HARNESS THE POWER OF QUANTUM TECHNOLOGY

QUANTUM TECHNOLOGY APPLICATIONS AND MANAGEMENT MSc 100% ONLINE

UNIVERSITY OF SUSSEX

CONTENTS

ABOUT THE COURSE

If you want to dive deeper into the science underpinning quantum physics and explore the commercialisation of new quantum technologies, our online Quantum Technology Applications and Management Masters (MSc) will give you the skills and confidence to harness the power of quantum technology and drive innovation in your organisation.

At the University of Sussex, we are proud to be the first institution in the UK to offer an online degree in quantum technologies. Our cutting-edge MSc combines scientific theory with practical business skills, drawing on expertise from world-leading academics at the School of Mathematical and Physical Sciences as well as teachings from the University of Sussex Business School.

The MSc consists of an innovative curriculum that is application-focused and relevant to the real world, ensuring that you graduate ready to shape the future of quantum technologies. Our Quantum Technology Applications and Management MSc is delivered 100% online, giving you the flexibility you need to balance your studies with your career. By studying online, you'll have the opportunity to connect with a global network of like-minded professionals who understand the endless possibilities of quantum technology.

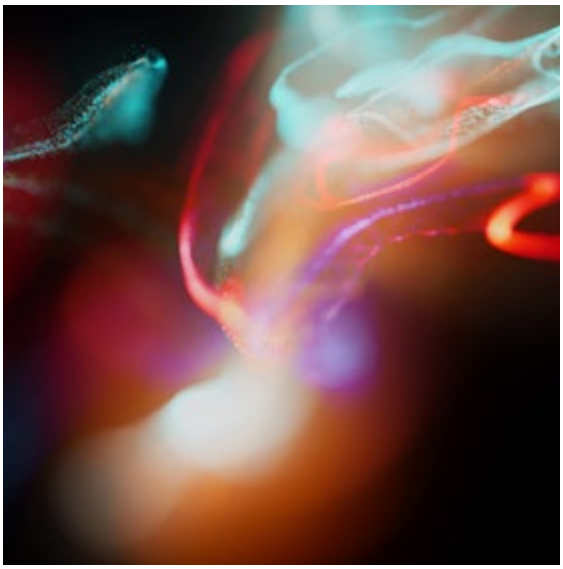
This course will equip you with a combination of theoretical, practical, and technical skills, including:

- how to use Python programming language, microcontroller deployment, and 3D Computer-Aided Design
- how quantum mechanics can be employed to drive practical solutions to real-world problems, such as creating quantum networks by implementing cryptography to establish secure communication
- an understanding of key quantum principles, such as atomic and photonic systems, which leading employers will need quantum professionals to know
- how to commercialise new quantum technologies, identify new opportunities through an assessment of market viability, and analyse the economic, security, and public policy implications of launching new technologies into the marketplace.

THE SCHOOLS

THE SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES

The School of Mathematical and Physical Sciences at the University of Sussex is ranked in the top 20 for student satisfaction in Physics and Astronomy in the UK (Complete University Guide, 2023), so you'll be part of a top-tier school that will boost your employability. You'll learn from academics at the forefront of advances in quantum technology, and you'll graduate with the insight you need to navigate current challenges and innovations in the field. The School is committed to producing high-quality research, and the University is ranked joint 7th in the UK for the quality of our Physics research environment (Times Higher Education rankings of REF 2021 results).



THE UNIVERSITY OF SUSSEX BUSINESS SCHOOL

Our Quantum Technology Applications and Management MSc incorporates business-focused elements designed to teach you how to commercialise quantum technology. You'll also benefit from teaching from the University of Sussex Business School, ranked in the top 15 in the UK for Business and Economics (Times Higher Education World University Ranking, 2023). The Business School produces high-quality research, with more than 85% of our Business and Management Studies research rated as either 'world-leading' or 'internationally excellent', and 97% of our Economics and Econometrics research rated as either 'world-leading' or 'internationally excellent' (Research Excellence Framework, 2021).

