

# Formal Foundations of Programming - Course Outline

## SWEN 224: 2013 Trimester 2

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This document sets out the workload and assessment requirements for SWEN 224. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement in lectures, ECS email and/or on the course web site. A printed copy of this document is held in the School Office.

### Objectives

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This course introduces a selection of topics, focusing on the use of formal notations and formal models in the specification, design and analysis of programs, languages, and machines. Topics include program specification and verification, formal languages and automata theory, scanners and parsers.

The principal objective of the course is to teach students how to use mathematical techniques to describe and reason about various kinds of computational structures and processes. A student completing the course should be able to:

1. Use mathematical structures such as sets, functions, relations and sequences to model software systems, and to state desired properties of such systems, including pre and postconditions, class invariants and loop invariants. (3(a),3(c))
2. Use mathematical reasoning to prove properties of the various formalisms studied in the course, including correctness properties of programs. (3(a),3(b),3(c))
3. Use tools such as Alloy and Dafny to check correctness properties of software systems. (3(a),3(b),3(d),3(f))
4. Use formalisms such as regular expressions and context free grammars to describe the syntactic structure of artificial languages. (3(a),3(c))
5. Use state machine models such as finite acceptors and push down acceptors to construct recognisers for artificial languages. (3(a),3(c))
6. Understand the relationships between different classes of grammars and automata, and the limitations of these formalisms. (3(a),3(c))

SWEN 224 is part of the Engineering program at Victoria University of Wellington. BE students are expected to exhibit a number of graduate attributes upon graduation. These course objectives contribute to the graduate attributes as indicated above. A full table of these attributes is available at [Graduate Attributes](#).

### Textbook

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There is no text book for the course.

Copies of slides used in lectures will be handed out in lectures, and made available on-line on the course website.

Handouts covering the lecture material in more detail will be provided for some parts of the course.

Pointers to additional material, in the VUW library and on the Web, will be provided on the course web site.

### Lectures, Laboratories, and Practical work

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SWEN 224 is a second trimester course, with three lectures per week:

- Tuesday 3.10-4.00pm, Maclaurin 102
- Wednesday 3.10-4.00pm, Cotton 122
- Friday 3.10-4.00pm, Maclaurin 102

The trimester starts on %TRIMESTER\_START%. The examination period at the end of the course is 25 October - 16 November.

Some lecture times will be used as tutorials.

A tentative [schedule](#) of lecture topics, handouts, and assignment due dates is available online. This will be updated as the course progresses.

Students will attend one two-hour lab session per week. Students should sign-up to a lab session in the first week of the course, and attend that session throughout the course. The available labs times are:

- Monday 10-12, Co243
- Monday 3-5, Co243
- Wednesday 9-11, Co243

- Friday 9-11, Co242

## Assignments and Projects

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There will be between 8 and 10 assignments, with some assignments spanning one week and some spanning two weeks.

Assignments will cover a mixture of written work (addressing objectives 1 to 5) and some involving the use of software tools such as Alloy (addressing objective 6). Some assignments may involve a small amount of Java programming, but this will mainly be in association with the use of tools such as ESC/Java. Programming will not form a major part of the course, but a reasonable level of proficiency in writing Java programs will be assumed.

It is expected that students will do a substantial part of the work for their assignments during their scheduled lab sessions, and tutors will be available in the labs to provide assistance. To make best use of the lab sessions, it is essential that you prepare for the lab by reading the assignment, thinking about what is required and reviewing the relevant lecture material. You will probably need to complete part of the work and write it up after the lab session.

Written components of the assignments may be submitted in the SWEN 224 posting box in the Cotton Level 2 corridor. Other work should be submitted electronically via the course submission web page. Any documentation submitted electronically should be in plain text, ps or pdf format. Please do NOT submit documents in WORD (.doc) or any other proprietary format (any such documents will be ignored).

Assignments will be accepted up to noon on the day following the deadline, with a 10% penalty, but their marking may be delayed.

Assignments will only be accepted for marking later than this in exceptional circumstances and by prior arrangement. If you have difficulties in completing the assignments, it is your responsibility to contact the course organiser as early as possible to discuss alternative arrangements.

Marked assignments will normally be returned at labs. Marked assignments not collected at labs will be left in the School Office.

