MONASH University
Information Technology

Unit Guide

FIT3155
Advanced data structures and algorithms

Semester 2, 2018

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

Last updated: 09 Jul 2018

Status: Approved

Table of contents

Unit handbook information

Synopsis

This unit builds on the concepts learnt in introductory algorithms and data structures study. It covers advanced algorithmic paradigms and problem-solving techniques required to address real-world programming challenges. It explores, in depth, the design and analysis of space-efficient data structures and time-efficient problem solving strategies to be used with them. Topics include amortized analysis, advanced sorting and searching algorithms, new tree/string/graph data structures and algorithms, and number-theoretic algorithms amongst others.

Mode of delivery

Malaysia (On-campus)
Clayton (On-campus)

Workload requirements

Minimum total expected workload equals 12 hours per week comprising:
(a.) Contact hours for on-campus students:

- Two hours lectures weekly
- Two hours laboratories weekly
- One hour tutorial fortnightly

  (b.) Additional requirements (all students):
  - A minimum of 8 hours independent study per week for completing lab and project work, private study and revision.

Unit relationships

Prerequisites

FIT2004

Prohibitions

None

Co-requisites

None

Chief Examiner

[Dr Arun Konagurthu](#)

Campus Lecturer(s)

Clayton

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Malaysia

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Academic overview

Learning outcomes

At the completion of this unit, students should be able to:

1. analyse efficient data structures and effective algorithmic paradigms;
2. design and implement efficient algorithms and data structures for use on large data sets;
3. apply advanced algorithms and data structures to tackle complex computational problems;
4. prove the correctness of programs and reason about their space and time complexities.

Teaching approach

Lecture and tutorials or problem classes:

The teaching and learning approach provides facilitated learning and practical exploration of a case study to develop real-world skills.

Assessment summary

Examination (2 hours): 60%; In-semester assessment: 40%

Assessment task	Value	Due date
Assignment 1	20%	End of Week 8
Assignment 2	20%	End of Week 12
Final examination	60%	To be advised

Unit schedule

For units with on-campus classes, teaching activities are normally scheduled to start on the hour (teaching will commence on the hour and conclude 10 minutes prior to the scheduled end time).

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Pattern matching	
2	Advanced string algorithms	
3	Advanced tree data structures-1	
4	Advanced tree data structures-2	
5	Ammortised analysis	
6	Merge-Find Set algorithm and applications	
7	Compression-based algorithms	
8	Number-theoretic algorithms	Assignment 1 due end of week 8 (20%)
9	Linear programming	
10	Advanced graph algorithms	
11	Approximation algorithms	
12	Compact data structures	Assignment 2 due end of week 12 (20%)
	SWOT CAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

Assessment requirements

Faculty Unit Assessment Pass Policy

To pass a unit which includes an examination as part of the assessment, a student must obtain, unless otherwise approved and published:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

For units with 100% in-semester assessment, there is a 40% pass rate required for each major assessment item (i.e. items worth 20% or more) in order to pass the unit.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, or 40% or more for each major assessment item where there is 100% in-semester assessment, and the total mark for the unit is:

- equal to or greater than 50%, then a mark of 49-N will be recorded for the unit.
- less than 50% then the actual mark for the unit will be recorded.

Assessment tasks

Assessment title: Assignment 1

Learning outcomes: Outcomes 1-3

Details of task: This assignment will consist of a practical algorithmic problem set based on topics covered during weeks 1-7. As a part of this assignment, computer programs have to be written in addition to submitting a typed report analysing the given data sets (were stated).

Value: 20%

Hurdle requirements: N/A

Individual assessment in group tasks: N/A

Criteria for marking: Ability to answer the questions and solve the stated problems correctly. Ability to code with space and time complexity considerations. Ability to code the technique, and correctness of the program on sample data sets.

Due date: End of Week 8

Estimated return date: Two weeks after submisssion deadline

Additional information: N/A

Assessment title: Assignment 2

Learning outcomes: Outcomes 1-4

Details of task: This assignment will consist of a practical algorithmic problem set based on topics covered during weeks 1-7. As a part of this assignment, computer programs have to be written in addition to submitting a typed report analysing the given data sets (where stated).

