G53FSP
Formal Specification

Dr. Rong Qu
Course Introduction

http://www.cs.nott.ac.uk/~rxq/g53fsp
Formal Specification Definition

- Covers a range of topics
  - Mathematical specification of programming language
  - Application of formal methods in the management of large software projects

- Use of formal mathematical techniques in program development is becoming more important as systems become more complex and crucial
Course Aims

- English “requirements specification” of a computer systems an exact formal specification required in program

- Understand the principles of Formal Specification techniques via mathematical methods

- Be able to read and write specifications in Z
Course Aims

- Z language
  - Developed at Oxford
  - Widely accepted
  - Other methods also available
Course Context

G51MCS
Mathematics for Computer Scientists

G51MC2
Mathematics for Computer Science 2

G53FSP
Formal Specification
Pre-requisites

- Rely heavily on
  - Set theory
  - First order predicate logic

- First part of this module
  - Set theory
  - Relations and functions
  - Sequences, etc
Who Can Attend?

- Third-year
  - Single Honors
  - Joint Honors Computer Science

- Other students from outside the School
  - who fulfilled the pre-requisites for admissions to the module
Course Introduction

- Lectures
  - Handouts/notes, summary of each lecture
  - Speak properly (louder, clearer, faster, slower)
  - Feedback on coursework
  - Course content not too much / too little
Course Introduction

- Lectures
  - 2 slots per week
    - Lectures, tutorial, coursework feedback, etc
  - About 16 hours

- Lecture Times and Locations
  - Tue 13:00 (C3 Exchange Building)
  - Thur 15:00 (C1 Exchange Building)
Text Book


~9 in GGL, UoN
Useful Reading

  - Well written easy to understand
Useful Reading

  - Comprehensive tutorial intro
  - Practical exercises
  - Code
Course Assessment

- 100% on coursework
- 3 pieces of coursework
  - 15%: 2 exercises (Burke & Foxley book)
  - 35%: 4 exercises (Burke & Foxley book)
  - 50%: 1 handout

- Non-assessed exercise (latex, 2 exercises)
- Need to be formatted electronically using a proper Z pre-processor
  - Roff, latex
Coursework Schedule

- Coursework
  - Is already available
  - Closing dates 15:30pm on the day
  - Hand in to school’s support office
  - No further extensions
Course Outline

- Lecture 1 & 2 – introduction
  - Background knowledge
  - FSP introduction
    - specifications, formal methods advantages and disadvantages

- Lecture 3-5 – mathematical background
  - Propositional calculus, predicate calculus, set theory, bags, relations, functions, sequences, recursion and induction
Course Outline

- Lecture 6-16 – the Z specification language
  - Schemas: information schemas, state schema, observation or query schema, axiom schema
  - Algebra: operations on Z schema
  - Large system case study
  - Coursework and exercises walkthrough
Course Information

- Course web page
  - http://www.cs.nott.ac.uk/~rxq/g53fsp
- All lecture notes online
- All coursework
- Course schedule – please check updates during the course
- Supplementary materials
Summary

- Aims of the course
- Textbooks
- Lectures, course outline
- Assessment, coursework schedule
- Course web page