COMPSCI 105, Summer Semester, 2016
Principles of Computer Science

Course Information

What is Computer Science?
Computer Science has revolutionised virtually all aspects of human enterprise. A large part of the subject involves techniques for making software development simpler and more reliable, but fundamentally Computer Science is about *abstraction*. Abstraction refers to finding an appropriate model that can be used to solve a particular problem. Computer Scientists create abstractions of real-world problems that can be efficiently represented and manipulated inside a computer.

What is COMPSCI 105?
This course extends the programming skills obtained from the first programming course (COMPSCI 101) emphasising good software design through an appreciation of data structures and code efficiency. COMPSCI 105 provides an introduction to objects and classes, exception handling, algorithm analysis and recursion. The importance of abstraction and abstract data types is illustrated through the study of fundamental data structures (such as linked lists, stacks, queues, trees and hash tables). The performance characteristics of different implementations of these data structures are studied, aided by an introduction to the performance of searching and sorting algorithms.

Learning outcomes
A student who successfully completes this course will be able to:

- Define a class to model and represent an object
- Write code which handles important exception types
- Use a standard data interchange format for reading and writing complex data types
- Write programs that store and manipulate data in standard linear data structures (arrays, linked lists, stacks, queues) and non-linear data structures (hash tables, trees)
- Compare the efficiency of algorithms using standard big-O notation
- Implement recursive solutions to simple problems
- Implement recursive data structures such as linked lists and trees
- Explain the basic algorithm for any of the studied sorting methods

Teaching staff
Paul Denny (Course Coordinator)

- Room: 465, Level 4, Computer Science Building (303S)
- Phone: 09 923 7087 (or +64 9 3737599 x 87087)
- Email: paul@cs.auckland.ac.nz

Course schedule

Timing of the lectures, labs, assignments and test for summer school are shown below:

Monday	Tuesday	Wednesday	Thursday	Friday
4 Jan	*5 Jan*	*6 Jan* **Lect 1:** 10am 401-439 Introduction and Python lists **Lab 0**: 12, 1, 2 CodeRunner intro	*7 Jan* **Lect 2:** 10am 423-342 Equality, references, mutability **Lab 1**: 12, 1, 2 Strings and lists, equality	*8 Jan* **Lect 3:** 10am 401-439 Classes (Part 1)
11 Jan **Lect 4:** 10am 401-439 Classes (Part 2)	*12 Jan* **Lect 5:** 10am 401-439 Classes (Part 3) and JSON	*13 Jan* **Lect 6:** 10am 401-439 Exceptions (Part 1) **Lab 2**: 12, 1, 2 Classes	*14 Jan* **Lect 7:** 10am 423-342 Exceptions (Part 2) **Lab 3**: 12, 1, 2 Exceptions	*15 Jan* **Lect 8:** 10am 401-439 Algorithm complexity (Part 1)
18 Jan **Lect 9:** 10am 401-439 Algorithm complexity (Part 2) **Asst One Due**	*19 Jan* **Lect 10:** 10am 401-439 ADTs and Stacks (using Python lists)	*20 Jan* **Lect 11:** 10am 401-439 Queues (using Python lists) **Lab 4**: 12, 1, 2 Complexity (PeerWise)	*21 Jan* **Lect 12:** 10am 423-342 Queues (using Python lists) **Lab 5**: 12, 1, 2 Stacks and Queues	*22 Jan* **Lect 13:** 10am 401-439 Linked lists (Part 1) **Course Test 6:30pm**
25 Jan **Lect 14:** 10am 401-439 Linked lists (Part 2)	*26 Jan* **Lect 15:** 10am 401-439 List variations and Iterators (Part 2)	*27 Jan* **Lect 16:** 10am 401-439 Recursion (Part 1) **Lab 6**: 12, 1, 2 Linked lists, iterators	*28 Jan* **Lect 17:** 10am 423-342 Recursion (Part 2) and Binary search **Lab 7**: 12, 1, 2 Recursion	*29 Jan* **Lect 18:** 10am 401-439 Hashtables (Part 1)
1 Feb **Auckland Anniversary Day (holiday)**	*2 Feb* **Lect 19:** 10am 401-439 Hashtables (Part 2)	*3 Feb* **Lect 20:** 10am 401-439 Sorting - simple sorts **Lab 8**: 12, 1, 2 Searching and hashtables	*4 Feb* **Lect 21:** 10am 423-342 Sorting - better sorts **Lab 9**: 12, 1, 2 Sorting	*5 Feb* **Lect 22:** 10am 401-439 Introduction to Trees
8 Feb **Waitangi Day (holiday)**	*9 Feb* **Lect 23:** 10am 401-439 Binary search trees	*10 Feb* **Lect 24:** 10am 401-439 Binary expression trees **Lab 10**: 12, 1, 2 Trees	*11 Feb* **Lect 25:** 10am 423-342 Priority queues and heaps	*12 Feb* **Lect 26:** 10am 401-439 Revision **Asst Two Due**

Assessment
Your final grade will be determined by your performance with respect to the following four assessments:

- Labs (worth 10%)
- Assignments (worth 15%)
- Test (worth 15%)
- Final exam (worth 60%)

Your combined mark for the Labs and Assignments is worth 25% and is referred to as your "Practical" component. Your combined mark for the Test and Final exam is worth (75%) and is referred to as your "Theory" component.

