section lists 'Think Python (Version 1.1.24+Kart [Python 3.2])'. A right sidebar contains 'RELATED PROGRAMMES' like Software Engineering, Information Technology, and Information Systems, along with buttons for 'Apply now!', 'Handbook', 'Postgraduate study options', and 'Computer Science Blog'. Two pink arrows point from text labels to the website: one from 'Resources' to the 'Resources' link in the 'DETAILS' sidebar, and another from 'Online Reference Book' to the 'Reference Book' section.

Resources

Online Reference Book


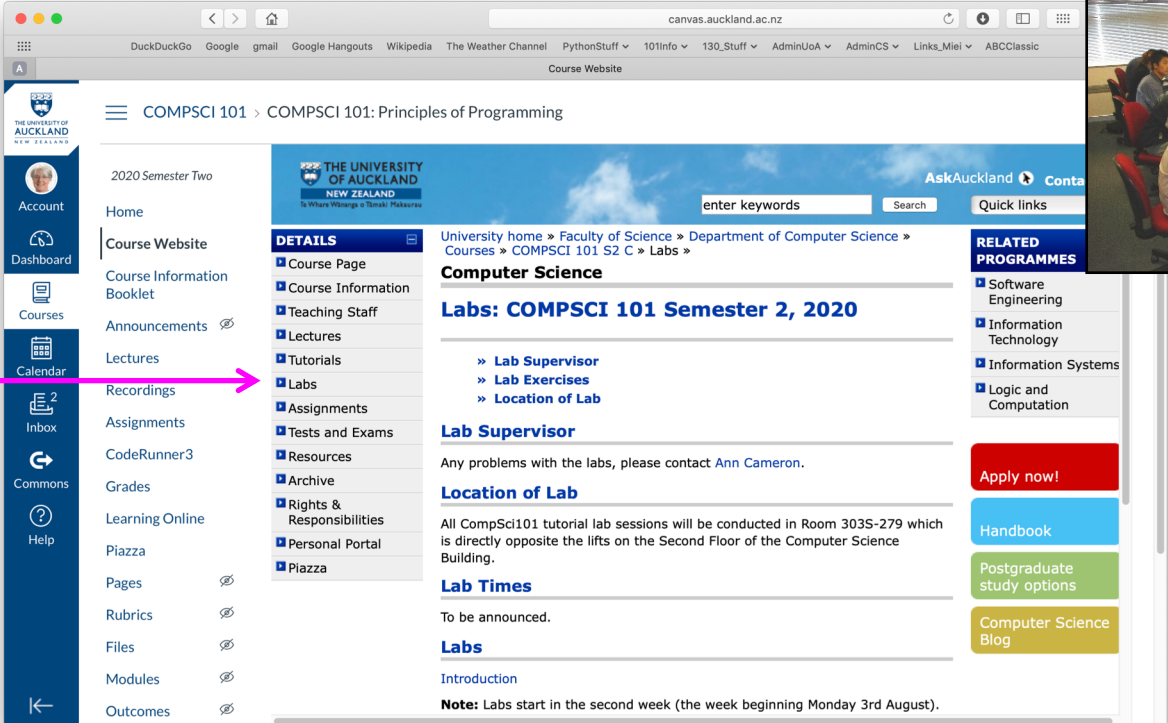
<https://www.cs.auckland.ac.nz/courses/compsci101s2c/resources/>

Labs

Labs start next week: Monday August 3

- Each week you will have **one two hour** laboratory session.
- You should attend the same lab time each week.
- Labs are held in room 279 (Building 303S) which is on the second floor of the Computer Science building.

Labs →



<https://www.cs.auckland.ac.nz/courses/compsci101s2c/labs/>

More about labs

Labs start next week: Monday August 3

There are 9 labs and each lab is worth 1% of your final mark.

- At your lab time you will be given programming problems to solve within the 2 hours for your lab.
- Lab exercises must be submitted to CodeRunner3 before 4:30pm (NZ Time) on Thursday of each week.



The screenshot displays the Canvas LMS interface for the course COMPSCI 101: Principles of Programming. On the left sidebar, the 'Labs' link is highlighted with a pink arrow and the word 'Labs' in pink text. The main content area shows the course details and a section titled 'Labs: COMPSCI 101 Semester 2, 2020'. This section includes links for 'Lab Supervisor', 'Lab Exercises', and 'Location of Lab'. Below these, there is a 'Lab Times' section stating 'To be announced.' and a 'Labs' section with an 'Introduction' link. A note at the bottom states: 'Note: Labs start in the second week (the week beginning Monday 3rd August).' An inset photo in the top right corner shows two students working on a computer.

