Unit Outline: KXT312 Advanced Algorithmic Problem Solving & Programming

Winter, 2007
Sandy Bay Campus, Hobart
Newnham Campus, Launceston

Prerequisites
KXT201 (or KXA251) plus an HD grade in one or more of KXT102 (KXA154), KXT201 (KXA251), KXA353, KXA354.

Unit Weight
12.5% of one academic year

Unit Coordinators
Mike Cameron-Jones / Robyn Gibson

Details of Teaching Arrangements
See Schedule.

University Website
Information and Resources for 'Current Students' are available on the university website at: http://www.utas.edu.au/students/

Provider
School of Computing - Faculty of Science, Engineering, and Technology. http://www.comp.utas.edu.au

OVERVIEW

Introduction
This unit provides highly able students with an opportunity to extend their knowledge of algorithms and their ability to solve algorithmic problems through to the point of a working program implementing the algorithmic solution. The unit has a problem solving based focus and includes the following topics: advanced graph algorithms, arithmetic algorithms, geometric algorithms, and C++ programming (procedural, object-based, and generic).

Prior Learning
Students are assumed to have a solid knowledge of algorithms as covered in KXT201 (or its predecessor, KXA251), and excellent programming skills as consistent with the HD aspect of the prerequisites.

Learning Outcomes
On successful completion of this unit, you will be able to:

- Identify (or adapt) an appropriate algorithm from this unit (or a prerequisite unit) to apply to solve a computational problem.
- Correctly implement an algorithm in a working (procedural, object-based or generic, as appropriate) C++ program.

Unit Content
1. Procedural, object-based and generic C++ programming.
2. Advanced Graph Algorithms
3. Arithmetic Algorithms
4. Geometric Algorithms
5. Other Algorithms

Generic Skills
The university has defined a set of generic graduate attributes expected in its graduates. http://www.utas.edu.au/policy/subject.html#graduates 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.
### 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.utas.edu.au/tl/policies/codes.html](http://www.utas.edu.au/tl/policies/codes.html)

### Schedule

**Monday 9 July - Friday 13 July**

Classes will be held starting at 10am and ending at 5pm each day. Students will be expected to attend all classes and to work on their own self study activities before and after class times.

**Sunday 15 July**
Practical Problem Solving and Programming Test 1  
(Time TBA)

**Sunday 22 July**
Practical Problem Solving and Programming Test 2  
(Time TBA)

**Sunday 29 July**
Class Presentations  
(Time TBA)

### Teaching and Support Staff

#### Unit Coordinators:

- Robyn Gibson  
  E-Mail: R.Gibson@utas.edu.au  
  Phone: (03) 6324 3461  
  Room: V121, Newnham Campus, Launceston
- Mike Cameron-Jones  
  E-Mail: Michael.CameronJones@utas.edu.au  
  Phone: (03) 6324 3395  
  Room: V171, Newnham Campus, Launceston

#### 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 from 10am - 4pm 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 10am - 12pm, and in the afternoon from 2pm - 4:30pm, Monday-Thursday. On Fridays it is open from 10am - 12pm in the morning and 2pm - 4pm in the afternoon. The phone number is 6324 3447.

### 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/)
Readings will be prescribed during the unit.

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 XP), Mac labs (Mac OS-X 10.4), and Networking labs at the Newnham and Sandy Bay campuses. It also maintains 6 Macs (Mac OS-X 10.4) at the NW Centre. Unix accounts can be accessed from all Macs and PCs.

If you have not used these facilities before please contact the School Help Desk to organise your 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.

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. 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/

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**ASSESSMENT**

**Assessment Items**

**Item 1**

- **Title:** Participation in Learning Activities
- **Type:** In-Semester - learning tasks
- **Weighting:** 10%
- **Due:** Continuously In Class

Students will be expected to attend, and appropriately participate in, all classes, and complete tasks between classes. Their performance in this will be assessed.

**Item 2**

- **Title:** Practical Problem Solving and Programming Test 1
- **Type:** In-Semester - test
- **Weighting:** 30%
- **Due:** Sunday 15th July (Time TBA)

Students will be tested on their individual ability to solve computational problems by identifying (or adapting) appropriate algorithms and correctly implementing them in C++ programs. The test will occur in a closed lab environment, and students will have a (partial) "catch-up" opportunity in an open environment for the 120 hours after the test.
Item 3

**Title:** Practical Problem Solving and Programming Test 2  
**Type:** In-Semester - test  
**Weighting:** 30%  
**Due:** Sunday 22nd July (Time TBA)

Students will be tested on their individual ability to solve computational problems by identifying (or adapting) appropriate algorithms and correctly implementing them in C++ programs. The test will occur in a closed lab environment, and students will have a (partial) "catch-up" opportunity in an open environment for the 120 hours after the test.

Item 4

**Title:** Written Assignment and Presentation  
**Type:** In-Semester - individual assignment  
**Weighting:** 30%  
**Due:** Sunday 29th July (Time TBA)

Students will have to investigate an algorithm outside the scope of the unit and illustrate its implementation and application to an example problem, presenting their work both in the form of a written report and a presentation to the class.

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**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 a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own, for example:

- using an author's words without putting them in quotation marks and citing the source;
- using an author's ideas without proper acknowledgment and citation; or
- copying another student's work.

**If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor** for relevant referencing guidelines, and the academic integrity resources on the web at [http://www.utas.edu.au/tl/supporting/academicintegrity/index.html](http://www.utas.edu.au/tl/supporting/academicintegrity/index.html).

The intentional copying of someone else’s work as one’s own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see [http://www.utas.edu.au/policy/subject.html#students](http://www.utas.edu.au/policy/subject.html#students).

The University reserves the right to submit assignments to plagiarism detection software, and might then retain a copy of the assignment on its database for the purpose of future plagiarism checking.

**Referencing**

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

**Submissions**

The details of the submission method (paper, electronic or other) for each assignment will be supplied in a separate assignment specification sheet. 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](http://www.comp.utas.edu.au/app/studyresources.jsp).
Extensions and Penalties

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

Final Grade

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: