**University of Tasmania**  
**School of Computing**  
**KXA251 Algorithms and Metrics**  
**Unit Outline**  
**Semester 1, 2003**

**Prerequisites**  
KXA154

**Corequisites**  
None

**Unit Weight**  
12.5

**Unit Coordinator**  
Dr. Mike Cameron-Jones  
Room V171  
(03) 6324 3395  
Michael.CameronJones@utas.edu.au

**Scheduled Teaching Sessions**

- **Campuses:** Newnham, Launceston  
- Sandy Bay, Hobart

Lectures: 3 hr/wk  
Tutorials: 1 hr/wk (from week 2)

The Unit Timetable can be accessed from the Study Resources section of the School website. ([http://www.comp.utas.edu.au/app/studyresources.jsp](http://www.comp.utas.edu.au/app/studyresources.jsp)).

**Unit Website**

The unit website is accessed from [http://webct.utas.edu.au:8900](http://webct.utas.edu.au:8900). You will need to use your email pop account username and password to log on to the WebCT system. Once authenticated by the system your personalised MyWebCT area will be displayed. It contains links to the websites that you have permission to access - including the website for this unit.

This unit is Web Dependent: communication. This means that you will need to use the Web for this unit. The unit website contains unit information and resources. The information on the unit web site is largely available elsewhere. However, it is intended that in the event that an assignment clarification is required, it will be communicated by posting it on the unit web site, so that students have equitable access to the clarification regardless of such factors as their campus and their tutorial time.

If you are not able to access the unit website, please contact the University IT help desk:

- Level 2 Morris Miller Library, Sandy Bay Campus; Level 0 Building A, Newnham Campus.  
- Telephone: 6226 1818  
- Fax: 6226 7669  
- Email: HelpDesk@utas.edu.au

**Prescribed Text**


**Provider**

School of Computing - Faculty of Science, Engineering, and Technology. [http://www.comp.utas.edu.au](http://www.comp.utas.edu.au)

**Useful University Web Links**

Information and Resources for 'Current Students' are available on the university website at: [http://www.utas.edu.au/students/](http://www.utas.edu.au/students/) It includes useful links such as:


**OVERVIEW**

**Introduction**

The primary focus of the unit is on standard algorithms (and data structures) for solving computing problems, and (analysis of) the corresponding run-time and space complexity. The unit starts with an introduction to programming in C (presupposing a knowledge of Java) and ends with some software engineering theory.

The student is assumed to have a knowledge of programming (in Java), of elementary algorithms and data structures, and of software engineering, as covered in the prerequisite unit, Software Process, KXA154.

**Objectives**

On successful completion of this unit, you will be able to:
1. Develop C programs using iteration, recursion, arrays, structs, pointers, dynamically allocated memory and linked data structures, as appropriate.

2. Analyse the run-time (and space) complexity of algorithms (and their associated data structures), using $O()$ (and related) notation if appropriate.

3. Apply standard algorithms (and data structures) for storing and searching, for sorting, and for solving graph problems, and demonstrate understanding of the methods' run-time (and space) complexity.

4. Demonstrate understanding of standard algorithm design techniques.

5. Demonstrate understanding of the use in software engineering of measurement, cost and schedule prediction, and risk analysis.

**Unit Content**

| Introduction: | 1. Programming in C  
2. Algorithm Analysis: $O()$ and related notations  
3. Lists, Stacks and Queues in C |
| Storing, Searching and Sorting: | 1. Trees: Binary Search Trees, AVL trees  
2. Hashing and Heaps  
3. Sorting Algorithms |
| Graphs: | 1. Graph Searching and Shortest Paths  
2. Minimum Spanning Trees  
3. Network Flow |

**Algorithm Design Techniques**

**Software Engineering:** Measurement, Cost and Schedule Prediction, Risk Analysis

For more information see the section titled 'Content' on the unit website.

**Generic Skills**

The university has defined a set of generic graduate attributes expected in its graduates. [http://www.admin.utas.edu.au/academic/acservices/meetings/Senate/Appendix/3_01D1.doc](http://www.admin.utas.edu.au/academic/acservices/meetings/Senate/Appendix/3_01D1.doc) Your course is designed to enable you to develop generic skills that are valued in, and expected of, graduates. These are skills that you will need to develop over time. Hence you are encouraged to look for opportunities, as you study each unit, to reflect on and improve these skills.

