MONASH University
Information Technology

FIT3037
Software engineering

Unit Guide

Semester 2, 2010

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

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Additional communication information:

All communication of a personal nature should be directed by email to the responsible lecturer at your campus. All general queries should be posted to the appropriate discussion forum so all students can participate in the discussion and be aware of the outcome of these discussions.

Introduction

Welcome to Software Engineering!

Software engineering is a very wide ranging unit which attempts to consolidate many things you will probably have come across before (eg process models, analysis and design methods etc) and give each a better context within the overall domain. We also introduce a few distinctly different aspects that few will have seen before, these include formal methods, real-time analysis and configuration management. Overall the objective is to develop a greater understanding of the complexity and magnitude of creating very large software systems and the methods and techniques used to overcome the problems that may be encountered.

Don't hesitate to ask questions via the discussion forums, answer other students queries if you can and participate as much as possible.

Regards,

Ray

Unit synopsis

In this unit students will learn about many aspects of working with a large team on large projects to produce quality software products on time and within budget. The student will gain an appreciation of the tools and techniques used to develop software systems within a group context. Topics to be studied include: software development lifecycle models; sizing, estimation, planning and control of projects; functional specification and design of real-time systems; formal specification and design using Z; integration and testing strategies, configuration management; reuse and re-engineering.

Learning outcomes

At the completion of this unit students will have:
A knowledge and understanding of:

- the continuing software crisis, problems encountered in the development of large software systems: poor quality, late delivery and budget overruns;
- techniques used in software engineering to counter these problems;
- the role of software lifecycle models in project control and planning;
- different categories of software metrics;
- software estimation methods;
- methods for specifying real-time systems;
- techniques and tools to support configuration management;
- strategies for testing software;
- the roles and responsibilites of project team members.

Developed the skills to:

- apply techniques for scheduling and control of large projects;
- construct and validate a software specification;
- formal methods specification of software systems;
- functionally design of software systems;
- describe large software systems using appropriate language and technical sprecification techniques to suit the intended audience;

- be aware that quality software is not a luxury but essential in solving the software crisis.

Contact hours

2 hrs lectures/wk, 2 hrs tutorials/wk

Workload

For on campus students, workload commitments are:

- two-hour lecture and
- two-hour tutorial (or laboratory) (requiring advance preparation)
- a minimum of 2 hours of personal study per one hour of contact time in order to satisfy the reading and assignment expectations.

- You will need to allocate up to 4 hours per week in some weeks, for use of a computer, including time for newsgroups/discussion groups.

Off-campus students generally do not attend lecture and tutorial sessions, however, you should plan to spend equivalent time working through the relevant resources and participating in discussion groups each week.

Unit relationships

Prerequisites

FIT2005

Prohibitions

CSE2201, CSE2401, FIT2024, GCO3811

Teaching and learning method

Teaching approach

This unit requires a fair amount of reading, both from the textbook Pressman and also the study guide/lecture slides. The unit covers much territory you will be familiar with in isolation but attempts to bring it together as a coherent knowledge base to describe the methods used in the development of large software engineering projects. The tutorial questions available from the MUSO site are there for you to judge how well you understand the concepts. If you find you are struggling with these please do some further reading and if still in doubt ask via the discussion forums.

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS, http://mutts.monash.edu.au/MUTTS/

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system: http://allocate.its.monash.edu.au/

Unit Schedule

Week	Date*	Topic	Study guide	References/Readings	Key dates
1	19/07/10	Introduction, Process models, metrics, requirements specifications	1	Pressman Ch 1, 3, 14.4, 15, 22	
2	26/07/10	Interface analysis and design	2	Pressman Ch 12	
3	02/08/10	Real-time Specification	3	Pressman Ch 7.1-7.4, 8.2-8.7	
4	09/08/10	Formal methods introduction	3	Pressman Ch 28	Ass 1 due 12/8/10
5	16/08/10	Formal specification - Z	3	Pressman Ch 28	
6	23/08/10	System and Software Desigin	4	Pressman Ch 9, 10.1-10.5, 11.1-11.2	
7	30/08/10	Project and risk management	5	Pressman Ch 21, 25	
8	06/09/10	Software Estimation	5	Pressman Ch 23	Ass 2 due 9/9/10
9	13/09/10	Component-based development, Cleanroom Software Engineering	6	Pressman Ch 29,30	
10	20/09/10	Software Testing and Strategies	7	Pressman Ch 13, 14	