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/labs/>

Before the First Lab

Visit the lab **on Wednesday July 29**, between 1pm and 2:30pm.

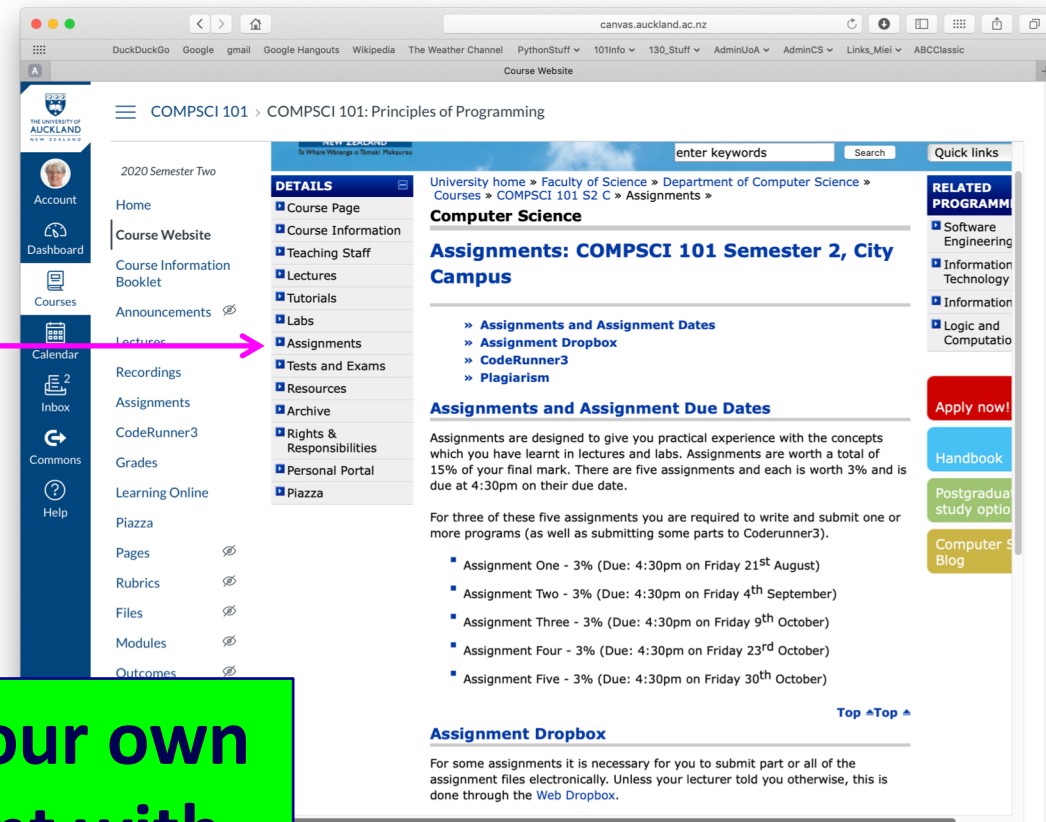
- Before the first lab you need to complete the lab preparation sheet (I will hand this out).
- In order to complete the sheet you need to visit the CompSci 101 lab.