**LEARNING AND TEACHING**

**Approach to Learning**

You are expected to spend about 130 hrs studying in this unit - this includes attendance at scheduled teaching sessions. (For a 13 week semester this is, on average, 10 hr/wk.) This is the amount of study time that the 'typical' student will need to reach the level of competence and understanding required to fulfil the unit objectives.

You are expected to:

- attend all scheduled lectures and tutorials, unless otherwise notified by the unit coordinator
- prepare for, and actively participate in lectures and tutorials
- complete the assigned learning tasks
- review what has been learnt
- complete assessment items and submit them on time
- access and be familiar with the information and resources available on the unit website
- seek help from teaching staff if you have any questions or difficulties in studying this unit

You are encouraged to read the university's *Code of Conduct for Teaching and Learning*. Part A describes the 'Responsibility of the University to Students' and part B describes the 'Responsibilities of Students to the University'. [http://www.admin.utas.edu.au/HANDBOOKS/UTASHANDBOOKS/RULES/CTEA.html](http://www.admin.utas.edu.au/HANDBOOKS/UTASHANDBOOKS/RULES/CTEA.html)

**Schedule**

See the 'Schedule' section on the unit website for the timetable and associated resources.

**Teaching Staff**

**Unit Coordinator:**

Dr. Mike Cameron-Jones  
E-Mail: Michael.CameronJones@utas.edu.au  
Phone: (03) 6324 3395  
Room: V171

**Lecturing Staff**

Newnham, Launceston: Dr. Mike Cameron-Jones  
Sandy Bay, Hobart: Dr. Mike Cameron-Jones
School Help Desk

Contact the School Help Desk if you have any queries or problems with accessing, using, or printing from the computers in the School of Computing labs.

- **Hobart:** the Help Desk is located near the School's reception desk and is open in the morning from 9-11, and in the afternoon from 12-1 and 2-4, Monday-Friday. The phone number is 6226 2960.
- **Launceston:** the Help Desk is located near the entrance to the computing labs and is open in the morning from 10-12, and in the afternoon from 2-4:30, Monday-Thursday. On Fridays it is open from 10-12 in the morning and 2-4 in the afternoon. The phone number is 6324 3654.
- **Burnie:** the computer labs at the NWC are maintained by ITS. Please contact the University Help Desk for assistance. The 6 Macs are maintained by the School of Computing. If you have a query or problem that is specific to the School of Computing please phone the School of Computing Help Desk in Launceston.

University Services and Support

The University has staff available to assist you, such as the:

- Learning Development Advisor
- Student Counselor
- Careers Advisor
- Disability Officer

For more information and contact details see the Services and Support section on the University 'Current Students' web page. [http://www.utas.edu.au/students/](http://www.utas.edu.au/students/)

Resources

Unit Website

The unit website contains unit information and resources. The information on the unit web site is largely available elsewhere. However, it is intended that in the event that an assignment clarification is required, it will be communicated by posting it on the unit web site, so that students have equitable access to the clarification regardless of such factors as their campus and their tutorial time.

Prescribed Text


Readings

A text previously used for this unit is:


The classic text on the C language is:


Possible sources for some of the Software Engineering material are:


Software

The software that you will need to access the unit website and to study this unit, including general purpose software such as word processors, is provided on the computers in the School's computing labs. If you intend to use software on other computers please check that the versions are compatible.

Computing Facilities

The School has PC labs (Windows 2000 Professional), Mac labs (Mac OS-X 10.2), Unix labs (linux / X-windows), and Networking labs at the Newnham and Sandy Bay campuses. It also maintains 6 Macs (Mac OS-X 10.2) at the NW Centre.

If you have not used these facilities before please contact the School Help Desk to organise you account details. If you would like to access the facilities at the Newnham and Sandy Bay campuses after hours please contact the School Help Desk.
Please contact the School Help Desk if you have difficulty accessing or using these facilities.

Students will be provided with an account on a School Unix machine, which will host the appropriate C compiler for the unit.

**Ethical Use of Facilities**

Use of computing facilities provided by the School is subject to the School's Ethics Guidelines - [http://www.comp.utas.edu.au/app/ethics.jsp](http://www.comp.utas.edu.au/app/ethics.jsp). Copies of the guidelines are also available in all School labs. The School's facilities may only be used for study-related purposes, and may not be used for personal gain. The playing of games is strictly prohibited in all labs at all times. Before being granted access to the School's facilities, you will be required to sign a declaration that you have read and understand these guidelines, and that you will abide by them. Disciplinary action may be taken against students who violate the guidelines.