Very important: to pass the course, you must pass your "Practical" component (i.e. score at least 12.5 out of 25) and you must also pass your "Theory" component (i.e. score at least 37.5 out of 75). Failing either your "Practical" or your "Theory" component, regardless of your performance in the other component, will result in failing the course.

Labs
There are 11 labs, but only 10 that you must attend in person. The very first lab, Lab 0, must be completed online before Thursday 7th Jan. The first lab which you must attend, Lab 1, is held on Thursday 7th January. Labs are held on Wednesdays and Thursdays throughout summer school. Your attendance will be recorded for Labs 1 - 10. If you are unable to attend a lab for any reason please let the course coordinator, Paul Denny, know as soon as possible.

Most of the Labs use the CodeRunner tool, which is designed to help you practice writing code by presenting you with a set of short online exercises. Submissions are graded by running a series of test cases of the code in a sandbox and comparing the output with the expected output. You access CodeRunner by logging into:

https://www.coderunner.auckland.ac.nz/moodle/

In total, the Labs contribute 10% towards your final grade.

Assignments
There are two assignments (worth a total of 15%) for which you are required to write one or more programs. Both assignments are to be submitted to the assignment dropbox:

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

Test
The Test is worth 15% of your final mark, and will be held between 6 pm - 8 pm on Friday 22nd January. Please ensure you are available to sit the Test - if you are enrolled in another course that has a test scheduled for the same time (or if you are unable to attend this test time for another valid reason), then please contact the course coordinator, Paul Denny, as soon as possible.

Exam
The Exam is worth 60% of your final mark. Please check Student Services Online for the exam time and date. The exam is closed book, and calculators and watches are not permitted. Provisional exam results can be obtained from Student Services Online.

How to seek assistance
We want everybody to succeed. The labs are a good place to seek one on one assistance with a lab tutor. Labs are held on Wednesdays and Thursdays at 12:00 noon, 1:00pm and 2:00pm throughout summer school.

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 (Paul Denny). Students are asked to discuss privately any impairment related requirements face-to-face and/or in written form with the course coordinator. If you need extra help with understanding the course material, or preparing for the test or exam, you are very welcome to visit the teaching staff or any lab tutor at a 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).

Webmail
All students have a university email account. Your university email address is: USERNAME@aucklanduni.ac.nz, e.g. abcd001@aucklanduni.ac.nz. You can access your email from anywhere you have Internet access, by logging into

http://webmail.ec.auckland.ac.nz

You must read email sent to your university email address regularly, as staff members often send important messages to students via their university email address. When emailing staff members, please use your university email address.

Class Website
Although we will be using Canvas during summer school for lecture notes, recordings and assessment resources, the COMPSCI 105 website contains some basic information about the course:

https://www.cs.auckland.ac.nz/courses/compsci105ssc/

Lecture Recordings
Recorded lectures can be found on Canvas.

Missed exam
If you miss the exam for any valid reason, or you sit the exam but believe that your performance was impaired for some reason, then you may be able to apply for an aegrotat, compassionate or special pass consideration. For more detailed information, refer to the University of Auckland's Calendar.

Checking your marks on Canvas
You can check your marks by logging onto Canvas

https://canvas.auckland.ac.nz

If there are any problems with your Lab, Assignment or Test marks, please contact Paul Denny.

Policy on Cheating and Plagiarism
Cheating is viewed as a very serious offence by the University of Auckland. Penalties are administered by the Discipline Committee of the Senate, and may include suspension or expulsion from the university. Do not copy anyone else's work, or allow anyone else to copy from you.

For more information on the University's policy on cheating, please refer to the web page:

https://www.auckland.ac.nz/en/about/learning-and-teaching/policies-guidelines-and-procedures/academic-integrity-info-for-students.html

Do not ever copy anyone else's work, or allow anyone else to copy from you.

Print Quota
You can add credit to your print quota at the library or the IC Helpdesk on Level 2 of the Kate Edger Information Commons, 11 Symonds St.

Enjoy the course!