| | |
|---|---|
| <div>  </div> <div> <p>CompSci 101 Preparation for First Lab</p> </div> <div> <p>Welcome to CompSci 101 ☺</p> </div> <div> <p>This sheet is designed to help you prepare for the laboratory. Read this handout carefully and complete the tasks before your lab session starts. This sheet must be completed before you attend your first lab on the 9th or 10th January and will be marked by the lab tutor when you get your lab exercises marked.</p> </div> <div> <p>AIMS</p> </div> <div> <p>The purpose of this pre-lab is to help you become familiar with:</p> </div> <div> <ul style="list-style-type: none"> • using the Computer Science laboratories • the Course Information document </div> <div> <p>COMPULSORY READING</p> </div> <div> <ul style="list-style-type: none"> • Course Information document on the CompSci 101 website: https://www.cs.auckland.ac.nz/courses/compsci101s2c/ </div> <div> <p>GETTING STARTED</p> </div> <div> <p>TASK 1: Know WHERE your lab sessions are held</p> </div> <div> <p>Every lab session is held in Room 303S-279 on Level 2 of the Computer Science Extension to the Maths and Physics Building (Building 303S). Please go along to Room 279 on Wednesday 29th July sometime between 1pm and 2:30pm.</p> </div> <div>  </div> <div> <p>What message is written on the door of Room 279 on Wednesday 29th July?</p> </div> <div> <div></div> </div> | <div> <p>TASK 2: Log into a computer in Room 279 on Wednesday 8th January sometime between 11am and 12:30pm.</p> </div> <div> <p>Sometime between 1pm and 2:30pm on Wednesday, 29th July, go along to the lab (Room 303S-279) and make sure that your login username and password work correctly in that lab.</p> </div> <div> <p>What is your username?</p> </div> <div> <div></div> </div> <div> <p>TASK 3: Know WHEN your lab sessions are.</p> </div> <div> <p>Now that you know where your lab sessions are held and you are able to log into a computer, it is equally important that you turn up on time. Marks are awarded for arriving to your lab on time.</p> </div> <div> <p>You will have booked your lab time when you enrolled using Student Services Online. Check your lab times on Student Services Online, and write down the day and the time of the lab session that you will attend each week.</p> </div> <div> <p>Your name:</p> </div> <div> <p>Surname:</p> </div> <div> <p>First name:</p> </div> <div> <div></div> </div> <div> <p>Your Lab Time:</p> </div> <div> <p>Lab Day:</p> </div> <div> <p>Lab Time:</p> </div> <div> <div></div> </div> <div> <p>TASK 4: Know what to bring to your first lab session in Week 2.</p> </div> <div> <p>You need to bring along the following items to your first lab session in Week 2 (the week beginning Monday 3rd August):</p> </div> <div> <ul style="list-style-type: none"> ✓ USB Flash Drive ✓ This pre-lab sheet (completed) ✓ A pen </div> <div> <p>Page 2 of 4</p> </div> |
|---|---|

Assignments

Assignments give you the experience of solving problems on your own.
The assignments are worth 15% of your final mark.
Never share your code.

Assignments



**Solve the problem on your own
– discuss the assignment with
others but *never* share code.**

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/assignments/>

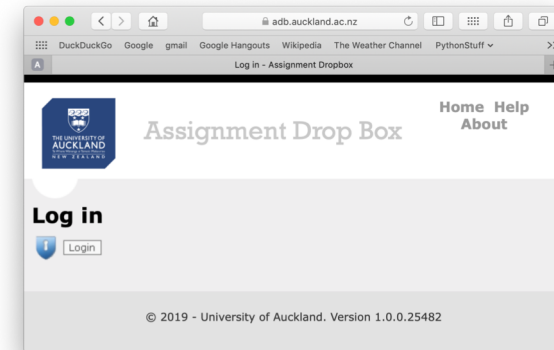
Assignments

There are 5 assignments in total worth 15% of your final mark.

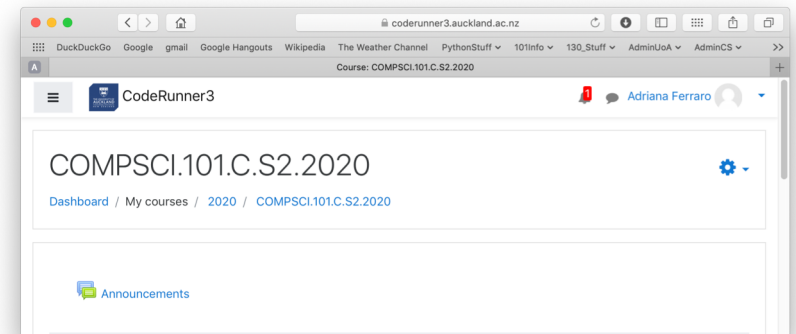
All assignments are due at 4:30pm on the due date.

For **parts** of these five assignments, your programs will be handed in using the **Assignment Drop Box** :

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



For other **parts** of these five assignments you will be required required to write and **submit** one or more programs using **CodeRunner3**.



<https://www.cs.auckland.ac.nz/courses/compsci101s2c/assignments/>

CodeRunner3

The CodeRunner3 tool is designed to help you practise by presenting you with a set of coding and other exercises. Submissions are graded by running a series of test cases on your code (or short answers) in a sandbox and comparing the output of your code (or short answers) with the expected output. Coderunner3 uses the Moodle learning system.

