

120_1

CO120.1-Programming I

Course Aims

Academic aims

This is the students' first programming course. It aims to introduce some of the fundamentals of programming for beginners using a strongly-typed functional programming language (Haskell) that most students will have little or no experience of. The emphasis is on writing succinct, beautiful code, without being bogged down in the syntax and semantics of a conventional procedural or object-oriented language. The course is taught using a problem-solving approach with students being encouraged to use the various language features to solve well-specified problems independently and explore some fundamental algorithms and data structures in computer science.

Learning Outcomes

Students will be able to:

- * Use static types as a partial specification of what a function is intended to do.
- * Use type error messages as an aid to debugging.
- * Devise recursive solutions to problems that involve iteration.
- * Reason about the complexity of basic recursive functions and functions defined over linear and tree-like data structures.
- * Design and use test suites for functional testing.
- * Use the knowledge and experience gained to develop succinct and efficient solutions to unseen, but well-specified, problems of small to medium scale.

Course syllabus

Syllabus

Expressions, basic types, product types, arithmetic sequences, list comprehensions, function types and user-defined function definitions, recursion, polymorphism, list processing, enumerated types, higher-order functions, algebraic data types, type classes and overloading.

Pre-requisites

None, other than basic pre-university mathematics.

Teaching methods

Weekly lectures, catch-up tutorials, small-group tutorials, timetabled laboratory sessions, supervised catch-up laboratory sessions.

There is also a series of optional lectures on Advanced Programming in Haskell.

Assessments

There is an unassessed practice test (formative assessment only), a 'driving test' (20%) and a final 'main test' (80%), all of which are taken in the laboratory under exam conditions using the Lexis test administration system.

Students can also undertake independent self assessment through unassessed exercises, for which model answers are made available.

Reading list

S. Thompson, "Haskell: The Craft of Functional Programming" (Third Edition), Addison Wesley, 2011.

P. Hudak, "The Haskell School of Expression", Cambridge University Press, 2000.

R. Bird, "Introduction to Functional Programming using Haskell", Prentice Hall, 1988.

S. S. Skiena and M. A. Revilla, "Programming Challenges -- the Programming Contest Training Manual", Springer, 2003.

B. O'Sullivan, J. and D. B. Stewart, "Real World Haskell", O'Reilly Media, 2008.

The Haskell Wiki: <http://haskell.org/>

Course leaders

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Campuses & maps >

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