MEET OUR GLOBALLY-RENOWNED ACADEMICS

You'll learn from world-leading academics who are actively shaping the future of quantum technology.

DR FEDJA ORUCEVIC,

COURSE DIRECTOR, SENIOR LECTURER IN PHYSICS, SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES

Fedja obtained his PhD in the Laboratoire Kastler Brossel at Ecole Normale Supérieure in Paris in the field of Cavity QED. He worked at the Massachusetts Institute of Technology and the Universities of Sussex and Nottingham before joining the University of Sussex in 2017.

Fedja's research interests encompass both fundamental and applied quantum physics. He is involved in various research projects in ultracold atoms, including the fundamental studies of low-dimensional quantum gases. On the more applied side, he is working on the design and optimisation of low-powered cold atoms sources and the development of quantum sensors. As an investigator in the UK National Quantum Hub for Sensing and Timing, he works on the development of quantum magnetometers for use in navigation, healthcare and electric vehicle battery characterisation and diagnostics – much of this work is done in collaboration with industrial partners.

PROFESSOR PETER KRÜGER,

RESEARCH PROFESSOR OF EXPERIMENTAL PHYSICS, SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES

Peter obtained his PhD from Heidelberg University and joined Sussex in 2016. Peter leads the Quantum Systems and Devices group, is the founding director of the Sussex Programme for Quantum Research, and is part of the UK National Quantum Technologies Programme's leadership team.

Please visit our website to see a full list of the team teaching this course.

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MEET OUR GLOBALLY-RENOWNED ACADEMICS

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PROFESSOR PAUL NIGHTINGALE,

PROFESSOR OF STRATEGY (SCIENCE POLICY RESEARCH UNIT) AND ASSOCIATE DEAN OF RESEARCH UNIVERSITY OF SUSSEX BUSINESS SCHOOL

Paul was originally trained as a chemist and worked in industry as a chemist doing analytical environmental toxicology work, in the R&D labs of a major blue-chip firm. His PhD was on the changing technology of technical change and looked at the use of computer simulations in the pharmaceutical, aerospace, chemical, and chemical engineering industries. It also involved a pilot study of the LEP detector at CERN.

After his PhD he worked for 10 years in the Complex Product Systems Innovation Centre where he did a lot of work on bioinformatics systems and risk management technology in investment banks. He has done a substantial amount of policy work on innovation policy in the UK and led NESTA's Innovation Gap research project.

His main areas of work now relate to finance and financial innovation, and its impact on the economy. This involves work on the funding of small firms, especially innovative small firms. Paul also works on project delivery, trying to understand what drives success in major transformational projects and major R&D projects.

Finally, he also works on science and technology policy, including undertaking evaluations. This work involves looking at mismatches between the science system and the changing needs of a modern service economy, such as the UK.

DR ALICE KING,

LECTURER IN APPLIED MATERIALS AND INTERFACES, SCHOOL OF MATHEMATICAL AND PHYSICAL SCIENCES

Alice is a lecturer in materials physics with a focus on using nanomaterials in biological systems, leading the bio-nanotechnology group here at Sussex. She completed her PhD at Sydney University in Australia, during which she developed solar capture systems from plant chlorophyll and carbon nanotubes. The primary drive of her work now is in developing tissue scaffolds and thin film technologies that have nanoscale functionality for improved diagnostics and therapy in cellular disease.

Please visit our website to see a full list of the team teaching this course.

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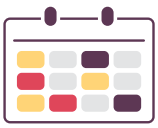
THE BENEFITS OF ONLINE LEARNING



FLEXIBLE LEARNING

We have four entry points in 2023, allowing you to start your course at a time that suits you. If you need to take a break from your studies at any time, our MSc gives you the flexibility to do so*.

*Maximum study break applies – the course must be completed within four years from enrolment.

STUDY FROM ANYWHERE

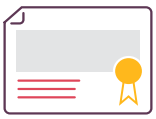
Taught 100% online, you'll benefit from our expert teaching, informed by our world-leading research. Discover the world of quantum from the comfort of your home.

