Quantum Information & Computation

Two six-week courses from NQCC and University of Bristol. Learn, and be able to use, the key concepts and tools in the field, to enable you to enagage with, and start to contribute to, state-of-the-art developments.

Quantum Information

A self-contained professional-level introduction to quantum information theory, accessible to anyone with a background in mathematics, physics, computer science or engineering.

By the end of this course, you will be able to understand the concepts and mathematical techniques needed for quantum mechanics and information theory. You will also learn about quantum teleportation, superdense coding, quantum key distribution and quantum non-locality.

Quantum Computation

This course builds upon Quantum Information Theory to describe the concepts underpinning quantum computation.

By the end of this course you will understand the key algorithms and their applications, such as Shor's and Grover's algorithms and quantum simulation. You will also learn about quantum Fourier transform and phase estimation, quantum error correction and noise and quantum channels.

Courses delivered by world-leading experts Professor Noah Linden and Dr Paul Skrzypczyk

Course dates: TBC

Content: 18 hours recorded material and supporting notes

Time commitment: Weekly 1 hour live interactive class and 1 hour live follow up session. One assignment to be completed per week. Total time commitment of of 50-60 hours.

Duration: Six weeks

Above information is per course

One course
£5,000 + VAT

Two courses
£8,000 + VAT*

*If booked at the same time

Quantum Information

delivered by Dr Paul Skrzypczyk & Prof Noah Linden

- Mathematical tools for quantum mechanics (inc. Dirac notation)
- The rules of quantum mechanics
- Multi-party quantum systems
- Key quantum information primitives: no-cloning, super-dense coding, teleportation
- Introduction to quantum computing: Deutsch's and the Deutsch-Jozsa algorithm
- Quantum cryptography
- Density operators and reduced density operators
- The Bloch sphere
- Bell's theorem and quantum nonlocality

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Two courses
£8,000 + VAT*

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Quantum Computation

delivered by Prof Noah Linden

- Classical and quantum computational complexity
- Grover's algorithm and its generalisations
- The quantum Fourier transform and periodicity
- Integer factorisation
- Phase estimation
- Hamiltonian simulation
- Noise and the framework of quantum channels
- Quantum error-correction

University of BRISTOL

UKRI National Quantum Computing Centre