Value: 20%

Hurdle requirements: N/A

Individual assessment in group tasks: N/A

Criteria for marking: Ability to answer the questions and solve the stated problems correctly. Ability to code with space and time complexity considerations, and correctness of the program on sample data sets.

Due date: End of Week 12

Estimated return date: Two weeks after submission deadline

Additional information: N/A

Examination(s)

Title : Final examination
Value : 60%
Length : 2 hours
Type (open/closed book) : closed book
Electronic devices allowed : Not allowed
Learning outcomes assessed : Covers all the unit learning outcomes

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.

You must negotiate any extensions formally with your campus unit lecturer via the in-semester special consideration process: http://www.monash.edu.au/exams/special-consideration.html

Penalty of 10% per day, INCLUDING weekends, public holidays for assignments

Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Resubmission of assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Referencing requirements

To build your skills in citing and referencing, and using different referencing styles, see the online tutorial Academic Integrity: Demystifying Citing and Referencing at http://www.lib.monash.edu/tutorials/citing/

Assignment submission

It is a University requirement (http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-managing-plagiarism-collusion-procedures.html) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at http://www.infotech.monash.edu.au/resources/student/forms/. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an electronic submission).

Please note:

1. **It is your responsibility to retain copies of your assessments.**
2. **Assessments submitted without an assignment coversheet will not be marked.**

Online submission: If Electronic Submission has been approved for your unit, please submit your work via the learning system for this unit, which you can access via links in the my.monash portal.

Please keep a copy of tasks completed for your records.

Feedback to you

Informal feedback on progress in labs/tutes
Graded assignments with comments
Solutions to tutes, labs and assignments
Examination feedback after results publication

Required resources

Students generally must be able to complete the requirements of their course without the imposition of fees that are additional to the student contribution amount or tuition fees. However, students may be charged certain incidental fees or be expected to make certain purchases to support their study. For more information about this, refer to the Higher Education Administrative Information for Providers, Chapter 18, Incidental Fees at http://education.gov.au/help-resources-providers.

Please check with your lecturer before purchasing any required resources. Limited copies of prescribed texts are available for you to borrow in the library, and prescribed software is available in student labs.

Technological requirements

Students must regularly check Moodle for announcements.

Lab/Assignment can be implemented in Python.

Your feedback to us

The Student Evaluation of Teaching and Units (SETU) is a survey in which students are able to rate their satisfaction of their units and teaching staff.

This is a new unit and your feedback on the unit will provide faculties with an insight into your learning journey and how the unit, course and teaching staff can be enhanced in future teaching periods.

If you would like to know more about SETU, please go to: www.monash.edu/ups/setu

Other information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:
http://www.policy.monash.edu/policy-bank/academic/education/index.html

Student Academic Integrity Policy

www.monash.edu/__data/assets/pdf_file/0004/801841/Student-Academic-Integrity-Policy.pdf

Special Consideration

For information on applying for special consideration, please visit: http://www.monash.edu/exams/changes/special-consideration

Graduate Attributes Policy

http://www.monash.edu/__data/assets/pdf_file/0009/786969/Course-Design-Policy.pdf

Student Charter

http://www.monash.edu/students/policies/student-charter.html

Student Services

The University provides many different kinds of services to help you gain the most from your studies. Contact your tutor if you need advice and see the range of services available at http://www.monash.edu/students.

For Malaysia see http://www.monash.edu.my/Student-services, and for South Africa see http://www.monash.ac.za/current/.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research.
Go to http://www.monash.edu/library or the library tab in my.monash portal for more information.

At Malaysia visit the Library and Learning Commons at http://www.lib.monash.edu.my/.

At South Africa visit http://www.lib.monash.ac.za/.

Disability Support Services

Students who have a disability, ongoing medical or mental health condition are welcome to contact Disability Support Services.

Disability Support Services also support students who are carers of a person who is aged and frail or has a disability, medical condition or mental health condition.

Disability Advisers visit all Victorian campuses on a regular basis.

- Website: monash.edu/disability
- Telephone: 03 9905 5704 to book an appointment with an Adviser, or contact the Student Advisor, Student Community Services at 03 55146018 at Malaysia
- Email: disabilitysupportservices@monash.edu
- Drop In: Level 1, Western Annexe, 21 Chancellors Walk (Campus Centre) Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Malaysia Campus