



MONASH University
Information Technology

FIT3013
Formal specification for software engineering

Unit Guide

Semester 2, 2013

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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FIT3013 Formal specification for software engineering - Semester 2, 2013

Review of set theory, the predicate calculus, relations, relational algebra and formal specification concepts; algebraic and model based specifications; the role of formal specifications in software engineering. The Event-B notation, the role of proof obligations and refinement, the LTL and CTL temporal logics, the model checking approach and techniques.

Mode of Delivery

Clayton (Day)

Contact Hours

2 hrs lectures/wk, 1 hr tutorial/wk

3 x 2 hrs laboratories during the semester for hands-on practice with Rodin and Event-B.

Workload requirements

Students will be expected to spend a total of 12 hours per week during semester on this unit as follows:

- 2 hours in lectures
- 1 hour in tutorials
- 3 hours of study material revision
- 6 hours practising with the verification tools (details to be advised), and developing assignment solutions.

Unit Relationships

Prohibitions

CSE4213

Prerequisites

FIT2004 and one of MAT1830, MTH1112 or MAT1077

A knowledge of set theory, predicate logic, graph, automata and declarative programming is assumed, together with some experience in dealing with the first two.

Chief Examiner

Dr Yuan-Fang Li

Campus Lecturer

Clayton

Yuan-Fang Li

Tutors

Clayton

Kefeng Xuan

John Hurst

Academic Overview

Learning Outcomes

At the completion of this unit students will be able to -

- Articulate the role and importance of formal modelling and verification;
- Develop Event-B specifications;
- Apply Rodin to analyse an Event-B specification and verify proof obligations;
- Distinguish and evaluate the trade-offs in system modelling using Event-B and LTL;
- Develop basic LTL specifications and formulate LTL properties;
- Apply a model check to verify LTL properties.

Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Administrivia & introduction to basic mathematical background knowledge	Weekly assessed tutorials commence (10% of unit marks)
2	Introduction to B & Event-B	
3	Abstract machines in B	
4	Abstract machines through an example	
5	Event-B Semantics	
6	Proof obligations and discharge using Rodin	
7	Structuring specifications	Assignment 1 due Week 7, Friday
8	Introduction to automata	
9	Introduction to model checking (1)	
10	Introduction to model checking (2)	
11	LTL model checking (1)	Assignment 2 due Week 11, Friday
12	LTL model checking (2)	
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html

*Unit Schedule details will be maintained and communicated to you via your learning system.

Assessment Summary

Examination (2 hours): 50%; In-semester assessment: 50%

Assessment Task	Value	Due Date
Assignment 1 - Event-B Specification and Proof Discharge	20% (Parts 1 and 2 = 10% each)	Week 7, Friday
Assignment 2 - Model Checking	20%	Week 11, Friday
Tutorial Exercises	10%	Weekly
Examination 1	50%	To be advised

Unit Schedule

Teaching Approach

Lecture and tutorials or problem classes

This teaching and learning approach provides facilitated learning, practical exploration and peer learning.

Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles

(<http://www.infotech.monash.edu.au/resources/staff/edgov/policies/assessment-examinations/unit-assessment-hu>)

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at

<http://lib.monash.edu/tutorials/citing/>

Assessment Tasks

Participation

• Assessment task 1

Title:

Assignment 1 - Event-B Specification and Proof Discharge

Description:

A proof-discharged Event-B specification of a problem (exact problem to be advised).

This assignment is administered in two parts. Part 1 is about defining the various parameters of the specification (in fact, a requirements analysis), and Part 2 is about coding the Event-B specification in Rodin and LaTeX. The two parts will be offered separately, so that feedback may be returned on Part 1, before students complete Part 2.

Assignment release date Week 3.

Weighting:

20% (Parts 1 and 2 = 10% each)

Criteria for assessment:

Correctness and completeness of specification.

Discharge of all proof obligations (mechanically or manually).

Declarative style of specification.

Due date:

Week 7, Friday

• Assessment task 2

Title:

Assignment 2 - Model Checking

Description:

A specification will be given, which is to be developed in a model in linear temporal logic.

