School of Information and Physical Sciences

SENG6120: Data Structures

Callaghan and Online

Semester 1 - 2024

COURSE OUTLINE

OVERVIEW

Course Description

Expands the problem-solving techniques of SENG6110 to large problems, with an in-depth study of an object-oriented software analysis and design methodology. Software implementation techniques and standards are introduced with the aim of improving programming skills. Students use fundamental algorithmic techniques and structures such as stacks, queues, trees and heaps as tools for problem solving design and implementation.

Academic Progress Requirements

Nil

Requisites

This course replaces SENG4420. If you have successfully completed SENG4420 you cannot enrol in this course.

Assumed Knowledge

SENG6110

Contact Hours

Callaghan
Computer Lab
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

Lecture
Face to Face On Campus
2 hour(s) per week(s) for 13 week(s) starting Week 1

Online
Computer Lab
Online
2 hour(s) per week(s) for 13 week(s) starting Week 1

Lecture
Online
2 hour(s) per week(s) for 13 week(s) starting Week 1

Unit Weighting Workload

10
Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.

CONTACTS

Course Coordinator

Callaghan and Online
Dr Kyle Harrison
Kyle.Harrison@newcastle.edu.au
(02) 4055 0738
Consultation: Fridays, 2-3pm in ES214 or by appointment.
A Zoom option will be provided for online students.

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Information and Physical Sciences
SR233, Social Sciences Building
Callaghan
CESE-SIPS-Admin@newcastle.edu.au
+61 2 4921 5513
9am-5pm (Mon-Fri)
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SYLLABUS

Course Content

1. Object oriented programming techniques
2. Stacks, queues, trees, heaps, hash tables
3. Methods for searching and sorting
4. Recursion
5. Hashing

Course Learning Outcomes

On successful completion of this course, students will be able to:
1. To understand the Object-Oriented notions and how the notions are implemented in object-oriented programming languages.

2. To understand the need for the most appropriate data structure to provide the best solution to a problem

3. To understand and use Linear, Hierarchical and Graph Structures in problem solving and algorithms

4. To understand and use arrays and linked structures in implementing data structures

Course Materials

Recommended Text:

- "Data Structures and Algorithm Analysis in C++", 4th Edition, M.A. Weiss, Pearson, 2014.

COMPULSORY REQUIREMENTS

In order to pass this course, each student must complete ALL of the following compulsory requirements:

Contact Hour Requirements:

-

Course Assessment Requirements:

- Assessment 5 - Formal Examination: Pass requirement 40% - Must obtain 40% in this assessment item to pass the course.

Compulsory Placement and WHS Requirements:

-

SCHEDULE

ASSESSMENTS

This course has 5 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Class Exam	Week 5 (11:59PM on Monday 25 March)	Individual	10%	1, 2
2	Assignment 1	Week 6 (11:59PM on Sunday 7 April)	Individual	15%	1, 2, 3, 4
3	Assignment 2	Week 10 (11:59PM on Sunday 19 May)	Individual	10%	1, 2, 3, 4
4	Assignment 3	Week 13 (11:59PM on Sunday 9 June)	Individual	15%	1, 2, 3, 4
5	Formal Examination*	Examination Period. Date to be determined by the Examinations Team.	Individual	50%	1, 2, 3, 4

* This assessment has a compulsory requirement.

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Class Exam

Assessment Type In Term Test
Purpose To measure the learning outcomes of the first 4 weeks of lectures.
Description Test specifications will be posted on Canvas.
Weighting 10%
Length 60 minutes
Due Date Week 5 (11:59PM on Monday 25 March)
Submission Method Online
Assessment Criteria
Return Method Not Returned
Feedback Provided Online - .
Opportunity to Reattempt Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 2 - Assignment 1

Assessment Type	Written Assignment
Purpose	To measure the student's ability to implement and/or use a linked list structure to solve an underlying problem in C++.
Description	Assignment specifications will be posted on Canvas.
Weighting	15%
Due Date	Week 6 (11:59PM on Sunday 7 April)
Submission Method	Online
Assessment Criteria	To be posted on Canvas together with the Assessment Specs.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 3 - Assignment 2

Assessment Type	Written Assignment
Purpose	To measure the student's ability to implement and/or use one or more specialized containers (e.g., stacks and queues) to solve an underlying problem in C++.
Description	Assignment specifications will be posted on Canvas.
Weighting	10%
Due Date	Week 10 (11:59PM on Sunday 19 May)
Submission Method	Online
Assessment Criteria	To be posted on Canvas together with the Assessment Specs.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 4 - Assignment 3

Assessment Type	Written Assignment
Purpose	To measure the student's ability to implement and/or use complex data structures (e.g., hash tables and binary search trees) to solve an underlying problem in C++.
Description	Assignment specifications will be posted on Canvas.
Weighting	15%
Due Date	Week 13 (11:59PM on Sunday 9 June)
Submission Method	Online
Assessment Criteria	To be posted on Canvas together with the Assessment Specs.
Return Method	Online
Feedback Provided	Online - .
Opportunity to Reattempt	Students WILL NOT be given the opportunity to reattempt this assessment.

Assessment 5 - Formal Examination

Assessment Type	Formal Examination
Purpose	The final formal examination is designed to test the individual student's knowledge of the course material and their ability to apply that knowledge.
Description	Students whose overall mark in the course is 50% or more, but who score less than 40% in the compulsory item and thus fail to demonstrate the required proficiency, will be awarded a Criterion Fail grade, which will show as FF on their formal transcript. However, students in this position who have scored at least 25% in the compulsory item will be allowed to undertake a supplementary 'capped' assessment in which they can score at most 50% of the possible mark for that item.
Weighting	50%
Compulsory Requirements	Pass requirement 40% - Must obtain 40% in this assessment item to pass the course..
Due Date	Examination Period. Date to be determined by the Examinations Team.
Submission Method	Formal Exam
Assessment Criteria	Correctness and clarity of written answers and/or program code.
Return Method	Not Returned

Feedback Provided	No Feedback - .
Opportunity to Reattempt	Students WILL be given the opportunity to reattempt this assessment.

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.
75-84	Distinction (D)	Excellent standard indicating a very high level of knowledge and understanding of the relevant materials; demonstration of a very high level of academic ability; sound development of skills*; and achievement of all assessment objectives.
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning outcomes.
0-49	Fail (FF)	Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.

*Skills are those identified for the purposes of assessment task(s).

Communication Methods

Communication methods used in this course include:

- Canvas Course Site: Students will receive communications via the posting of content or announcements on the Canvas course site.
- Email: Students will receive communications via their student email account.
- Face to Face: Communication will be provided via face to face meetings or supervision.

Course Evaluation

Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.

Oral Interviews (Vivas)

As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the Oral Examination (viva) Procedure. In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the Student Conduct Rule.

Academic Misconduct

All students are required to meet the academic integrity standards of the University. These standards reinforce the importance of integrity and honesty in an academic environment. Academic Integrity policies apply to all students of the University in all modes of study and in all locations. For the Student Academic Integrity Policy, refer to https://policies.newcastle.edu.au/document/view-current.php?id=35.

Adverse Circumstances

The University acknowledges the right of students to seek consideration for the impact of allowable adverse circumstances that may affect their performance in assessment item(s). Applications for special consideration due to adverse circumstances will be made using the

online Adverse Circumstances system where:
1. the assessment item is a major assessment item; or
2. the assessment item is a minor assessment item and the Course Co-ordinator has specified in the Course Outline that students may apply the online Adverse Circumstances system;
3. you are requesting a change of placement; or
4. the course has a compulsory attendance requirement.

Before applying you must refer to the Adverse Circumstance Affecting Assessment Items Procedure available at:
https://policies.newcastle.edu.au/document/view-current.php?id=236

Important Policy Information

The Help button in the Canvas Navigation menu contains helpful information for using the Learning Management System. Students should familiarise themselves with the policies and procedures at https://www.newcastle.edu.au/current-students/respect-at-uni/policies-and-procedures that support a safe and respectful environment at the University.

GRADUATE PROFILE STATEMENTS

The following table illustrates how this course contributes towards building the skills students will need to work in their profession.

Level of capability

- Level 1 indicates an introduction to a topic at a university level
- Levels 2 and 3 indicate progressive reinforcement of that topic
- Level 4 indicates skills commensurate with a graduate – entry to professional practice
- Level 5 indicates highly specialist or professional ability

Master of Information Technology

	University of Newcastle Master of Information Technology Graduate Profile Statement	Taught	Practised	Assessed	Level of capability
1	The ability to identify and analyse complex problems within information technology and design solutions to the problems at a highly skilled level	X	X	X	4
2	A depth of technical expertise in at least one facet of information technology sufficient for a career in information technology together with the capacity to continue developing relevant knowledge, skills, and expertise throughout their careers	X	X	X	4
3	The ability to manage projects in aspects of information technology relevant to their field of study, including the ability to develop, manage and participate at all levels in team environments				
4	An understanding of professionalism and ethics in the context of the global information technology industry				
5	The ability to communicate effectively through a range of verbal, written and/or presentation skills at an advanced level				

6	The ability to apply their knowledge and skills to plan and execute a substantial capstone experience or a research-based project and/or piece of scholarship.				

This course outline was approved by the Head of School. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.