School of Computing and Information Systems

Unit Outline

KXC251 Algorithms and Metrics

September 2011 - January 2012
Hangzhou, China

Unit Coordinator
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UNIT OVERVIEW

Introduction
The primary focus of the unit is on standard algorithms and data structures for solving computing problems, and the
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.

Prerequisites
KXC154

Unit Weight
12.5% of one academic year

Teaching Pattern
Lectures: 3 hr/wk Tutorials 1 hr/wk (or equivalent)

Unit Content

Introduction:
- Programming in C++
- Algorithm Analysis: O() and related notations
- Lists, Stacks and Queues in C++

Storing, Searching and Sorting:
- Trees: Binary Search Trees, AVL trees
- Hashing and Heaps
- Sorting Algorithms

Graphs:
- Graph Searching and Shortest Paths
- Minimum Spanning Trees
- Critical Path Analysis and Network Flow
Algorithm Design Techniques

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

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

**Prior Knowledge and/or Skills**

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, KXC154.

**Learning Outcomes**

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.

**Generic graduate attributes**

The university has defined a set of generic graduate attributes expected in its graduates. [http://www.utas.edu.au/__data/assets/pdf_file/0010/29917/genericattributes_grads1.pdf](http://www.utas.edu.au/__data/assets/pdf_file/0010/29917/genericattributes_grads1.pdf) 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.

**UNIT ASSESSMENT**

**Assessment Pattern**

Internal (30%), Exam (70%)

**Assessment Summary**

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Assignment</td>
<td>15%</td>
<td>Week 11: 3pm on Tue 15th November 2011</td>
</tr>
<tr>
<td>Second Assignment</td>
<td>15%</td>
<td>Week 15: 3pm on Fri 16th December 2011</td>
</tr>
<tr>
<td>3 hr Examination</td>
<td>70%</td>
<td>University Examination Period</td>
</tr>
</tbody>
</table>

**Assessment Items**

**Item 1**

**Title:** First Assignment  
**Type:** In-Semester - individual assignment  
**Task Length:** not applicable  
**Weighting:** 15%  
**Links to Learning Outcomes:** 1, 2, 3, 4  
**Due:** Week 11: 3pm on Tue 15th November 2011  
**Description:** This will be a programming assignment. Your submission will have to meet the requirements in the specification. These will include requirements relating to the input and output, and to the compiler and machine on which your submission will be tested.

**Item 2**

**Title:** Second Assignment  
**Type:** In-Semester - individual assignment  
**Task Length:** not applicable  
**Weighting:** 15%  
**Links to Learning Outcomes:** 1, 2, 3, 4  
**Due:** Week 15: 3pm on Fri 16th December 2011  
**Description:** This will be a programming assignment. Your submission will have to meet the requirements in the specification. These will include requirements relating to the input and output, and to the compiler and machine on which your submission will be tested.

**Item 3**

**Title:** 3 hr Examination  
**Type:** Formal Examination
Task Length: not applicable  
Weighting: 70%  
Links to Learning Outcomes: 1, 2, 3, 4, 5  
Due: University Examination Period  
Description: Students may bring ONE A4 sheet of handwritten notes to the examination.

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

How your Final Grade will be determined

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 45% of the total mark for in-semester assessment items
2. at least 45% of the mark for the formal examination
3. at least 50% of the overall mark

Attendance Requirements

It is a requirement of your Chinese university that you attend all classes. UTAS supports this principle. It is our belief that attendance in class leads to better engagement with the subject matter and therefore to better results. Please attend all classes.

UNIT RESOURCES

Unit Web Site

This unit is Web Supplemented. This means that the use of the Web is optional for this unit. The unit website contains unit information and resources.

The unit website is accessed from http://www.utas.edu.au/coursesonline/. You will need to use your University of Tasmania email pop account username and password to log on to the MyLO system. Once authenticated by the system your personalised MyLO Learning Online area will be displayed. It contains links to the websites that you have permission to access - including the website for this unit.

If you are not able to access the unit website, please contact the technical staff at ZUT.

Prescribed Text

None

Readings


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 computing labs. If you intend to use software on other computers please check that the versions are compatible. In this unit, you will use a C++ compiler.

GENERAL RESOURCES

School Website

School of Computing and Information Systems - Faculty of Science, Engineering, and Technology.  
http://www.cis.utas.edu.au

Faculty Website

Information and Resources for Faculty of Science, Engineering and Technology students are available on the faculty
University Website

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

School Help Desk

Contact technical staff at ZUT for information about accessing and using the Computer labs.

University Services and Support

If you are experiencing difficulties with your studies or assignments, have personal or life planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

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/

GENERAL ASSESSMENT

Approach to Learning

The University is committed to high standards of professional conduct in all activities, and holds its commitment and responsibilities to its students as being of paramount importance. Likewise, it holds expectations about the responsibilities students have as they pursue their studies within the special environment the University offers.

