School of Information Technology

ICT 381 Software Engineering
(previously B381)

First Semester 2004

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SECTION I: Introduction

Unit Overview

This unit explores the issues concerned with the development of large-scale software for computer-based complex systems. The software systems are generally developed by team(s) of software engineers. Due to their complexity, such systems are normally of sufficient large scale that it is not realistically possible for a single person to comprehend all the inherent complexity within the system. The development of such systems must be approached in a disciplined manner. This unit looks at some appropriate tools and techniques and considers how they may be used in a consistent way to produce a planned construction process. Consideration is also given to aspects of verification of process and product and to tracking progress with appropriate measures and corrective actions.

This unit explores the measurement of the product and process with an objective leading to continuous improvement. There will be some consideration of high reliability and safety critical systems and how lessons learnt may be carried over to other software production. The course looks briefly at formal verification, cleanroom methods, defect measurement, reliability models, software metrics, risk management and fault tolerance.

Students are encouraged to develop their personal software process in such skills as estimation and planning. Consideration is also given to human factors and professional issues within the software engineering environment.

Prerequisites

ICT229 (previously B229) Systems Analysis, or
ICT231 (previously B231) Systems Analysis & Design

Exclusions

Students who have successfully completed B381/ICT381/M381 Software Engineering I or B382/ICT382 Software Engineering II may not enrol in this unit for credit.
Aims and Objectives

At the conclusion of the course, students should have:

- an understanding of the concepts of software engineering
- an understanding of the many software life-cycle models that can be used for software development and maintenance
- an ability to instantiate a defined process model and verify its use within a project
- an understanding of the importance of planning and control
- an appreciation of the concept of quality and how it affects the software development process
- an understanding of the use of standards for assessing process capability
- a detailed understanding of the use of Validation, Verification and Testing during software development
- a detailed understanding of Configuration Management for software
- an appreciation of the theory and concepts of software metrics
- an understanding of methods for the modelling and measurement of a process and specifically the phases of a software development project
- an understanding of metrics in estimation, planning and control
- an appreciation of the concepts of system quality and complexity and their measurement
- an understanding of the use of software reliability models
- an understanding of risk management during software development
- some appreciation of the special methods needed for safety critical systems
- an understanding of a range of approaches to the measurement of an organisation's capability to produce reliable systems
- an appreciation of ethics, professional and legal issues in Software Engineering

Note: ICT381 is NOT a programming unit. Students should appreciate that programming is only one aspect of software engineering.

Course style

There will be one two-hour lecture, an one-hour tutorial plus a third one-hour workshop to introduce particular exercises. This course is not about learning specific tools - it is concerned with software development techniques and the underlying theories and concepts. The main concepts will be indicated in the lecture notes at each week.

Unit Timetable

Lectures: Thursday 3:30 to 5:30 in BSLT
Workshop: Thursday 5:30 to 6:30 in BSLT
Tutorial: Wednesday 9:30 to 10:30 in LB 4.10

Learning Activities and Format of the unit

The learning activities for this unit are:

- Lectures and demonstrations of software engineering techniques and processes
- Tutorial discussions on the topics
- Practical work to exercise your understanding of the material and supporting tools
- Reading and understanding new software engineering material in the library or elsewhere

Lectures/Workshop

The lectures will give an overview of the material of the course and promote discussion of this material. The last lecture/workshop of the week will be more of an informal session investigating or applying the concepts and techniques being studied in that week's topic.
SECTION II: Unit Resources

Study Materials

The following are required:

- this guide and detailed syllabus with topic information
- notes will be available on the unit web-page before or after each lecture
- weekly details of the tutorial work

Text Book:


Supplementary reading available in the library:

- Students may obtain a copy of HB90.9-2000 "Software Development - Guide to ISO 9001:2000" - from Standards Australia – as an example of an organisation standard. This will be a necessary text for those planning to enroll in ICT340.

