

**FIT1029**  
**Algorithmic problem solving**

**Unit Guide**

**Semester 1, 2014**

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# Table of Contents

<b><u>FIT1029 Algorithmic problem solving - Semester 1, 2014</u></b> .....	<b>1</b>
<u>Mode of Delivery</u> .....	1
<u>Workload Requirements</u> .....	1
<u>Chief Examiner</u> .....	1
<u>Campus Lecturer</u> .....	1
<u>Clayton</u> .....	1
<u>Malaysia</u> .....	1
<u>Your feedback to Us</u> .....	2
<u>Previous Student Evaluations of this Unit</u> .....	2
<b><u>Academic Overview</u></b> .....	<b>3</b>
<u>Learning Outcomes</u> .....	3
<b><u>Unit Schedule</u></b> .....	<b>4</b>
<u>Teaching Approach</u> .....	4
<u>Assessment Summary</u> .....	4
<b><u>Assessment Requirements</u></b> .....	<b>6</b>
<u>Assessment Policy</u> .....	6
<u>Assessment Tasks</u> .....	6
<u>Participation</u> .....	6
<u>Examinations</u> .....	7
<u>Examination 1</u> .....	7
<u>Learning resources</u> .....	7
<u>Reading list</u> .....	7
<u>Feedback to you</u> .....	8
<u>Extensions and penalties</u> .....	8
<u>Returning assignments</u> .....	8
<u>Assignment submission</u> .....	8
<u>Online submission</u> .....	8
<u>Recommended text(s)</u> .....	8
<u>Additional subject costs</u> .....	9
<b><u>Other Information</u></b> .....	<b>10</b>
<u>Policies</u> .....	10
<u>Faculty resources and policies</u> .....	10
<u>Graduate Attributes Policy</u> .....	10
<u>Student Charter</u> .....	10
<u>Student services</u> .....	10
<u>Monash University Library</u> .....	11
<u>Disability Liaison Unit</u> .....	11

# **FIT1029 Algorithmic problem solving - Semester 1, 2014**

Algorithms are recipes for solving a problem. They are fundamental to computer science and software engineering. Algorithms are the formal foundation of computer programming but also exist independently of computers as systematic problem-solving procedures. This unit introduces algorithmics, the study of algorithms. It is not about programming and coding but rather about understanding and analysing algorithms and about algorithmic problem-solving, i.e. the design of systematic problem-solving procedures. The unit will not require any knowledge of a programming language and is very hands-on. Students will develop algorithms to solve a wide variety of different problems, working individually as well as together in groups and as a class.

Topics include: What is a computational problem and what is an algorithm; basic control structures; basic data structures; modular algorithm structure; recursion; problem-solving strategies for algorithm development; understanding the efficiency of an algorithm; and limitations of algorithms.

## **Mode of Delivery**

- Clayton (Day)
- Malaysia (Day)

## **Workload Requirements**

Minimum total expected workload equals 12 hours per week comprising:

(a.) Contact hours for on-campus students:

- Two hours of lectures
- One 2-hour tutorial

(b.) Additional requirements (all students):

- A minimum of 2-3 hours of personal study per one hour of contact time in order to satisfy the reading and assignment expectations.

## **Chief Examiner**

Dr David Albrecht

## **Campus Lecturer**

### **Clayton**

Dr. Julian Garcia

### **Malaysia**

Dr. Simon Egerton

## Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through the Student Evaluation of Teaching and Units (SETU) survey. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, see:

[www.monash.edu.au/about/monash-directions/](http://www.monash.edu.au/about/monash-directions/) and on student evaluations, see:  
[www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html](http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html)

## Previous Student Evaluations of this Unit

This unit was first offered in 2010 and in Semester 1, 2012, some of those students were taking third year units. Evidence gathered over the years indicates that the introduction of FIT1029 has helped to improve the students' programming skills and improved the pass rates in core BCS and BSE units.

Feedback from students who have taken FIT1029 and have gone on to later year studies in the BCS and the BSE indicates that students feel that FIT1029 has helped them gain a better appreciation of algorithms, and to regard thinking about algorithms as an activity that should be kept separated from coding algorithms into a particular computer programming language.

If you wish to view how previous students rated this unit, please go to  
<https://emuapps.monash.edu.au/unitevaluations/index.jsp>

# Academic Overview

## Learning Outcomes

At the completion of this unit students will be able to -

- describe an algorithm consisting of basic structures (sequence, choice, iteration, modules) at the level of detail required for a particular audience;
- demonstrate how basic data structures (list, graphs, trees, sets, tables) function;
- create simple recursive and iterative algorithms;
- evaluate different possible strategies for developing an algorithm and be able to select an appropriate one to solve a given problem;
- apply standard patterns to develop algorithms;
- break problems down into simpler problems;
- determine the complexity of simple algorithms;
- recognise the limitations of algorithms.

## Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Introduction to the unit, algorithms and data structures.	Peer Instruction Participation recorded in every lecture or tutorial
2	Describing and finding algorithms.	
3	Invariance and greedy approach.	
4	Applying Brute Force to solve problems.	Assignment 1 due
5	Decomposition.	
6	Decrease and conquer.	Test during lecture
7	Transform and conquer; and divide and conquer.	
8	Recursion and backtracking.	
9	Dynamic Programming.	
10	Complexity.	Assignment 2 due
11	Limitations of algorithms.	
12	Strategies for finding algorithms.	
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: <a href="http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html">http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html</a>

\*Unit Schedule details will be maintained and communicated to you via your learning system.