SPREAD THE COST

You can choose to either pay your fees in one instalment at the start of your course or pay for each module as you study to spread the cost out across the course.

NO NEED TO TAKE A CAREER BREAK

Learning online with us is the perfect way to develop your skills, knowledge, and employability without taking time away from your career.



GAIN THE SAME QUALIFICATION AS ON-CAMPUS

You'll be taught by world-leading academics, researchers, and practitioners from the School of Mathematical and Physical Sciences, with teaching from the University of Sussex Business School. You'll learn alongside a global class of students who understand the power of quantum technology.

24-HOUR ACCESS TO LEARNING MATERIALS

Our Virtual Learning Environment (VLE) is a bespoke platform designed to deliver our practically-focused Masters to students around the world.

MODULE GUIDE

MODULES

The modules in this course will explore the theoretical principles of quantum physics and illustrate the commercial opportunities presented by new quantum technologies. Each module lasts seven weeks and is delivered via Canvas, a state-of-the-art online learning platform, which can be accessed by a computer, tablet, or smartphone.

In order to graduate from the MSc course, all modules must be successfully completed.

The course uses multiple assessment methods to assess students' knowledge, competence development, and engagement through individual and groupwork exercises, such as written reports, simulations, essays, project reports, MCQs, and portfolios. An indication for the likely assessment methods of each module is given, though this may be subject to change.

FOUNDATIONS OF QUANTUM MECHANICS

This module will familiarise you with the fundamental concepts and mathematical framework of modern quantum science, improving your quantum literacy. You'll receive an overarching introduction to quantum physics and the tools you need to understand the practical implementations of quantum technologies. The topics covered in this module will highlight the foundational phenomena at the forefront of the second quantum revolution on which the field of emerging quantum technologies is built.

After a quick review of mathematical notions that will be used throughout this module (e.g., Dirac notations, Hermitian and Pauli matrices, Bloch sphere etc.), we'll describe the postulates of quantum mechanics and discuss their interpretation. The module will then explore the topics at the heart of quantum mechanics that have direct implications in the field of quantum technologies, such as entanglement, Heisenberg uncertainty, harmonic oscillator, etc.

By the end of this module, you'll be able to:

- demonstrate a systematic understanding of basic concepts of quantum physics (e.g., wave functions, operators, uncertainty principles and expectation values)
- analyse composite quantum systems and entanglement
- understand and assess the principles on which quantum technologies operate
- master quantum mechanical principles and algebraic approaches and deploy them to assess real-world technologies, such as quantum sensing.

Module Lead: Dr Fedja Orucevic

Types of assessments may include:
Problem set (40%) - solutions to a problem set assessing quantitative skills and understanding of quantum mechanics postulates.
Portfolio (60%) - a collection of exercises solved throughout the module and an executive summary of a case study of your choice.

MODULE GUIDE

APPLICATIONS OF QUANTUM TECHNOLOGY

This module will give you an overview of the key emerging quantum technology applications, with a particular focus on the areas that are most ready to make the transition from a laboratory setting to real-world industrial settings. You'll explore and discuss imaging, sensing, timing, communication, and computing in various contexts, such as biomedical diagnostics, secure information exchange (e.g., end-to-end encryption), and navigation. Within each technology area, you'll examine the specific features and performance characteristics that set them apart from their counterparts, and using selected examples, you'll learn how these characteristics can be translated to produce tangible benefits in real-world applications. At this point, you'll start to understand how quantum physics moves from the theoretical to the practical, and you'll start to think about how science and technology are linked to businesses and markets.

Beyond just studying how new quantum technologies are built on scientific principles, you'll begin to develop key analytical skills that will help you assess different situations in which quantum solutions are meaningful now, areas that require further technological development, and areas where existing quantum technology is sufficient. With these skills, you'll start to think about how you can identify new technical and commercial opportunities in the quantum field.

