NQCC-Bristol Quantum courses

Learn quantum information and quantum computation with two intensive mathematical six-week online quantum courses taught by leading experts at the University of Bristol, delivered in collaboration with the NQCC.

Introduction to Quantum Information Science & Technologies

An in-depth introduction to quantum information, accessible to anyone with a background in mathematics, physics, computer science or engineering, and a basic knowledge of linear algebra.

By the end of the course, you will be able to use the key mathematical techniques that are needed in quantum information science and technologies research, and understand some of the most exciting applications.

Quantum Computation

A more specialised course that builds upon the content explored in the *Introduction to Quantum Science & Technologies* course. This course is ideal for technical professionals and researchers looking to further develop their knowledge of quantum computing.

By the end of this course, you will gain an understanding of key quantum algorithms, quantum Fourier transform, and quantum error correction, giving you the knowledge and skills to start conducting independent research in quantum information science.

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

Per course

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

Teaching: Recorded lecture videos, course notes and assignments. You will receive personalised feedback on your work.

Time commitment: Two weekly live group classes. One assignment per week. Total time commitment **8 to 10 hours/week**

Quantum Computation course dates: **14th Oct — 10th Dec 2024**

(*with one-week breaks w/c 28th Oct & 18hh Nov*)

Introduction to Quantum Information Science and Technologies course dates: TBA Spring 2025

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 students (reducing cost to £500)

Introduction to Quantum Information Science & Technologies

- 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

- Introduction to quantum cryptography

- Density operators and reduced density operators

- Introduction to quantum sensing

- Introduction to the quantum internet

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Quantum Computation

- 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

- Introduction to quantum error-correction
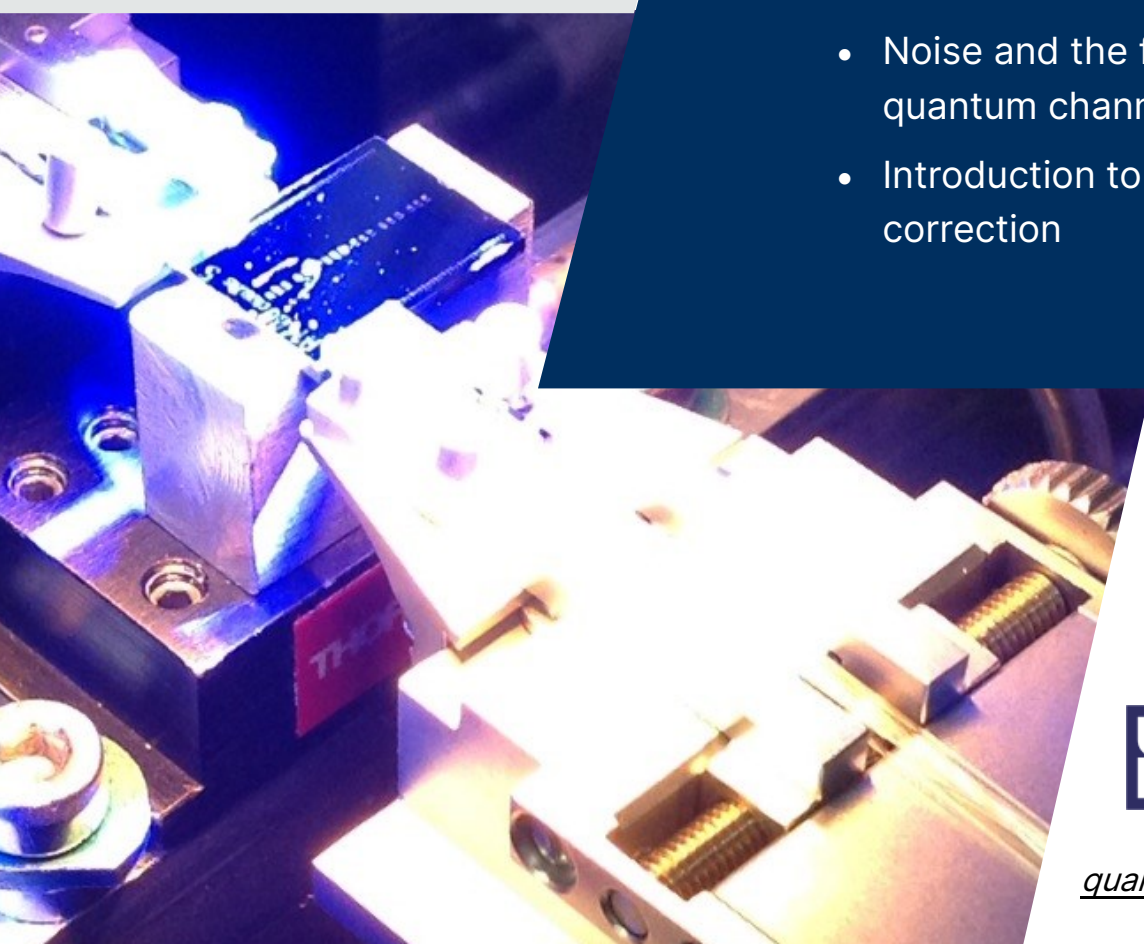
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UKRI National Quantum Computing Centre

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