Computer and Internet Resources

All students should have access to computer resources and Internet for research and preparation of relevant documents. There is little computational or programming work in this unit. All students will also be given access to the materials on the Software Factory website. Details will be given once the class list is confirmed.
Weekly Lecture topics

1. The concept of a software process
2. Paradigms and practices for software process control
3. Estimation (planning depends on estimation skills)
4. Project risk management
5. Standards and procedures
6. Formal requirements analysis
7. Validation and verification
8. Testing as a controlled process
9. Configuration management and change control
10. Certification of systems of software products
11. Measurement and software metrics
12. Adapting methods for special types of software or applications
13. Human factors – the client, the manager, the software team

Tutorials

Tutorials will normally take the form of discussions about the topic material and/or short practical assignments. Students are advised to write their own summaries of the tutorial discussions as they will be useful for revision purposes. These should be stored in your Practical Work Folder. The only keyboard work will be in preparing reports.

Practical Work

In addition to the practical work in the weekly tutorial sessions, students will have a number of exercises to complete at non-timetabled times. Worksheets will be provided for these exercises and students are expected to write-up their results/experience and store it in a Practical Work Folder.

Students are expected to maintain their Practical Work Folder containing:

- notes of all practical/tutorial work;
- a log of papers and articles on relevant topics read.

This Folder should be available for inspection at the tutorial and will be audited during the semester. It should be handed in for assessment at the end of the course. The Practical Work and the Reading Log are worth 5% of the final mark.

- Practical Work. Each week, students will be doing some practical work associated with the topics of the course, normally in preparation for the tutorial. You should record what you did, discussions, answers to questions etc., from each week's tutorial in the Practical Work Folder.

- Reading Log. It is important that students develop the habit of maintaining a current knowledge of their areas of expertise. Each student is required to give some time to browsing in the library and reading at least one journal article or new book chapter (on some aspect of software engineering) per week. [The twelve readings may not include chapters of the text book or articles from trade magazines]. Evidence of the research will be by means of a Reading Log. Information in the log should include author, article title, journal or book title, date published, date read, a note on the author's theme or thesis and your evaluation of the item with regard to its relevance in the context of software engineering. Students should determine what specific idea the author had that made him or her believe the item was worth publishing.

The reading log should be maintained as a word-processed document with each log entry starting on a new page. Entries should be in the order read.
Printed versions of each log entry should be stored in the Practical Work Folder. As a result of the readings, at the end of the semester, each student will append to the reading log a one page appreciation of the state of the art in the topic chosen. This will indicate the current state of knowledge, what is within the capability of software engineers and what is at present infeasible. It should list a number of currently open research questions.


For a set of major original papers, have a look at the tutorial collections produced by Richard Thayer (editor) such as: “Software Engineering Project Management” published by the IEEE in 1990 and 1997.

Online Materials from “Software Factory”

Students enrolled in this unit are eligible to access supplementary information from the following site:


Details on access and log-in details will be provided later.

SECTION III: Assessment Details

Assessment Components

Assessment of students' work in this course consists of several components:

- Assignment 1 (Due date: on or before Friday 16th April 2004) 25%
- Assignment 2 (Due date: on or before Friday 28th May 2004) 20%
- Practical Work Folder and Reading log (Due date: on or before Friday 4th June 2004) 5%
- Examination 50%

Assignments Submission

Note: It is the responsibility of all students to keep a copy of all submissions handed in for assessment.

The two major assignments for this course will involve performing some group and individual work relating to the topics covered in the course. The details of the work to be done, submission requirements and submission dates will be given out at an appropriate time during the semester.

As most of the students will be likely taking up employments in the software industry, the standard of presentation of assignments and projects will be at a level suitable for putting before a Managing Director or the Managing Board. Also, in industry, there is usually a preference for an adequate job done early than a perfect job done late. If an assignment is submitted late, 5% will be deducted for each day late up to a maximum of 7 calendar days. After 7 days (that is, 1 week after due date), no marks will be rewarded for the assignment.

If an extension is required, you must contact the unit coordinator. An extension may be granted in medical ground, but must be supported with a medical certificate.
Internal Students

Submit assignments 1 & 2 into the assignment box at ECL Building Level 2. The box will be labeled with the unit code.