The University's Code of Conduct for Teaching and Learning states:

Students are expected to participate actively and positively in the teaching/learning environment. They must attend classes when and as required, strive to maintain steady progress within the subject or unit framework, comply with workload expectations, and submit required work on time.

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 teaching sessions, unless otherwise notified by the unit coordinator
- prepare for, and actively participate in all scheduled teaching sessions
- 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'.


It is expected that students will familiarise themselves with access and use of the MyLO system operated by the University for the electronic delivery of course materials, and for various forms of communication.

It is expected that students will consult email sent to their University email address at least twice a week for notices relating to the administration of the unit, and for notification of the results of assignments.

It is expected that students will read the background material specified in the course curriculum, will actively attend and participate in tutorials, and be prepared to discuss relevant issues arising with tutors, lecturers and fellow students.

Student Expectations of the Unit

Students enrolled in this Unit may reasonably expect the following:
1. To be able to contact a lecturer or tutor by electronic mail, to raise issues arising in the unit, either relating to content or student performance within the unit.

2. Subject to availability, to be able to discuss such issues in person with the lecturer or tutor.

3. That assignments will be marked and the marks will normally be returned within 3 weeks of due dates.

4. That all relevant notices regarding the administration of the unit, including any necessary changes, will be communicated to all students enrolled in the unit via email.

These expectations are in addition to those specified in relevant University regulations.

Plagiarism

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.

While students are encouraged to discuss the assignments in this unit and to engage in active learning from each other, it is important that they are also aware of the University's policy on plagiarism. Plagiarism is taking and using someone else’s thoughts, writings or inventions and representing them as your own; for example downloading an essay wholly or in part from the internet, 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 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, 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.academicintegrity.utas.edu.au.

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/__data/assets/pdf_file/0006/23991/ord91.pdf.

The University and any persons authorised by the University may submit your assessable works to a plagiarism checking service, to obtain a report on possible instances of plagiarism. Assessable works may also be included in a reference database. It is a condition of this arrangement that the original author's permission is required before a work within the database can be viewed."

It is important that you understand this statement on plagiarism. Should you require clarification please see your unit coordinator or lecturer. Useful resources on academic integrity, including what it is and how to maintain it, are also available at: http://www.academicintegrity.utas.edu.au

Referencing

The preferred text referencing systems for the School is the Harvard system (also referred to as the author-date system). In your written work you will need to support your ideas by referring to scholarly literature, works of art and/or inventions. For information on presentation of assignments, including referencing styles: http://utas.libguides.com/referencing

It is important that you understand how to correctly refer to the work of others and maintain academic integrity. Failure to appropriately acknowledge the ideas of others constitutes academic dishonesty (plagiarism), a matter considered by the University of Tasmania as a serious offence. The university document on plagiarism contains information about referencing the work or ideas of others (see http://www.utas.edu.au/plagiarism/).

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 on the School's web site http://www.cis.utas.edu.au/cisview/resources.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.cis.utas.edu.au/downloads/ExtensionPolicy.pdf (PDF - 100KB).
Review of Assessment and Appeals

1. It is expected that students will adhere to the following policy for review of any piece of continuous assessment.
   a. Within 5 days of the release of the assessment result, the student should request an appointment with the Lecturer. The student should be prepared to discuss specifically which section of the marking criteria they are disputing and why they consider the mark is inappropriate.
   b. Following this discussion, students may request a formal remark of the original submission (in accordance with Rule of Academic Assessment 111, clause 22.1). This remark will be undertaken, where practicable, by an alternative assessor.

2. Students may also request a review of the final result in a unit. The request and payment must be made within 10 days from the date of the result notification. Students are referred to Rule of Academic Assessment 111, clause 23 at [http://www.utas.edu.au/university-council/university-governance/rules](http://www.utas.edu.au/university-council/university-governance/rules) and [http://www.studentcentre.utas.edu.au/examinations_and_results/results/result_review_results.htm](http://www.studentcentre.utas.edu.au/examinations_and_results/results/result_review_results.htm).

Complaints Procedure

It is expected that students will adhere to the following policy for making any complaint or grievance directly related to a Unit:

   a. In the first instance, students are to approach the Lecturer or Unit Coordinator concerned and arrange a time to speak with them about their concern.
   b. If an issue remains unresolved, the student should approach the Head of School and arrange a time to speak with them about their concern.

If the School's internal policy of complaints is unable to resolve an issue, students should consult Ordinance 8 Student Complaints for further direction, see [http://acserv.admin.utas.edu.au/complaints_info.html](http://acserv.admin.utas.edu.au/complaints_info.html).

Formal Examination

The formal examination will be held at ZUT, Hangzhou, and is conducted by the University Registrar.

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

In order to comply with the benchmarks set by the Faculty of Science, Engineering & Technology for distribution of grades in units, both the in-semester and examination marks that students obtain may be adjusted either upwards or downwards. See [http://fcms.its.utas.edu.au/scieng/scieng/policies.asp](http://fcms.its.utas.edu.au/scieng/scieng/policies.asp) for details of the Faculty Assessment Guidelines.