By the end of this module, you'll be able to:

- demonstrate an understanding of key capabilities of various quantum technologies from an application point of view
- understand key advantages of general and application-specific quantum technologies over their conventional counterparts
- demonstrate critical awareness of current development stages and maturity of quantum solutions in various fields
- critically appraise the benefits of quantum technology for selected test cases.

Module Lead: Professor Peter Krüger

Types of assessments may include:
Problem set (30%) - solutions to a problem set on quantitative evaluation of the performance of quantum technology solutions in various application contexts.
Portfolio (70%) - a portfolio on a set of quantum technology use case studies.

MODULE GUIDE

FOUNDATIONS OF QUANTUM COMPUTING

This module will introduce you to quantum computation on a level which will allow you to appreciate what it consists of on an elementary, hardware-independent level. Quantum mechanics is a model of physics with subtle and often-misunderstood consequences. So, while quantum computation offers the prospect of enhanced computational power, it is also important to understand how it differs from massively parallelised computations, how it avoids the pitfalls of analog computation, and what techniques may prove essential to ensure that it does not succumb to noise. For these reasons, a solid grasp of the underpinnings of quantum computation though theoretical principles is essential to have an informed perspective of the capability of this new computational paradigm.

As quantum hardware platforms continue to mature, this module will provide you with the necessary skills to understand these developments. You'll learn about the motivations of quantum computing and develop a foundation to understand how quantum mechanical systems represent and process data, along with the mathematical tools to apply this framework. You'll learn how quantum data may be described mathematically, how quantum computations may be described at a very low level, and how quantum data can be protected from noise. This will put you in a better position to critically assess the claims made regarding new developments in hardware.

From a professional perspective, quantum computing technology is a subject of increasing interest across various industries. This module will be beneficial to students who are interested in pursuing a career in quantum information systems, quantum applications, or for students who want an in-depth understanding of how quantum technology is used to process data.

By the end of this module, you'll be able to:

- systematically comprehend and analyse the difference between quantum states and randomness, and exponential parallelism
- evaluate and assess simple communication procedures, such as quantum teleportation
- systematically recognise, comprehend, and critically appraise applications of quantum computing technology.

Module Lead: Dr Niel De Beaudrap

Types of assessments may include:
A formative exercise (0%) - mathematical problems drawn from the lecture materials, for students to develop and evaluate their understanding of the material.
Problem set (30%) - an exam assessing your recall of various definitions and grasp of the mathematical techniques, which are relevant to quantum computation on a foundational level.
Portfolio (70%) - a written report on a special topic in quantum computation, chosen by you but subject to the advice and approval of the lecturer.

MODULE GUIDE

EMERGING MARKETS FOR QUANTUM TECHNOLOGY

In this module you'll explore current developments in the quantum technology market, along with likely near-term and longer-term future developments. You'll learn about the relationship between quantum technologies and commercial opportunities, as well as the interplay of market pull and technology push across various sectors, from security-based communication and screening to smart materials and clinical diagnostics.

The module provides an overview of innovation management theories and frameworks, and how quantum technologies and other related science-intensive technologies are developed and commercialised. This will cover how firms source ideas, form strategies, implement and finance them, and generate commercial returns. The module teaches innovation management within an economic and social context, so you'll learn about managing relationships with stakeholders such as funders, regulators, customers, and the wider public to ensure innovations are both commercially successful and socially responsible.

This module is particularly relevant to students who currently work in the quantum technology space, or to students who want to develop a career in this field as a:

- technical manager in small or large companies
- technology advisor in an emerging quantum technology business
- manager who wants to develop better links between academia and business
- entrepreneur looking to use emerging quantum technologies to disrupt the market.

By studying this unique business-focused module, you'll better understand how quantum principles can be applied in a meaningful and tangible way, and learn how these technological advancements generate significant economic value. You'll learn general innovation management tools and methods, and a specific selection that focus on the atypical needs of quantum innovation across various sectors. You'll develop valuable interdisciplinary skills that will help you collaborate with numerous specialist professionals during your career. By helping you understand the requirements and needs of other stakeholders, this module will teach you how to contribute towards the development of successful strategies, implementation plans, and business models.

By the end of this module, you'll be able to:

- demonstrate critical awareness of the current status of emerging quantum technology markets
- assess the innovation, technological and business challenges in various quantum technology market sectors
- comprehend the framework for responsible innovation and reflect on the role played by quantum technologies.

Module Lead: Professor Paul Nightingale

Types of assessments may include:
Portfolio (40%) - the portfolio will review a small number of frameworks and assesses how useful they are for understanding innovation in quantum applications.
Essay (60%) - this will feature a commercialisation or innovation case study of your choice.

MODULE GUIDE

ATOM-LIGHT INTERACTIONS AND PHOTONICS

This module looks at the interaction of atoms with electromagnetic radiation and with the description of structures associated with the exploitation of optical-electromagnetic propagation.

You'll learn about the relevant atom-light physical processes, including the semi-classical model of light-matter interactions and the quantum model relevant to atom-cavity interactions. You'll learn how pulses of light can control atoms and the basic principles of detecting photons.

You'll discuss the general modelling of lasers. This module will give you a broader overview of photonics, and you'll develop the necessary skills to be able to analyse optical propagation in structures. You'll study the physical and technological principles of devices required in optical communications, exploring advanced design concepts of cavities and waveguides with an introduction to modal analysis. This module will provide you with an understanding of the working principles of modern optical systems deployed in the quantum infrastructure along with an understanding of advanced design skills.

Atom-light interactions are at the heart of many system implementations in quantum technologies, and the field of photonics has one of the fastest-growing markets. A solid understanding of atom-light interactions and photonics is a highly sought-after skill that professionals in the quantum technology workforce need.

By the end of this module, you'll be able to:

- comprehensively understand the techniques required in the application of classical, semi-classical, and quantum concepts to the interaction of atoms and light
- comprehend light-matter interaction and analyse its role in applications
- understand optical propagation models
- demonstrate critical awareness of state-of-the-art advances in the field of photonic technology for optical communications.

Module Lead: Professor Barry Garraway

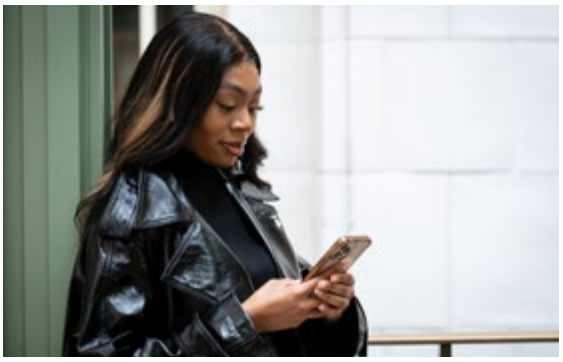
Types of assessments may include:
Problem set (40%) - solutions to a problem set demonstrating understanding and quantitative skills in the area of atom-light interactions.
Portfolio (60%) - a written report of up to 1,800 words about a group design of a photonic system.

MODULE GUIDE

MATERIALS FOR QUANTUM AND NANOTECHNOLOGIES

In this module, you'll learn how quantum mechanics underpins many of the developments that have enabled the characterisation of materials at the nanoscale, and you'll develop an understanding of these techniques and how they've aided the advance of both quantum and nanotechnologies, from bone and muscular regeneration in medical advances, right through to new age batteries and electronics. You'll study a range of nanomaterials, understanding their fundamental properties and how that relates to their application in technology. You'll also study how these materials are characterised and learn about the equipment that is used for this in industry.

Assessment will include data analysis from real-world samples and demonstrating a critical awareness of the meaning of this data. You'll also investigate the current challenges and opportunities surrounding research in the field and explore commercial developments with an assessed critical bibliography and structured questions to industry stakeholders. In this way, you'll have the opportunity to understand the role of materials in current technology, and how they are developed, analysed, and modified for applications.



By the end of this module, you'll be able to:

- apply the fundamentals of quantum physics to nanomaterials and the associated emerging technologies
- understand the principles and usage of common characterisation techniques in nanotechnology
- demonstrate critical awareness of current research and its limitations.

Module Lead: Dr Alice King

Types of assessments may include:
Report (40%) - a written critical bibliography of current research trends.
Report (20%) - a written structured question to an industry stakeholder.
Log (40%) - a written log detailing the completion of a data analysis project.

MODULE GUIDE

QUANTUM NETWORKS AND SECURE COMMUNICATIONS

In this module, you'll be introduced to quantum networks and quantum cryptography. You'll develop a theoretical understanding of these concepts and build a foundation from which you can describe quantum interfaces on an elementary level. You'll be given a framework to understand how quantum mechanical systems can be used to create quantum networks and implement cryptography, and you'll explore their theoretical foundations and experimental implementation. The topics covered in this module are of increasing interest from both a research and business perspective. Secure communication based on quantum technology is on the verge of being widely commercially available and will be an important part of future communication networks. Quantum networks are crucial building blocks for future quantum computers in order to scale quantum processors to a large number of quantum bits.

This module is particularly beneficial for students who are interested in developing their career in quantum information processing, secure communication, or quantum applications.

By the end of this module, you'll be able to:

- comprehend the concepts of quantum networks and quantum cryptography
- analyse and interpret simple quantum processes
- critically appraise simple communication procedures, such as quantum teleportation
- devise potential applications of quantum networks.

Module Lead: Professor Matthias Keller

Types of assessments may include:
Problem set (30%) - finding the solutions for a set of problems.
Portfolio (70%) - different tasks which may include: • a review of different schemes for quantum communication • a written analysis of specific schemes for quantum networking • an individual presentation on a specific topic within quantum networks and communication.

MODULE GUIDE

SENSING AND IMAGING

In this module, you'll learn about the key aspects of improved sensing methodologies and various techniques and devices that are enabled by quantum physics principles. The focus will be on atomic and photonic systems, and you'll study use cases in precision metrology and practical sensing and imaging. You'll also discuss sensing of time, magnetic fields, electromagnetic radiation, and gravity.

The module will cover current cutting-edge developments driving the ever-improving precision of atomic clocks through to the introduction of novel techniques in laser cooling and ion and atom trapping. These elements will be highlighted alongside benefits arising from the utilisation of quantum entanglement and squeezing in atom interferometers for inertial force detection. The module will also cover a range of recent developments, such as magnetometers for healthcare and material science, and microwave devices used for quantum radar.

Sensing and imaging – one of the more mature types of quantum technology – will be taught in more depth to equip you with the tools necessary to make your own impact on the development, deployment, commercialisation, and marketing of this technology in early emerging markets.

By the end of this module, you'll be able to:

- show a systematic understanding of the quantum mechanisms used in several sensing modalities
- describe and critically evaluate laboratory-based quantum sensors and practical devices
- systematically comprehend the quantum capabilities of sensor devices and appreciate their advantages compared to their most competitive and common classical counterparts.

Module Lead: Dr Jose Verdu Galiana

Types of assessments may include:
Problem set (30%) - solutions to a problem set assessing the understanding of principles behind quantum sensing and imaging.
Portfolio (70%) - the portfolio will contain the work produced during the seven weeks, such as exercises and case studies.

MODULE GUIDE

PROJECT DESIGN

This module is the first step towards the delivery of the final MSc project, and it will begin with you choosing a specific project/topic area (in agreement with your supervisor of choice). In the initial stage, you'll need to identify the specific scientific, technological, or economic framework of the project. You'll receive guidance as to how to formalise your project, and you'll deconstruct the project into an actionable plan in order to identify any specific challenges you may face, along with potential solutions.

In this module, you'll learn about the methodologies and practices you need to approach a specific challenge. Assessed via a presentation, you'll hone your communication skills which will enable you to deliver your project plan and vision to others. By doing so, you'll gain the confidence to use and explain scientific jargon and themes within a quantum technology framework.