Assignment must be submitted in hard copy and soft copy. Marking will be done on the printed hard copy only. The soft copy may be submitted on a floppy disk or a CD-ROM.

Each assignment must have a standard cover sheet. Cover sheets are available either at:

http://online.murdoch.edu.au/ or
ftp://ftip.it.murdoch.edu.au/pub/units/ICT381

External Students

External Students should submit assignments through external studies. Each assignment must have a standard cover sheet. Cover sheets are available at:


Examination

The examination is a 3-hour "close-book" examination and will be held during the University assessment period at the end of semester. You are permitted to take one A4 sheet of HANDWRITTEN notes. You are permitted to hand write notes on both sides of the sheet. There will be two parts with a number of short compulsory questions plus longer "essay" topics. For further information about examinations, refer to


Determination of the Final Grade

To pass this course a student must achieve a satisfactory performance in both the Continuous (Assignments + Practice folder + Reading log) and Examination components of the course. Satisfactory is normally defined as being > 50%. A passing grade for the course cannot be obtained unless all assignments, practice folder and reading log have been submitted for assessment.

A student’s final grade for the course will be reported as a letter grade. In order to obtain a particular letter grade you must attain certain minimum percentage scores, both overall and in the supervised component which is the final examination. Note that marks may be scaled to ensure equity of marking by different staff, and across assignments of different difficulty. Final grades are based on a student's assessable work and examination. This may not necessarily be indicative of either innate ability or effort applied. Your final grade will be reported by a letter Grade according to the following percentage ranges.

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<th>Percentage Range</th>
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<tr>
<td>HD</td>
<td>High Distinction</td>
<td>80-100</td>
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<tr>
<td>D</td>
<td>Distinction</td>
<td>70-79</td>
</tr>
<tr>
<td>C</td>
<td>Credit</td>
<td>60-69</td>
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<tr>
<td>P</td>
<td>Pass</td>
<td>50-59</td>
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<tr>
<td>N</td>
<td>Fail</td>
<td>Below 50</td>
</tr>
<tr>
<td>CP</td>
<td>Conceded Pass</td>
<td>45-49*</td>
</tr>
<tr>
<td>S</td>
<td>Supplementary Assessment</td>
<td>45-49*</td>
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<tr>
<td>UP</td>
<td>Ungraded Pass</td>
<td>50-100</td>
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* The award of the grades CP and S shall recommended at the discretion of the unit coordinator.

See Section 5 of the assessment code regarding grades:
Extensions for submission of work beyond the Friday of week 13 are not available except through application to the University Administration according to the deferred assessment procedures described in Degree Regulation 46 (29.6.92). Students should note (46.1) "...the student shall have been up-to-date with the assessment requirements of the course at the time the circumstances requiring deferred assessment arose."

Note: If you find that by week 10 of the semester you are significantly behind in your studies you should consider withdrawing. If you remain enrolled and fail to finish all the assignment work you will probably fail the course.

Assessment Information

Contact your lecturer if you require further explanation of the grades allocated for your assignments. Students may inspect their marked examination scripts and discuss the marking with the Course Coordinator within 14 days of the posting of results (Degree Regulation 43). Appeals against the final grade must be submitted in writing to the Dean according to the procedures given in Degree Regulation 49. For further details about assessment see the current University Handbook and Calendar, in particular Degree Regulations 40-51.

University Policy on Assessment

Assessment for this unit is in accordance with the provisions of Degree Regulations 40-48. Check these in the current Murdoch University handbook and Calendar or


Assessment roles and responsibilities

Please refer to the University Policy at


Honesty in assessment and avoiding plagiarism

For guidelines on honesty in assessment including avoiding plagiarism, see

http://www.murdoch.edu.au/admin/discipline/

Plagiarism and Collusion

The University regards most seriously any acts of dishonesty relating to assessment. Students are advised to refer to the Unit Welcome Page at

http://online.murdoch.edu.au/public/ICT381

End of ICT381 Unit Guide