<https://www.coderunner3.auckland.ac.nz/moodle/>

Information about using CodeRunner3 is available on CompSci 101 Assignments web page:

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/assignments/>

Timed CodeRunner3 Questions

There are 9 timed Coderunner3 exercises. Each question (or set of questions) is worth 1% but only your best 6 marks will be counted towards your final grade.

These exercises are timed which means that you will have to develop and implement your solution within a certain amount of time (usually 15 - 30 minutes). Each of these exercises will be closely aligned to each lab.

The timed CodeRunner3 questions (or set of questions) will become available after the end of the sessions for each lab (i.e. after 3pm on Wednesdays) and the Timed exercises must be submitted to CodeRunner3 before 4:30pm (NZ Time) on the Saturday of the same week that the lab is held.

Plagiarism

Plagiarism

Plagiarism: Any work that you take credit for, but which is done by someone else. This is treated very seriously in an academic environment.

Policy

- All assignments will be checked for copying
- *Everyone* involved is penalised
- Disciplinary action will be taken in all cases of plagiarism



Advice

- Don't ever copy an assignment (or part of an assignment) from anyone
- Don't ever allow anyone to copy your assignment

Academic Integrity

The screenshot shows the homepage of the Academic Integrity website. The browser address bar displays <https://www.academicintegrity.auckland.ac.nz>. The page header includes the University of Auckland logo and the text "ACADINT A01 Academic Integrity". A search bar is located in the top right corner. Below the header, there is a navigation menu with links for "Site Map", "Glossary", and "Help". A paragraph states: "All students starting a new programme at the university are required to complete the Academic Integrity course. For more information, go to [Academic Integrity-information for students](#)."

The main content area features a circular diagram with the text "Academic Integrity" in the center. The diagram consists of five modules arranged in a circle, connected by a light blue line. Each module includes a small icon of a person and a brief description:

- Start** - Introduction
- Module 1** - Academic integrity at university
- Module 2** - Avoiding academic dishonesty
- Module 3** - Using and acknowledging the work of others
- Module 4** - Using copyrighted material correctly
- Module 5** - Consequences of academic dishonesty at The University of Auckland

In the center of the circular diagram, there is a link that says "Click here for course assessment".

At the bottom of the page, there is a footer that reads: "© The University of Auckland | Powered by CourseBuilder".

<https://www.academicintegrity.auckland.ac.nz>

Two Invigilated Online Tests

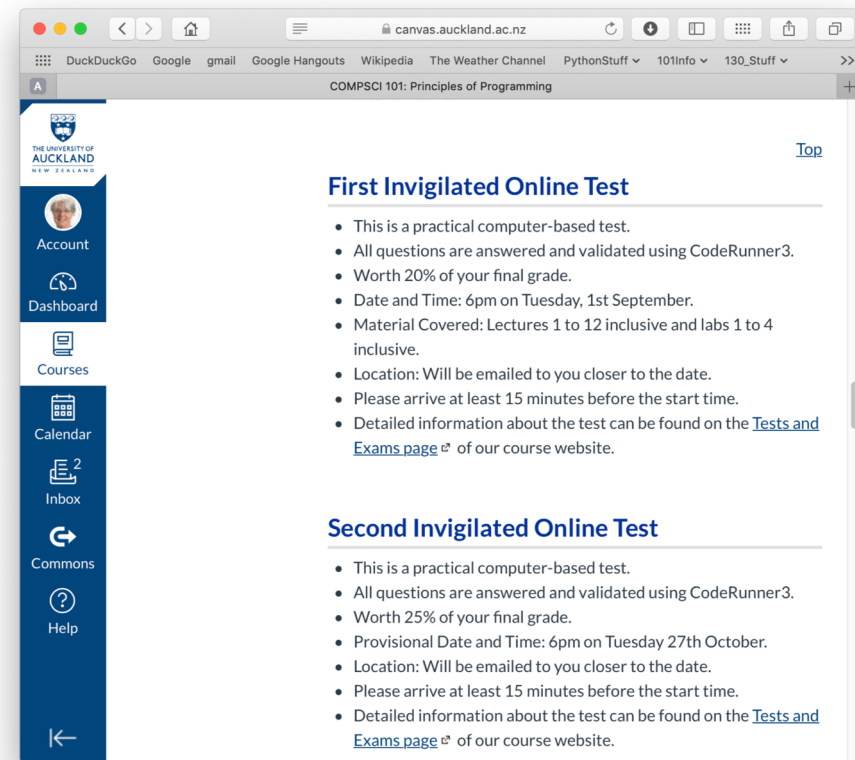
There are two practical invigilated tests. The tests are answered and validated on CodeRunner3.

Test 1: 6pm on **Tuesday, 1st September** - 20% of your final mark

Test 2: 6pm on **Tuesday, 27th October** - 25% of your final mark

You should arrive 15 minutes before the test start time.

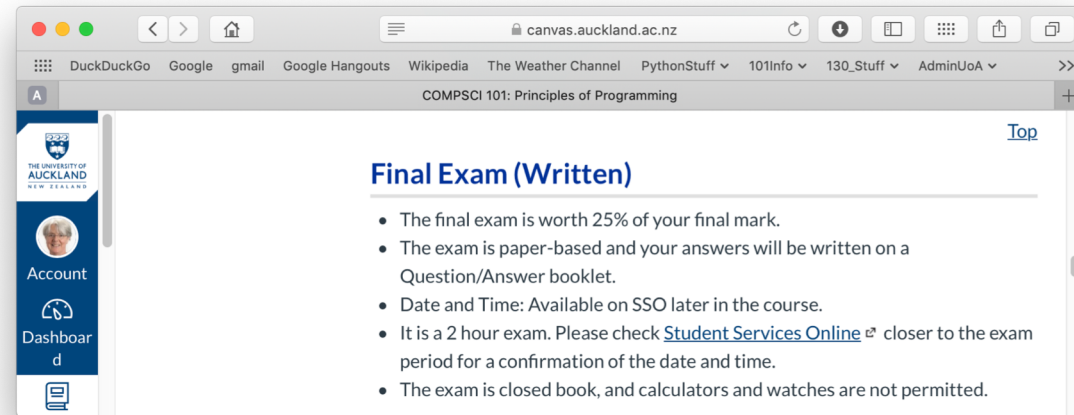
There is more information about the invigilated tests on the "Tests and Exams" web page:



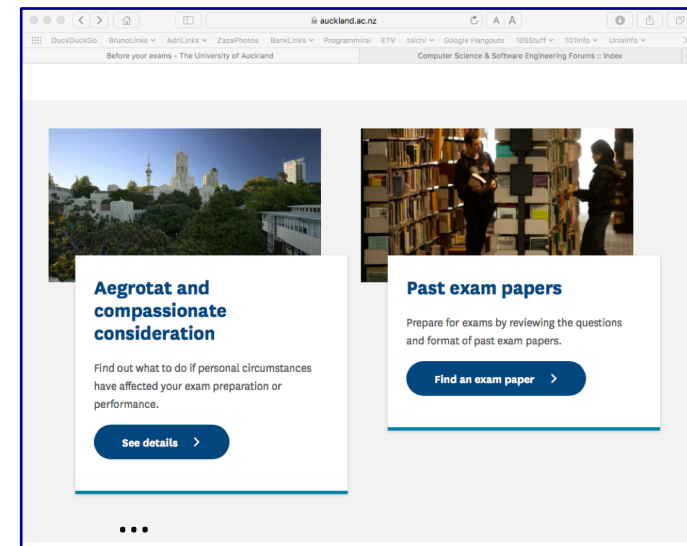
<https://www.cs.auckland.ac.nz/courses/compsci101s2c/exams/>

Written Exam

The final exam is worth 25% of your final mark.



Links to information about missed exams, aegrotats, etc. →



<https://www.auckland.ac.nz/en/students/academic-information/exams-and-final-results/during-exams.html>

Passing CompSci 101 Assessment

Assignments, timed questions, labs – 30%

Labs 9%

Assignments 15%

Coderunner 6%

Two online test - 45%

Test 1 20%

Test 2 25%

Exam - 25%

Exam 25%

To pass the course, you need

- to **pass the invigilated online tests component**, you need to achieve a pass (i.e. at least 22.5 marks out of 45) in the combined total of both invigilated tests.
- to **pass the invigilated final written exam**, you need to achieve a pass (i.e. at least 12.5 marks out of 25).
- **an overall mark of at least 50%** out of the full course total of 100%

The CompSci 101 website

Most of the resources you will need (e.g., lecture slides, lab material, assignments, course information) can be found on the CompSci 101 website:

<https://www.cs.auckland.ac.nz/courses/compsci101s2c/>

The CompSci 101 website can also be accessed from Canvas:

<https://canvas.auckland.ac.nz>

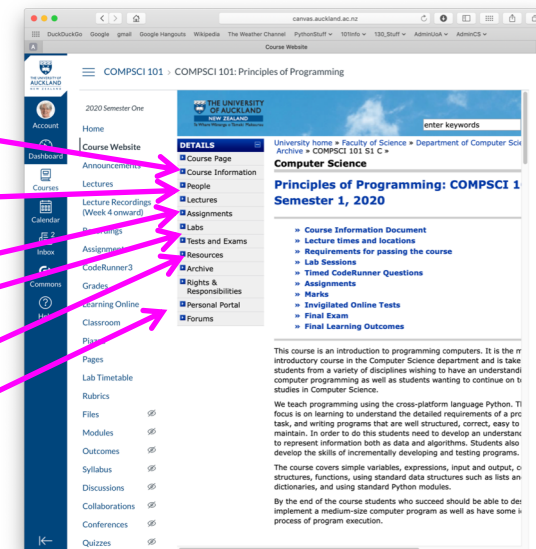
Course Information Document

People

*Lectures
Labs*

Assignments

Tests, Exams

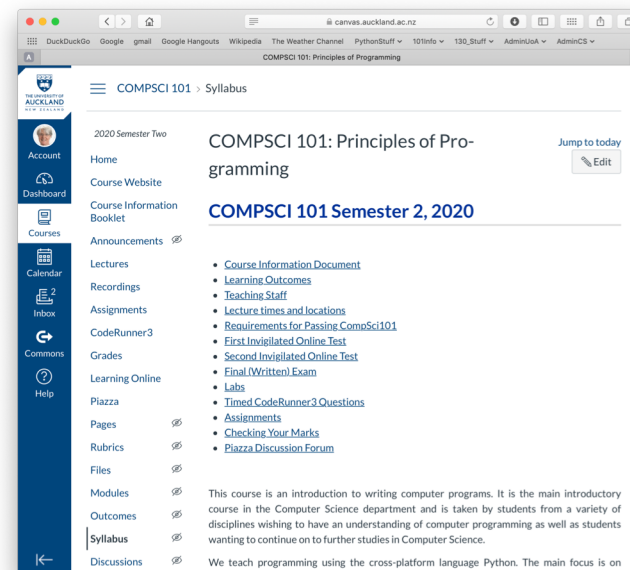


Canvas

On Canvas you will find:

- information about the course set up
- your marks
- class announcements
- lecture recordings
- a link to the CompSci 101 website

<https://canvas.auckland.ac.nz>



Computing resources

Undergraduate Labs:

There are demonstrators in these labs to help you

**GCL (room 303S.G91) –
Ground Floor Computer Lab**



Piazza

We will be using Piazza as our class forum (available in Canvas) for class discussions, i.e. for questions about lectures, assignments, labs and tests.

Link to Piazza

The screenshot shows the Piazza interface integrated into a Canvas LMS page for the course COMPSCI 101: Principles of Programming. The browser address bar shows 'canvas.auckland.ac.nz'. The left sidebar contains navigation links: Account, Dashboard, Courses, Calendar, Inbox, Commons, and Help. The main content area is titled 'COMPSCI 101 > COMPSCI 101: Principles of Programming'. Below this, there's a 'piazza' header with tabs for 'assignment1', 'assignment2', 'assignment3', 'assignment4', 'assignment5', and 'general_questions'. A 'New Post' button and a search bar are visible. A list of posts is shown, including a pinned post 'Welcome to COMPSCI 101, Semester 2, 2020' by 'Instr'. The right sidebar shows a 'note' section with the title 'Welcome to COMPSCI 101, Semester 2, 2020' and a 'general_questions' tab. The bottom of the page shows a footer with copyright information for Piazza Technologies, Inc.