		Mid semester break			
11	04/10/10	Software configuration maintenance	8	Pressman 27	Ass 3 due 11/10/10
12	11/10/10	Software re-engineering	8	Pressman Ch 31	

*Please note that these dates may only apply to Australian campuses of Monash University. Off-shore students need to check the dates with their unit leader.

Unit Resources

Prescribed text(s) and readings

Pressman R.S., Software Engineering: A Practitioners Approach, Sixth Edition, McGraw-Hill, 2005. ISBN 007-123840-9

or Seventh Edition 2009 ISBN 978-007-126782-3

Text books are available from the <u>Monash University Book Shops</u>. Availability from other suppliers cannot be assured. The Bookshop orders texts in specifically for this unit. You are advised to purchase your text book early.

Recommended text(s) and readings

Sommerville, Ian. Software Engineering, Eigth Edition, Addison-Wesley, 2007. ISBN 0-321-31379-8

Van Vliet Hans, Software Engineering: Principles and Practice, Second Edition, John Wiley and Sons, 2000. ISBN 0-497-97508-7

Pfleeger Shari Lawrence, Software Engineering Theory and Practice, Prentice-Hall, 1998. ISBN 0-13-081272-2

Required software and/or hardware

You will need access to a word processor for assignment preparation. A special Z font is available from the MUSO site for development of the Z formal methods specification in assignment 2.

Equipment and consumables required or provided

Students studying off-campus are required to have the minimum system configuration specified by the Faculty as a condition of accepting admission, and regular Internet access.On-campus students, and those studying at supported study locations may use the facilities available in the computing labs.Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.You will need to allocate up to **4** hours per week for use of a computer, including time for newsgroups/discussion groups.

Study resources

Study resources we will provide for your study are:

- Weekly detailed study guides/lecture slides outlining the learning objectives, discussion of the content, required readings and exercises;
- Weekly tutorial or laboratory tasks and exercises with sample solutions provided one to two weeks later;
- Assignment specifications and sample solutions;
- A sample examination and suggested solution
- Access to past examination papers;
- Discussion groups;
- This Unit Guide outlining the administrative information for the unit;
- The unit web site on MUSO, where resources outlined above will be made available.

Assessment

Overview

Examination (3 hours): 55%; In-semester assessment: 45%

Faculty assessment policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 50% then a mark of no greater than 49-N will be recorded for the unit.

Assignment tasks

Assignment coversheets

Assignment coversheets are available via "Student Forms" on the Faculty website: http://www.infotech.monash.edu.au/resources/student/forms/
You MUST submit a completed coversheet with all assignments, ensuring that the plagiarism declaration section is signed.

Assignment submission and return procedures, and assessment criteria will be specified with each assignment.

Assignment submission and preparation requirements will be detailed in each assignment specification. 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.infotech.monash.edu.au/resources/student/equity/special-consideration.html.

- **Assignment task 1**

    Title:
    Requirements specification
    Description:
    For the proposed system described in the assignment specification the student will analyse the system requirements and then document these requirements to conform with the IEEE Recommended Practice for Software Requirements Specifications as set out in IEEE Std 830.
    Weighting:
    15%
    Criteria for assessment:
    The full specification and criteria for the assignment will be available early in the semester from the MUSO Moodle site, a summary of the marking criteria is included here.

