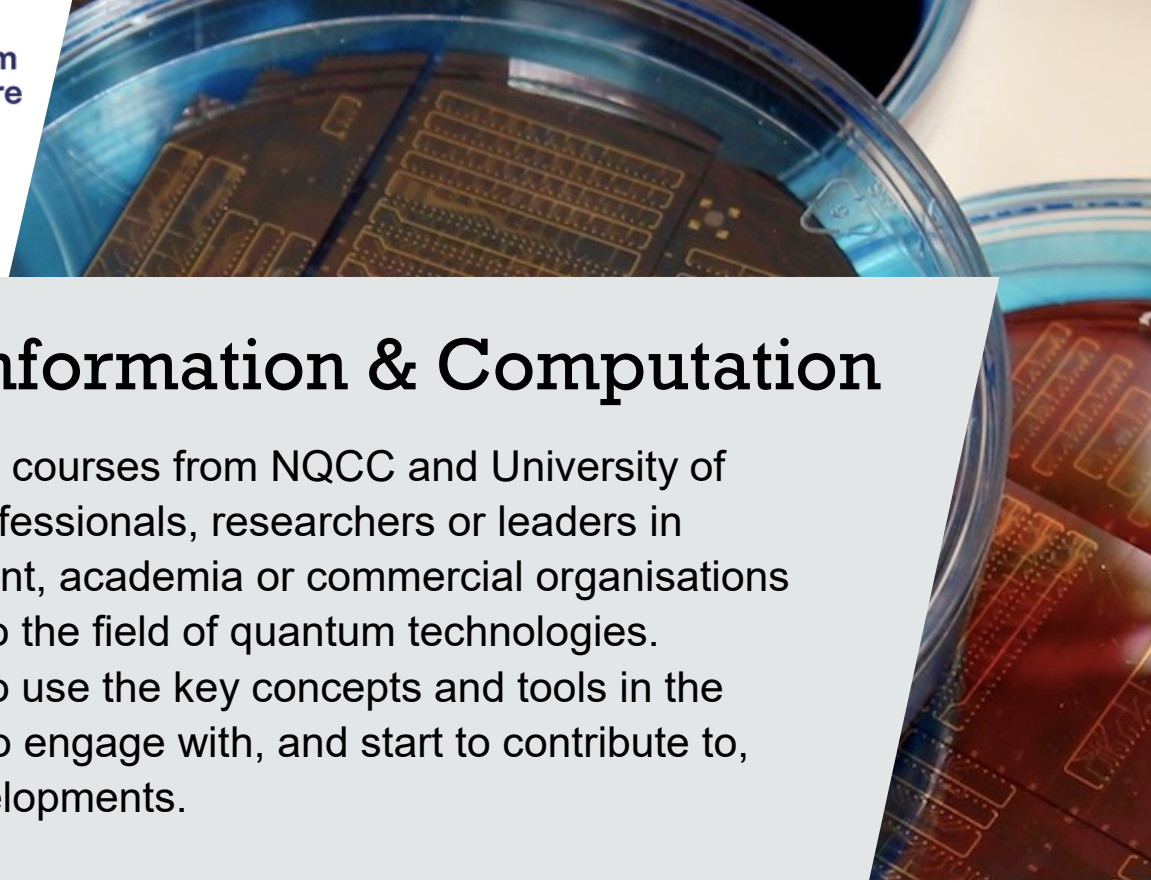




National Quantum
Computing Centre



University of
BRISTOL



Quantum Information & Computation

Two six-week online courses from NQCC and University of Bristol, aimed at professionals, researchers or leaders in business, government, academia or commercial organisations wanting to move into the field of quantum technologies.

Learn and be able to use the key concepts and tools in the field to enable you to engage 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 understand the concepts and mathematical techniques needed for quantum information. You will also learn about quantum teleportation, superdense coding, quantum key distribution and quantum non-locality.

Quantum Computation

This course builds upon Quantum Information 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 the quantum Fourier transform and phase estimation, quantum error correction and noise and quantum channels.

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

Per course

Duration: Six weeks (with two one-week breaks)

Content: 18 hours recorded material and supporting notes

Time commitment: Two weekly one-hour live interactive sessions.
One assignment per week. Total time commitment of 50-60 hours

Quantum Information course dates: 24th April — 23rd June 2023

(with one-week breaks w/c 8th & 29th May)

Quantum Computation course dates: Autumn 2023

Contact us: quantum-courses@bristol.ac.uk

Register interest: bris.ac.uk/maths/nqcc-bristol-course

One course

£3,000

Two courses

£5,000

**15 bursaries available
per course**

£2000/course for employees

at UK SMEs and UK ECRs
(reducing cost to £1000)

£2500/course for UK PhD stu-
dents (reducing cost to £500)

Quantum Information

Delivered by Prof Noah Linden &
Dr Paul Skrzypczyk

- 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

One course £3,000

Two courses £5,000

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£2000/course for employees at UK SMEs
and UK ECRs (reducing cost to £1000)

£2500/course for UK PhD students
(reducing cost to £500)

bris.ac.uk/math/nqcc-bristol-course

Quantum Computation

Delivered by Prof Noah Linden
& Dr Paul Skrzypczyk

- 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



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