Learning outcomes for CompSci 101

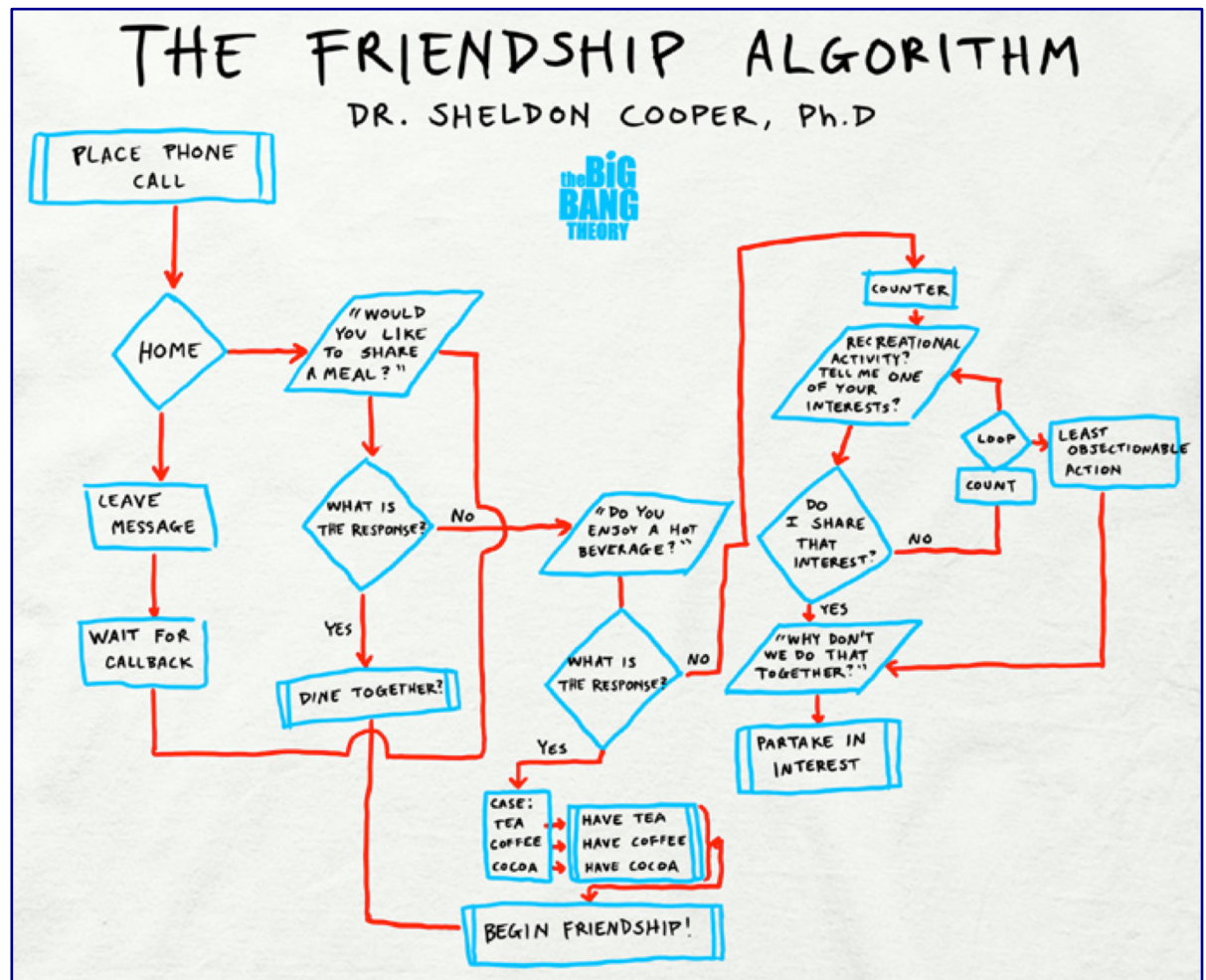
- determine the state of the program both during and after execution, given a code listing that may include functions and parameters, loops, conditionals and sequences.
- implement a given algorithm using Python.
- show that a program meets given specifications by writing appropriate tests.
- provide 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.
- add functions that perform a specified task into a program that solves a given problem.

Algorithms

A finite set of steps that specify a sequence of operations to be carried out in order to solve a specific problem.

A better definition:

An algorithm is a
well-defined,
unambiguous
sequence of steps



Algorithms – what kind of steps?