By the end of this module, you'll be able to:

- present a systematic analysis and reflection on key aspects and challenges of the project to a scientific, technological, and/or industrial audience
- determine and critically assess how the project is framed within the quantum technology landscape
- systematically recognise and express the scientific, technological, and/or economic challenges tackled by a project
- deliver a comprehensive project with an actionable plan, timeline, milestones, and deliverables.

Module Lead: Supervisor-led

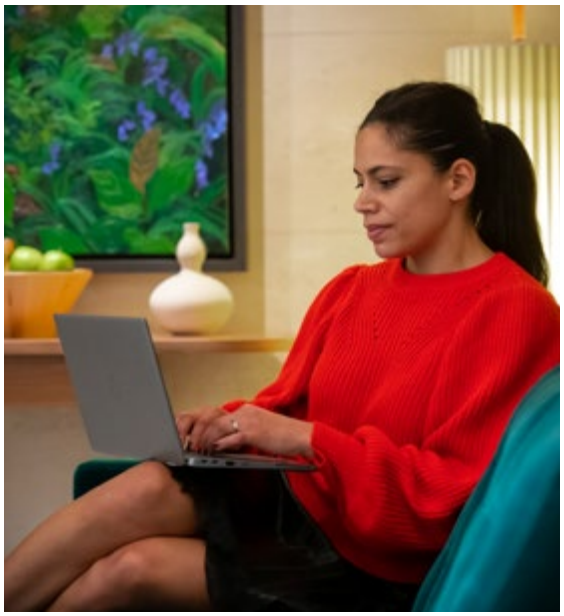
Types of assessments may include:
Presentation (30%) - a seven-minute oral presentation (with slides) of the proposal for your project.
Report (70%) - a written report of up to 2,100 words describing your proposed project, including the health and safety considerations, methodology, timeline, risks and mitigations, etc.

MODULE GUIDE

SKILLS FOR QUANTUM TECHNOLOGY

In this module, you'll learn the skills that are required for building practical quantum technology systems and platforms. The module will focus on:

- programming skills, such as using Python programming language in a scientific context, learning how to analyse and fit the data, and plotting graphs
- exploring the operation of microcontrollers and using stimulating experimentation opportunities based on open-source hardware
- 3D CAD design, where you'll learn how to construct solid models, assemblies, and detail drawings using a feature-based parametric design CAD programme.



This module is particularly useful for students looking to expand their quantum literacy, and you'll learn highly sought-after programming skills and engineering fundamentals. From a professional perspective, as companies continue to expand their quantum technology branches and require more quantum experts, students with the ability to handle system-designs involved in quantum technology (such as electronics and photonics) will have a distinct, competitive edge in the employment market.

By the end of this module, you'll be able to:

- use and deploy programming language (Python) in the original scientific context such as for plotting graphs or programming microcontrollers
- comprehend microcontroller chip architecture and hardware
- design and critically analyse 3D components using CAD software.

Module Lead: Dr Fedja Orucevic

Types of assessments may include:
Report (70%) - the report will contain the work you have carried out to design, assemble, program, and test a prototype system to perform a simple task using microcontroller and Python programming language.
Portfolio (30%) - you'll build a portfolio describing the steps in producing a 3D solid model.

MODULE GUIDE

PROJECT

The final part of the MSc is a major research project carried out under the supervision of a member of the faculty or postdoctoral researcher, with a significant degree of independence. Through your research activities, you'll familiarise yourself with a new field of research, using the appropriate tools to study the specific subject field to produce an original result in the context of the different aspects of modern quantum technology.

Your research project should demonstrate the application of concepts learnt throughout the course in order to solve a problem. It is also an opportunity for you to develop professional relationships with students, academics, and industries, and these relationships and networks will serve you long after the MSc has ended. As research projects typically relate to the current research interests of supervisors, they will be close to or beyond state-of-the-art and will add value to the course.

By the end of this module, you'll be able to:

- systematically understand key aspects of a new field of research
- demonstrate self-direction and originality in the use of appropriate research tools
- write a clear and comprehensive account of your project work in a research thesis
- carry out a major research project autonomously and creatively.