    The assignment will be marked for conformance to the IEEE standard for Requirements Specification for the logical and complete presentation of the system requirements. The

major criteria and the relevant percentages are:

1. Presentation of document (15%) including table of contents, index, page numbers and formatting, section numbering etc
2. English grammar and spelling (10%)
3. Section 1 Introduction (15%) needs to give good introduction to application and its environment and define scope and terminology well
4. Section 2 Overall description (15%) must provide good background to the environment in which application is to operate, including interfaces with hardware and other systems, user profiles, constraints etc
5. Section 3 Specific Requirements (45%)needs to include all requirements with sufficient detail to allow design to start. Must clearly and logically include functional and non-functional requirements for the proposed system.

Due date:
12 August 2010

- **Assignment task 2**

Title:
Formal Specification - Z
Description:
The student will develop a formal specification in Z for an interesting but relatively simple proposed system. This will include the specification of a suitable state space and schemas to perform operations on that state space.
Weighting:
15%
Criteria for assessment:
The full specification and criteria for the assignment will be available early in the semester from the MUSO Moodle site, a summary of the marking criteria is included here.
The major criteria and the relevant percentages are:

1. Presentation and basic layout (5%). Looking for : good layout, adherence to basic Z concepts and structures
2. State Space Specification (15%). Looking for : well defined structure for all the data to be stored. Predicates to hold these structures consistent. Types to be used consistently.
3. Initialisation Schema (10%). Must ensure initialisation cannot be re-run once data input and ensure that all data initialised.
4. Schema Calculus (10%). Looking for : Use of schema calculus to handle error conditions and make schemas less complex. Schema calculus to handle the majority of possible error conditions.
5. Defined Schemas (60%). Schemas defined in the assignment specification to be correctly written in Z with logical and consistent manipulation of the state space and local variables

Due date:
9 September 2010

- **Assignment task 3**

Title:
Real-time specification
Description:
The student will analyse a proposed realtime system and present a specification that describes the system operation and constraints of the system.

Weighting:

15%

Criteria for assessment:

The full specification and criteria for the assignment will be available early in the semester from the MUSO Moodle site, a summary of the marking criteria is included here.

The major criteria and the relevant percentages are:

1. Presentation (5%) - looking for well presented and laid out specification
2. ERD (10%). Looking for an entity relationship diagram that shows the basic relationships between the system to be developed and the other entities in the environment
3. DFD's and CFD's (30%). Looking for a set of data and control flow diagrams that show the data and control flows around the system. The flows must be maintained between different levels with no overall gain or loss of information.
4. PSPECS (15%). Each process at the lowest level MUST have a specification showing exactly what it does and how the data flowing through the process is manipulated.
5. CSPECS (20%). Basic job of Control Specification is to show how events in CFD are handled and to synchronise process activation as required. Looking for logical and consistent specification to manage this task.
6. Data Dictionary (10%). Need to include all names in dictionary, including process, data and control flow names
7. Coverage (10%). What percentage of the overall problem has been considered in this solution.

Due date:

11 October 2010

Examination

-
  Weighting:

  55%

  Length:

  3 hours

  Type (open/closed book):

  Closed book

  Electronic devices allowed in the exam:

  None

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse

late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

Refer to the Faculty Special consideration webpage or further details and to access application forms: http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html

Late assignment

Assignments received after the due date will be subject to a penalty of **5% per day or part thereof,** including weekends. Assignments received later than one week (cutoff date) after the due date will not normally be accepted.

Return dates

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

Feedback

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

Graded assignments with comments

Solutions to tutes, labs and assignments

Appendix

Please visit the following URL: http://www.infotech.monash.edu.au/units/appendix.html for further information about:

- Continuous improvement
- Unit evaluations
- Communication, participation and feedback
- Library access
- Monash University Studies Online (MUSO)
- Plagiarism, cheating and collusion
- Register of counselling about plagiarism
- Non-discriminatory language
- Students with disability
- End of semester special consideration / deferred exams