

CS932-15 Formal Systems Development

23/24

Department

Computer Science

Level

Taught Postgraduate Level

Module leader

Jane Sinclair

Credit value

15

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This module uses formal techniques to explore the specification, design and implementation of computer systems. It will cover more advanced features of specification and introduce data and functional refinement, considering how a system design may be modified in a variety of practical ways. Refining the specification to code is an important step in the software life-cycle. This module presents both the theoretical basis for this and practical means of refinement from system specification to program code.

Module aims

To study methods for designing, analysing and programming complex computing systems.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Revision of sets, relations, functions and sequences.

Revision of basic specification skills.

Introduction to development tool:

- Basic syntax;
- Introduction to the AMN approach;
- Examples and use of tool;
Case studies;
Data refinement:
- Refinement;
- Relations and nondeterminism;
- Simulations.
Functional Refinement;
Review of refinement concepts using the Guarded Command Language;
Implementation through refinement;
Throughout the course there will be an emphasis on tool support;
We would also hope to include a speaker/s from industry in the course teaching (perhaps for the case studies).

Learning outcomes

By the end of the module, students should be able to:

- Write formal specifications in one or more chosen notations.
- Understand the principles of formal verification and weakest precondition and the rules for specification consistency.
- Work with online tools to develop specifications; to generate and prove obligations for machines consistency and correctness of refinements; to refine specifications and develop code.
- Understand the principles of refinement and the formal rules that apply. Be able to find loop variants and invariants and to verify loops.

Indicative reading list

Please see Talis Aspire link for most up to date list.

[View reading list on Talis Aspire](#)

Subject specific skills

- Logical reasoning;
- Problem solving;
- Task analysis and decomposition;

Transferable skills

- Problem solving;
- Team work;

- Communication;
- Logical reasoning;
- Time management;
- Self-directed learning;

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Supervised practical classes	10 sessions of 2 hours (13%)
Private study	110 hours (73%)
Total	150 hours

Private study description

Background reading;
 Completion of exercise sheets;
 Revision;

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group D

	Weighting	Study time	Eligible for self-certification
Practical assignment 1 Assignment 1: practical coursework task	20%		Yes (extension)
Practical assignment 2 Assignment 2: practical coursework task	20%		Yes (extension)
In-person Examination	60%		No

	Weighting	Study time	Eligible for self-certification
CS932 2 hour exam			

- Answerbook Pink (12 page)

Assessment group R

	Weighting	Study time	Eligible for self-certification
In-person Examination - Resit	100%		No
CS932 Examination resit			

- Answerbook Pink (12 page)
- Students may use a calculator

Feedback on assessment

Individual written feedback on each assignment.

[Past exam papers for CS932](#)

Availability

Courses

This module is Optional for:

- Year 1 of TCSA-G5PD Postgraduate Taught Computer Science