## Teaching Approach

- **Lecture and tutorials or problem classes**

This teaching and learning approach helps students to initially encounter information at lectures, and discuss and explore the information during tutorials.

- **Problem-based learning**

Students will be presented with information and guided on how to best find solutions for a given problem.

## Assessment Summary

Examination (3 hours): 60%; In-semester assessment: 40%

Assessment Task	Value	Due Date
Assignment 1	10%	Week 4
Test	15%	Week 6
Assignment 2	10%	Week 10

#### Unit Schedule

Student Participation	5%	Every lecture or tutorial
Examination 1	60%	To be advised

# Assessment Requirements

## Assessment Policy

Faculty Policy - Unit Assessment Hurdles

(<http://intranet.monash.edu.au/infotech/resources/staff/edgov/policies/assessment-examinations/assessment-hurdles>)

Academic Integrity - Please see resources and tutorials at

<http://www.monash.edu/library/skills/resources/tutorials/academic-integrity/>

## Assessment Tasks

### Participation

#### • Assessment task 1

**Title:**

Assignment 1

**Description:**

This assignment will aim to help you understand how to go about finding algorithms to solve problems.

**Weighting:**

10%

**Criteria for assessment:**

Detailed assessment criteria will be issued along with the assignment.

1. All assumptions should be stated.
2. All algorithms must meet the problem specification.
3. Students should be able to answer questions about their own work.

**Due date:**

Week 4

#### • Assessment task 2

**Title:**

Test

**Description:**

This test will be based on the first 4 weeks of material.

**Weighting:**

15%

**Criteria for assessment:**

This test will evaluate:

1. Your understanding of the material provided during the first few weeks of semester.
2. Your capability to write simple algorithms in pseudo code given a clear specification.
3. Your ability to demonstrate an understanding of some basic data structures.
4. Your ability to analyse the behaviour of simple algorithms.

**Due date:**

Week 6



• **Assessment task 3**

**Title:**

Assignment 2

**Description:**

This assignment will help you understand different strategies for finding algorithms.

**Weighting:**

10%

**Criteria for assessment:**

Detailed assessment criteria will be issued along with the assignment.

1. All assumptions should be stated.
2. All algorithms must meet the problem specification.
3. Students should be able to answer questions about their own work.

**Due date:**

Week 10

• **Assessment task 4**

**Title:**

Student Participation

**Description:**

Student participation during either lectures or tutorials

**Weighting:**

5%

**Criteria for assessment:**

A grade will be based on a student's participation in lectures or tutorials.

**Due date:**

Every lecture or tutorial

## Examinations

• **Examination 1**

**Weighting:**

60%

**Length:**

3 hours

**Type (open/closed book):**

Closed book

**Electronic devices allowed in the exam:**

None

## Learning resources

### Reading list

Levitin, A. (2007). *Introduction to the Design and Analysis of Algorithms*. (2nd Edition) Addison-Wesley.

Monash Library Unit Reading List (if applicable to the unit)

<http://readinglists.lib.monash.edu/index.html>

## Feedback to you

Examination/other end-of-semester assessment feedback may take the form of feedback classes, provision of sample answers or other group feedback after official results have been published. Please check with your lecturer on the feedback provided and take advantage of this prior to requesting individual consultations with staff. If your unit has an examination, you may request to view your examination script booklet, see <http://intranet.monash.edu.au/infotech/resources/students/procedures/request-to-view-exam-scripts.html>

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments
- Test results and feedback

## 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 leader via the in-semester special consideration process: <http://www.monash.edu.au/exams/special-consideration.html>

## Returning assignments

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

## Assignment submission

It is a University requirement

(<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-managing-pla>) 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 online quiz). Please note that it is your responsibility to retain copies of your assessments.

## 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.

## Recommended text(s)

Levitin, A. (2007). *Introduction to the Design and Analysis of Algorithms*. (2nd Edition) Addison-Wesley.

## **Additional subject costs**

*Clayton students are required to purchase a Turning Point clicker from the Campus Bookstore or directly from the Australian Distributor. More information about clickers can be found on this webpage: <http://intranet.monash.edu.au/infotech/resources/students/enrolment/clickers.html>.*

## 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:

[www.policy.monash.edu.au/policy-bank/academic/education/index.html](http://www.policy.monash.edu.au/policy-bank/academic/education/index.html)

Key educational policies include:

- Student Academic Integrity Policy and Student Academic Integrity: Managing Plagiarism and Collusion Procedures ;  
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-policy.h>
- Assessment in Coursework Programs;  
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-po>
- Special Consideration;  
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.ht>
- Grading Scale;  
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html>
- Discipline: Student Policy;  
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html>
- Academic Calendar and Semesters; <http://www.monash.edu.au/students/dates/>
- Orientation and Transition; <http://intranet.monash.edu.au/infotech/resources/students/orientation/>
- Academic and Administrative Complaints and Grievances Policy;  
<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.h>

### Faculty resources and policies

Important student resources including Faculty policies are located at

<http://intranet.monash.edu.au/infotech/resources/students/>

### Graduate Attributes Policy

<http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.h>

### Student Charter

[www.opq.monash.edu.au/ep/student-charter/monash-university-student-charter.html](http://www.opq.monash.edu.au/ep/student-charter/monash-university-student-charter.html)

### Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at <http://www.monash.edu.au/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 [www.lib.monash.edu.au](http://www.lib.monash.edu.au) 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 Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

- Website: <http://www.monash.edu/equity-diversity/disability/index.html>
- Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Community Services at 03 55146018 at Malaysia
- Email: [dlu@monash.edu](mailto:dlu@monash.edu)
- Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Malaysia Campus