HOW TO GET
TO UNI

An algorithm is a well-defined, **unambiguous** sequence of steps

sequential
operations



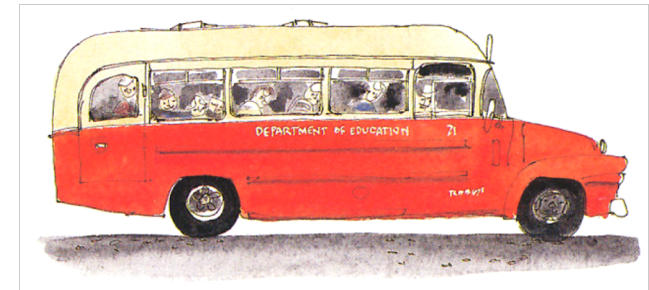
Walk to the bus stop at the shops up the road

Get on bus number "101"

Pay the bus driver \$4.50

Get off at the Symonds St bus stop

Walk 200m to the Computer Science building



Algorithms – what kind of steps?

HOW TO
WALK TO THE
BUS STOP

An algorithm is a well-defined, **unambiguous** sequence of steps

conditional
operations

[

Open the front door

IF it is raining **THEN**

take an umbrella

Walk down the driveway and turn left

Walk 50m down the street



Algorithms – what kind of steps?

HOW TO PAY
THE BUS
FARE

An algorithm is a well-defined, **unambiguous** sequence of steps

iterative
operations

Open wallet

[

WHILE you still haven't paid enough
give the driver another coin

Take a seat

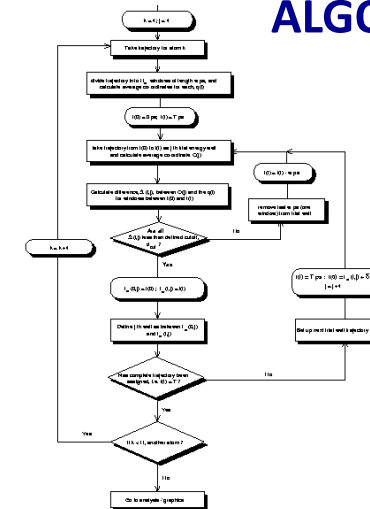


Basic programming steps

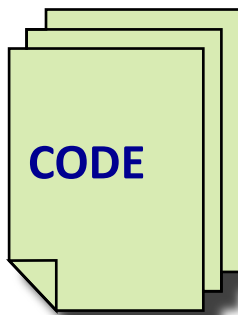


1. design

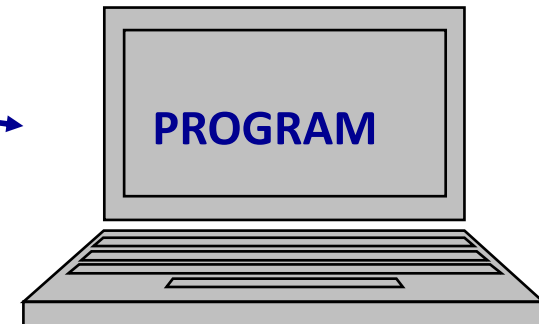
ALGORITHM



2. coding

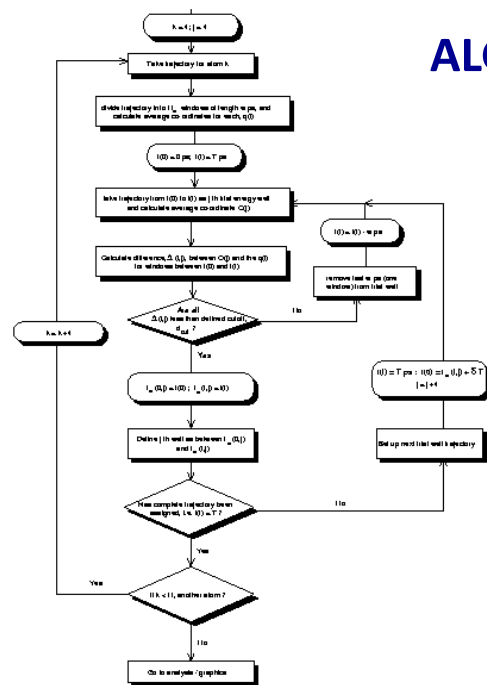


3. testing



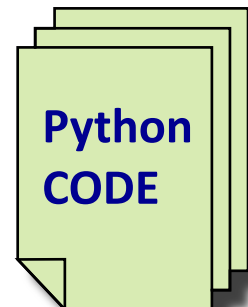
Programming - Step 2 - write the code

We will use the **Python 3 programming language** to implement our algorithms



ALGORITHM

2. coding





Letters Available: fghijpqtvwxyz

**Sorry, you have lost in the game of
Hangman...**

The word was lazybones

Enter a letter: a