A number of properties will also need to be expressed in LTL and verified by a model checker.

Assignment release date Week 7.

Weighting:

20%

Criteria for assessment:

Assessment Requirements

Correctness and completeness of specification and properties.

Declarative style of specification.

Due date:

Week 11, Friday

• **Assessment task 3**

Title:

Tutorial Exercises

Description:

Students will be given exercise questions during each tutorial and asked to provide solutions for them.

Weighting:

10%

Criteria for assessment:

Completion of exercises.

Quality or correctness of solutions to questions, demonstrating understanding of the learning materials.

Due date:

Weekly

Examinations

• **Examination 1**

Weighting:

50%

Length:

2 hours

Type (open/closed book):

Closed book

Electronic devices allowed in the exam:

None

Remarks:

Sample papers will be available on the unit website.

Learning resources

Monash Library Unit Reading List

<http://readinglists.lib.monash.edu/index.html>

Feedback to you

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

- Informal feedback on progress in labs/tutes
- Graded assignments without comments

Extensions and penalties

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.monash.edu.au/exams/special-consideration.html>

Returning assignments

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

Assignment submission

It is a University requirement (<http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-procedures.html>) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at <http://www.infotech.monash.edu.au/resources/student/forms/>. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz). Please note that it is your responsibility to retain copies of your assessments.

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the learning system for this unit, which you can access via links in the my.monash portal.

Required Resources

Please check with your lecturer before purchasing any Required Resources. Limited copies of prescribed texts are available for you to borrow in the library, and prescribed software is available in student labs.

The following software will be required in this unit. They can be downloaded for free from various sources and are available for all major operating systems.

- LaTeX, available in different packages for different operating systems. Links will be provided by the lecturer during the semester.
- Rodin, available from <http://www.event-b.org/>

Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:

www.policy.monash.edu.au/policy-bank/academic/education/index.html

Key educational policies include:

- Academic integrity;
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-policy.html>
- Assessment in Coursework Programs;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html>
- Special Consideration;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.html>
- Grading Scale;
<http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html>
- Discipline: Student Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html>
- Academic Calendar and Semesters; <http://www.monash.edu.au/students/dates/>
- Orientation and Transition; <http://intranet.monash.edu.au/infotech/resources/students/orientation/>
- Academic and Administrative Complaints and Grievances Policy;
<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy.html>
- Code of Practice for Teaching and Learning;
<http://www.policy.monash.edu.au/policy-bank/academic/education/conduct/suppdocs/code-of-practice-teaching-and-learning.html>

Graduate Attributes Policy

<http://www.policy.monash.edu/policy-bank/academic/education/management/monash-graduate-attributes-policy.html>

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at <http://www.monash.edu.au/students>. For Sunway see <http://www.monash.edu.my/Student-services>, and for South Africa see <http://www.monash.ac.za/current/>.

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research. Go to www.lib.monash.edu.au or the library tab in [my.monash](#) portal for more information. At Sunway, visit the Library and Learning Commons at <http://www.lib.monash.edu.my/>. At South Africa visit <http://www.lib.monash.ac.za/>.

Disability Liaison Unit

Students who have a disability or medical condition are welcome to contact the Disability Liaison Unit to discuss academic support services. Disability Liaison Officers (DLOs) visit all Victorian campuses on a regular basis.

Website: <http://www.monash.edu/equity-diversity/disability/index.html> Telephone: 03 9905 5704 to book an appointment with a DLO; or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway Email: dlu@monash.edu Drop In: Equity and Diversity Centre, Level 1, Building 55, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through the Student Evaluation of Teaching and Units (SETU) survey. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, see:

www.monash.edu.au/about/monash-directions and on student evaluations, see:
www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this Unit

Previous feedback has informed improvements to this unit, including an inclusion of 3 additional hands-on labs for practice with Rodin and proof discharge.

If you wish to view how previous students rated this unit, please go to <https://emuapps.monash.edu.au/unitevaluations/index.jsp>