## Computing Facilities

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Students are expected to have an account on the School's Unix system, so that they can use the workstations in labs, and to read email sent to their ECS address.

Students may use computing facilities other than those provided. In particular, students with access to suitable computing facilities at home are welcome to use them for their assignments. Most of the software we use is freely available on the web, and other materials needed will be made available on the course web site.

Note, however, that any submitted programs or inputs for software tools are expected to work on the School's computers, and **any complications in porting them to the School's system are entirely the responsibility of the student.**

## Workload

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In order to maintain satisfactory progress in SWEN 224, you should plan to spend an average of at least 10 hours per week on this paper. A reasonable breakdown for these hours would be:

- Lectures: 3
- Readings: 3
- Assignments and Labs: 4

## School of Engineering and Computer Science

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The School office is located on level three of the Cotton Building ([Cotton 358](#)).

## Staff

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The course organiser and lecturer for the second half of SWEN 224 is *Lindsay Groves*. His contact details are:

- [Cotton 257](#)
- +64 4 463 5656
- [Lindsay.Groves@ecs.vuw.ac.nz](mailto:Lindsay.Groves@ecs.vuw.ac.nz)

The lecturer for the first half of the course is *David Streader*. His contact details are:

- [Cotton 260](#)
- +64 4 463 5655
- [David.Streader@ecs.vuw.ac.nz](mailto:David.Streader@ecs.vuw.ac.nz)

## Announcements and Communication

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The main means of communication outside of lectures will be the SWEN 224 web area at [http://ecs.victoria.ac.nz/Courses/SWEN224\\_2013T2/](http://ecs.victoria.ac.nz/Courses/SWEN224_2013T2/). There you will find, among other things, this document, assignment handouts, and the [SWEN 224 Forum](#). The forum is a web-based bulletin board system. Questions and comments can be posted to the forum, and staff will read these posts and frequently respond to them.

## Assessment

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Your grade for SWEN 224 will be determined based on the following assessment weightings:

Item	Weight
Assignments	30%
Mid-term test	10% or 0%
Final Examination	60% or 70%

The test will only count if it is to the student's advantage.

## Tests and Exams

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The test is tentatively scheduled for 3.00-4.00pm on Friday, 23th August. Please watch the course home page for confirmation of the test date, time and venue. If you cannot attend the test, please advise the course co-ordinator well in advance.

The [timetable for final examinations](#) will be available from the University web site and will be posted on a notice board outside the faculty office. The final examination will be three hours long. No computers, electronic calculators or similar device will be allowed in the final examination. Paper non-English to English dictionaries will be permitted. The examination period for trimester 2 is 25 October - 16 November.

## Mandatory Requirements

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The mandatory requirements for SWEN 224 are to achieve:

- at least 40% average in the assignments,
- at least 40% in the final exam,

## Passing SWEN 224

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To pass SWEN 224, a student must satisfy mandatory requirements and gain at least a **C** grade overall.

## Withdrawal

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The last date for withdrawal from SWEN 224 with entitlement to a refund of tuition fees is Friday 26 July 2013. The last date for withdrawal without being regarded as having failed the course is Friday 27 September 2013 -- though later withdrawals may be approved by the Dean in special circumstances.

## Plagiarism

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### Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students, to help and seek help with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The [School policy on Plagiarism](#) (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

## Rules & Policies

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Find key dates, explanations of grades and other useful information at <http://www.victoria.ac.nz/home/study>.

Find out about academic progress and restricted enrolment at <http://www.victoria.ac.nz/home/study/academic-progress>.

The University's statutes and policies are available at <http://www.victoria.ac.nz/home/about/policy>, except qualification statutes, which are available via the Calendar webpage at <http://www.victoria.ac.nz/home/study/calendar> (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at <http://www.victoria.ac.nz/home/about/avcacademic>

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

[Grievances](#)

[Student and Staff Conduct](#)

[Meeting the Needs of Students with Disabilities](#)

[Student Support](#)

[Academic Integrity and Plagiarism](#)

[Dates and Deadlines including Withdrawal dates](#)

[School Laboratory Hours and Rules](#)

[Printing Allocations](#)

[Expectations of Students in ECS courses](#)

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.

[Course Outline as PDF](#)

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