# COURSE DETAIL

| INTRODUCTION TO QUANTUM PROGRAMMING AND SEMANTICS |
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| **Country**<br>United Kingdom - Scotland |
| **Host Institution**<br>University of Edinburgh |
| **Program(s)**<br>University of Edinburgh |
| **UCEAP Course Level**<br>Upper Division |
| **UCEAP Subject Area(s)**<br>Computer Science |
| **UCEAP Course Number**<br>150 |
| **UCEAP Course Suffix** |
| **UCEAP Official Title**<br>INTRODUCTION TO QUANTUM PROGRAMMING AND SEMANTICS |
| **UCEAP Transcript Title**<br>QUANTM PROG&SEMNTCS |
| **UCEAP Quarter Units**<br>4.00 |
| **UCEAP Semester Units**<br>2.70 |

**Course Description**

There are several languages for programming quantum protocols. Each has its own strengths and weaknesses. This course surveys current platforms (OpenQAsm, Qiskit, Q#, Quipper, Quantomatic, and PyZX) and analyzes their respective features semantically. The theoretical analysis uses category theory, a powerful mathematical tool in logic and informatics, that has influenced the design of many modern programming languages. It enables a powerful graphical calculus that lets you draw pictures instead of writing algebraic expressions. This technique is visually extremely insightful, yet completely rigorous. For example, correctness of protocols often comes down to whether a picture is connected or disconnected, whether there is information flow from one end to another. In a practical way, this course investigates the conceptual reasons why quantum protocols and quantum computing work, rather than their algorithmic and complexity-theoretic aspects.

**Language(s) of Instruction**
English

**Host Institution Course Number**
INFR11243

**Host Institution Course Title**
INTRODUCTION TO QUANTUM PROGRAMMING AND SEMANTICS

**Host Institution Course Details**
https://www.drps.ed.ac.uk/25-26/dpt/cxinfr11243.htm

**Host Institution Campus**

**Host Institution Faculty**
School of Informatics

**Host Institution Degree**

**Host Institution Department**

**Course Last Reviewed**
2025-2026

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