School of
Engineering and Computer Science
Te Kura Mātai Pūkaha, Pūrorohiko

# Prescription

This course addresses the use of mathematical logic in the specification and construction for software systems. It presents an introduction to the area of formal methods; the formal specification of software systems; the refinement of specifications to code; and their semantic foundations.

# Course learning objectives

Students who pass this course should be able to:

1. Apply design by Contract to build high integrity code (BE graduate attributes 3(a), 3(c)).
2. Review and enhance requirements and be able to trace requirements throughout the design process (BE graduate attributes 3(f), 3(d)).
3. Understand relation between testing and verification and manage their relative costs and benefits (BE graduate attributes 3(a), 3(d), 3(f)).
4. Write SPARK Ada programs and either prove properties or test the code to A high degree of code coverage.
5. Understand the Object Oriented Model used by Ada.

# Course content

You will be expected to write programs and specifications all with in the Ada language. The course will be mainly practical but you will need to understand some of the theoretical background in order to guide your design of both the software and specification.  Ada is currently used in industry when the cost of errors is high as is the case with embedded systems. The need to "get it rite" has been acknowledged as a growing problem as the internet of things develops.

# Required Academic Background

You must be a competent programmer and confident in your ability to pick up a new language. Detailed mathematics is not required but you need the ability to think rigorously about abstract ideas including specifications . You must be able to express your understanding of the programs requirements in First Order Logic and you need a good grasp of the the relation between specification and code.

# Withdrawal from Course

Withdrawal dates and process:
https://www.victoria.ac.nz/students/study/course-additions-withdrawals

# Lecturers

## Lindsay Groves (Coordinator)

Lindsay.Groves@vuw.ac.nz 04 4635656

257 Cotton, Kelburn


# Teaching Format

There will be two lectures per week and two programming assignments will be set during the trimester.

# Student feedback

Student feedback on University courses may be found at:
www.cad.vuw.ac.nz/feedback/feedback_display.php

# Dates (trimester, teaching & break dates)

- Teaching: 05 March 2018 - 08 June 2018
- Break: 23 April 2018 - 27 April 2018
- Study period: 11 June 2018 - 14 June 2018
- Exam period: 15 June 2018 - 04 July 2018

# Class Times and Room Numbers

**05 March 2018 - 25 March 2018**

- **Friday** 14:10 - 15:00 – 204, New Kirk, Kelburn

**05 March 2018 - 01 April 2018**

- **Monday** 14:10 - 15:00 – 204, New Kirk, Kelburn
- **Wednesday** 14:10 - 15:00 – 204, New Kirk, Kelburn

**02 April 2018 - 22 April 2018**

- **Friday** 14:10 - 15:00 – 204, New Kirk, Kelburn

**09 April 2018 - 22 April 2018**

- **Monday** 14:10 - 15:00 – 204, New Kirk, Kelburn
- **Wednesday** 14:10 - 15:00 – 204, New Kirk, Kelburn

**30 April 2018 - 10 June 2018**

- **Monday** 14:10 - 15:00 – 204, New Kirk, Kelburn
- **Wednesday** 14:10 - 15:00 – 204, New Kirk, Kelburn
- **Friday** 14:10 - 15:00 – 204, New Kirk, Kelburn

# Set Texts and Recommended Readings

## Required

There is no assigned textbook for SWEN 421, links to web pages and papers that should be read can be found on the lecture schedule.

# Mandatory Course Requirements

In addition to achieving an overall pass mark of at least 50%, students must:

- Achieve at least 50% overall in the two programming Assignments.

*If you believe that exceptional circumstances may prevent you from meeting the mandatory course requirements, contact the Course Coordinator for advice as soon as possible.*

# Assessment

In this course you will learn how to write SPARK Ada programs. This will require you adopt a quite different mindset from that used writing Java or C programs. The construction of the specification may take more code and more effort that coding the solution.
In order to achieve this you should complete all the exercises - even those that are not marked.

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|---|---|---|---|
| First Programming Exercise. | Week 4 | CLO: 1,2,3,4,5 | 20% |
| Final Programming Exercise | Week 7 | CLO: 1,2,3,4,5 | 30% |
| Final Examination | | CLO: 1,2,3,4,5 | 50% |

## Penalties

Work submitted late incurs a 5% penalty per day. Special considerations at the course coordinators discretion, or sickness backed up by a doctors note.

## Extensions

Students must hand in the assigned work on or before the time indicated on the lecture schedule. Late work will only be accepted for medical reasons with a note from your doctor.

## Submission & Return

All work is submitted through the ECS submission system, accessible through the course web pages. Marks and comments will be returned through the ECS marking system, also available through the course web pages.

## Marking Criteria

You will need to

1. demonstrate that your code runs as specified.
2. hand in a document stating what you have verified.

## Group Work

We encourage you to talk with each other about the course and the assignments, and to help each other when you are stuck. But work that you submit for your assignments should represent your own work.

# Workload

In order to maintain satisfactory progress in SWEN 421, you should plan to spend an average of at least *10* hours per week on this paper. A plausible and approximate breakdown for these hours would be:

- Lectures and tutorials: *3 hours*

- Readings: *2 hours*
- Assignments: *5 hours*

# Teaching Plan

See: https://ecs.victoria.ac.nz/Courses/SWEN421_2018T1/LectureSchedule

# Communication of Additional Information

All online material for this course can be accessed at https://ecs.victoria.ac.nz/Courses/SWEN421_2018T1/

# Links to General Course Information

- Academic Integrity and Plagiarism: https://www.victoria.ac.nz/students/study/exams/integrity-plagiarism
- Academic Progress: https://www.victoria.ac.nz/students/study/progress/academic-progess (including restrictions and non-engagement)
- Dates and deadlines: https://www.victoria.ac.nz/students/study/dates
- Grades: https://www.victoria.ac.nz/students/study/progress/grades
- Special passes: Refer to the Assessment Handbook, at https://www.victoria.ac.nz/documents/policy/staff-policy/assessment-handbook.pdf
- Statutes and policies, e.g. Student Conduct Statute: https://www.victoria.ac.nz/about/governance/strategy
- Student support: https://www.victoria.ac.nz/students/support
- Students with disabilities: https://www.victoria.ac.nz/st_services/disability/
- Student Charter: https://www.victoria.ac.nz/learning-teaching/learning-partnerships/student-charter
- Terms and Conditions: https://www.victoria.ac.nz/study/apply-enrol/terms-conditions/student-contract
- Turnitin: http://www.cad.vuw.ac.nz/wiki/index.php/Turnitin
- University structure: https://www.victoria.ac.nz/about/governance/structure
- VUWSA: http://www.vuwsa.org.nz

**Offering CRN: 18661**

**Points:** 15
**Prerequisites:** SWEN 324 (or 224); 30 300-level pts from (COMP, SWEN)
**Duration:** 05 March 2018 - 04 July 2018
**Starts:** Trimester 1
**Campus:** Kelburn