**Occupational Health and Safety**

The university is committed to providing a safe and secure teaching and learning environment. For more information see [http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf](http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf)

### ASSESSMENT

**Assessment Items**

#### Item 1

- **Title:** Weekly work and allocated tutorial participation
- **Type:** In-Semester - learning tasks
- **Weighting:** 6%
- **Due:** Weekly in allocated tutorial (from week 3)

Satisfactory preparation for, and satisfactory participation in, at least 8 of a student's allocated tutorials from week 3 onwards (at most one per week), will be worth 6%. No marks will be awarded for fewer than 8 tutorials. (The requirement has been set at 8 of the 11 tutorials to allow a margin for such things as family or work commitments.)

Where a tutorial (from week 3) does not occur, e.g. due to a public holiday, students allocated to that tutorial may count it towards their 8. Where a student misses a tutorial (from week 3) due to appropriately certificated illness, that student may apply to the lecturer to count that tutorial towards their 8.

#### Item 2

- **Title:** First Assignment
- **Type:** In-Semester - individual assignment
- **Weighting:** 12%
- **Due:** 5pm 1st May

Assignments must work with the required compiler on the School machine specified.

#### Item 3

- **Title:** Second Assignment
- **Type:** In-Semester - individual assignment
- **Weighting:** 12%
- **Due:** 5pm 29th May

Assignments must work with the required compiler on the School machine specified.

#### Item 4

- **Title:** 3 hr Examination
- **Type:** Formal Examination
- **Weighting:** 70%
- **Due:** University Examination Period

See the 'Assessment' section in unit website for more detailed information about assessment items.

**In-Semester Assessment**

Unless specifically stated in the specification of the assessment item provided on the unit website, it is required that:

- work submitted by a student is the work of that student alone OR
- where the assessment item is to be completed by a group of students, the work submitted by the group of students is the work of that group of students alone.

**Plagiarism**
Plagiarism is taking and using someone else's thoughts, writings, or inventions and representing them as your own; for example downloading an essay from a cheat site, copying another student's work, or using an author's words or ideas without citing the source. Plagiarism is a form of cheating. It is a University offence punishable by a range of penalties including a fine or deduction/cancellation of marks and, in the most serious of cases, exclusion from a unit, a course, or the University. **When in doubt consult your lecturer or tutor.** Details of penalties that can be imposed are available in the Ordinance of Student Discipline or at http://www.utas.edu.au/plagiarism.

**Referencing**

The university document on plagiarism contains information about referencing the work or ideas of others. The preferred text referencing systems for the School is the Harvard system (also referred to as the author-date system). For information on the Harvard system see http://www.utas.edu.au/library/assist/gpoa/gpoa2.html.

**Submissions**

All in-semester assignment submissions (including electronic submissions) are to include an Assignment Cover Sheet which includes a statement confirming that the submission is your own work. If this undertaking is not signed, the assignment will not be marked. The Assignment Cover Sheet is available from the School Help Desk in Launceston and Hobart, and on the School's web site http://www.comp.utas.edu.au/app/studyresources.jsp.

**Extensions**

Assessment items will not be accepted after the due date except under the conditions stated in the school policy on late assessment. http://www.comp.utas.edu.au/app/late_assess.jsp

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**Formal Examination**

The formal examination is conducted by the University Registrar. The 'Current Students' section on the university website contains information about the the conduct of, and timetable for, formal examinations.

**Final Grade**

Overall assessment will be based on the student's performance throughout the semester as well as in a formal examination. In order to achieve a pass (or better) result, a student must obtain:

1. at least 40% of the total mark for in-semester assessment items
2. at least 40% of the mark for the formal examination
3. at least 50% of the overall mark

Passing grades will be awarded based on the AVCC guidelines:

- PP at least 50% of the overall mark but less than 60%
- CR at least 60% of the overall mark but less than 70%
- DN at least 70% of the overall mark but less than 80%
- HD at least 80% of the overall mark

The maximum mark awarded to a student who fails the unit will be 44.

For more information, including other grades such as Supplementary and Terminating grades, see the School of Computing's guidelines for assessment - available at: http://www.comp.utas.edu.au/app/assess.jsp