



Introduction to Quantum Computing

Quantum computing is one of those technologies that promises to change companies and entire industries. Quantum computers exploit the modern physics theory of quantum mechanics, which allows them to go beyond binary computation and gives them unprecedented computation power for specific types of problems. This creates challenges, for example by rendering current encryption systems obsolete. Quantum computing also creates opportunities, by the promise of solving extremely complex problems that were hitherto unsolvable. This orientation masterclass helps organisations to prepare for this new technology and its implications for their business, strategy and technology.

The core promise of quantum computing is a fundamentally new set of computation methods, drastically expanding what computers can do. This is likely going to be a game changer in optimisation problems, such as in logistics and operations research, and it may trigger a next revolution in AI and machine learning. It also makes it worryingly easy to crack current security systems and forces us to revise encryption strategies.

During this 2-half day masterclass, you will learn from the Netherlands' most prominent scientists, leaders and entrepreneurs, who will share their knowledge of quantum technology. The masterclass focuses on the strategic, business and IT implications of the new technology instead of the mathematics and physics. A fun and inspiring lab visit brings quantum computing to life, in one of the long-term hotspots for quantum computing science development.

Facts and figures

2023 edition	28 & 29 November
Time	14.00 - 18.00
Language	English
Fee	€995 (VAT free), UvA alumni will receive 10% discount
Location	Day and Night Studio at Startup Village, Science Park 608, 1098 XH Amsterdam

For whom?

This masterclass is designed for managers and professionals working for businesses or government, and who need to understand how quantum computing will change their field or organisation. This includes:

- Regulators, including IT auditors, GDPR advisers, data security auditors, supervisors of financial markets, supervisors of data security in healthcare
- AI experts, machine-learning engineers, data scientists, computer scientists
- Data and cyber security experts
- Technology scouts, technology evangelists, digital futurologists, digital entrepreneurs
- Executives, strategic managers

Sectors for which the masterclass will be of special interest include finance, fintech, healthcare, IT, government, supervisory authorities, insurances, high-tech, energy, logistics and operations research.

No prior knowledge of quantum technology is required, nor any in-depth knowledge of mathematics or physics.

What will you learn?

The goals of the masterclass include:

- Demystification: get a realistic understanding of how quantum computing could change the playing field, and the challenges that may pose for existing technologies.
- Inspiration: discover new opportunities that quantum computing brings, and identify promising use cases in your industry.
- Start planning: estimate timelines for when quantum technology will be commercially relevant, and discuss concrete steps that your organisation can take.
- Start preparing: learn how to identify and address threats for encryption and security systems, and find out where expertise and talent could be found.
- Experience the vibe of high-tech innovation in the Amsterdam Startup Village and see a quantum computer in action in our lab.

The masterclass is also an excellent networking opportunity with leading quantum experts and like-minded participants who seek to make the most out of innovative technologies.

Course outline

The masterclass takes place over 2 days: the first focuses on an introduction of quantum technology and its applications, the second on concrete strategic steps that organisations can and should take. The masterclass consists of 8 talks by experts from varying organisations and subfields. You will also take part in a lab tour where you can take a close look at the University of Amsterdam's prototype quantum computer, which is based on ultracold atom qubits. At the end of each day, several speakers will take part in a panel discussion to elaborate on cutting edge topics. There will be ample opportunity for in-depth questions and discussion.

Structure and topics of the course

Day 1: Introduction to Quantum Technology

- Introduction to quantum mechanics and quantum technology by **Koen Groenland** (Quantum Innovation Officer at QuSoft), with a tour through the Quantum Experience.
- The applications of quantum computers by **Harry Buhman** (professor of Algorithms, Complexity Theory, and Quantum Computing at the University of Amsterdam, group leader of the Quantum Computing Group at Centrum Wiskunde & Informatica (CWI), and executive director of QuSoft).

- Applications in logistical optimisation by **Frank Phillipson** (professor of Computational Operations Research and senior consultant at TNO).
- Impact on cybersecurity by **Martijn Dekker** (Chief Information Security Officer at ABN AMRO).
- Panel discussion with speakers.

Day 2: What actions should we take?

- Building a quantum computer using cold atoms, with a tour at UvA's Quantum Lab by **Alex Urech** (researcher in experimental quantum computing at the UvA's Strontium Quantum Gas Group).
- Applications in material science, and developments on Pasqal's cold atom quantum computer by **Mario Dagrada** (VP of Quantum Software at Pasqal).
- The impact of quantum on society by **Deborah Nas** (co-founder of the Centre for Quantum & Society and professor of Strategic Design for Technology-based Innovation at the TU Delft).
- What future steps can your organisation take? by the **Capgemini Quantum Lab**.

Certification

After completing the masterclass, you will receive an Certificate of Attendance of the University of Amsterdam.

How can I apply?

You can enroll in this masterclass via abs.uva.nl/quantum-computing

Collaboration

This masterclass is organised by The Analytics Academy and Quantum Amsterdam. The Analytics Academy is a collaboration between Amsterdam Data Science, ORTEC and the Amsterdam Business School of the University of Amsterdam. Quantum Amsterdam is the innovation hub that connects academia, business and society to foster a thriving ecosystem around quantum technology, with a strong focus on software and IT for end-users.

Contact

If you have questions about the masterclass, please contact Iris Kroese via executive-education@uva.nl or +31 (0)6 1893 8203.

University of Amsterdam

Amsterdam Business School

Plantage Muidergracht 12 | 1018 TV Amsterdam | The Netherlands