Module Lead: Supervisor-led

Types of assessments may include:
Presentation (30%) - an oral presentation (with slides) of the work you carried out during the first half of your project and the plans for the second half.
Dissertation (70%) - a dissertation of up to 4,200 words about your research project.

The University of Sussex regularly reviews modules to provide the most innovative and relevant courses of study. As a result, module offerings may change. The information in this leaflet is correct at the date of publication, but please keep an eye on our website study-online.sussex.ac.uk for the most up-to-date course information.

PATHWAYS

The Quantum Technology Applications and Management course is designed to be flexible, catering to your needs and schedule. We appreciate that students may not be able to complete all 11 modules that make up the MSc, and as a result, we're proud to offer four entry pathways for this course.

- Foundation of Quantum Technology Management PG Cert (online)
- Advanced Quantum Technology and Applications PG Cert (online)
- Quantum Technology Fast Track PG Dip (online)
- Quantum Technology Applications and Management MSc (online)

For each qualification, you'll be required to complete specific modules, grouped together in 'carousels'. Please see full details on the following page.

PATHWAYS

Carousel 1

Foundations of Quantum Mechanics (15 credits)	**Applications of Quantum Technology (15 credits)**	**Foundations of Quantum Computing (15 credits)**	**Emerging Markets for Quantum Technology (15 credits)**

The four modules in this carousel cover the foundations of quantum physics and will nurture your industrial and entrepreneurial skills. It will provide you with a common language for discussing quantum physics and technologies in their scientific and socio-economic aspects. By studying these modules, you'll develop an understanding of quantum technology, along with skills that will be beneficial across a variety of industries.

Carousel 2

Atom-Light Interactions and Photonics (15 credits)	**Materials for Quantum and Nanotechnologies (15 credits)**	**Quantum Networks and Secure Communications (15 credits)**	**Sensing and Imaging (15 credits)**

The four modules in this carousel will take you on a deep dive into the science underpinning quantum technologies through the acquisition of knowledge on the four main areas of quantum technology applications.

Carousel 3

Project Design (15 credits)	**Skills for Quantum Technology (15 credits)**	**Project (30 credits)**

The final carousel focuses on the projects that will allow you to experience the hands-on application of how you'll use your degree as you move forward with your career post-graduation. You'll acquire highly sought-after skills desired by employers, including using programming language, implementation of microcontrollers, and computer-aided design.

PATHWAYS

The qualification you'll receive upon completion of the course will depend on which modules you study from the various carousels. Below we've outlined the requirements for each type of qualification.

FOUNDATION OF QUANTUM TECHNOLOGY MANAGEMENT PG CERT (ONLINE)

Carousel(s) to study: Carousel 1
Credits: 60
Duration of study:
- minimum 8 months
- maximum 20 months.

Cost: £4,220

ADVANCED QUANTUM TECHNOLOGY AND APPLICATIONS PG CERT (ONLINE)

Carousel(s) to study: Carousel 2
Credits: 60
Duration of study:
- minimum 8 months
- maximum 20 months.

Cost: £4,220

QUANTUM TECHNOLOGY FAST TRACK PG DIP (ONLINE)

Carousel(s) to study: Carousel 1 and 2
Credits: 120
Duration of study:
- minimum 16 months
- maximum 28 months.

Cost: £8,440

QUANTUM TECHNOLOGY APPLICATIONS AND MANAGEMENT MSC (ONLINE)

Carousel(s) to study: Carousel 1, 2 and 3
Credits: 180
Duration of study:
- minimum 2 years
- maximum 4 years.

Cost: £12,660

START DATES

All courses* will start teaching in May 2023, with entry points in July, September, and October of that year. From 2024 onwards there will be six entry points each year in January, March, May, July, September, and October.

**Our Advanced Quantum Technology and Applications PG Cert (online) course will start teaching in 2024, with six entry points each year as above.*

Find out more about our different qualifications

STUDY-ONLINE.SUSSEX.AC.UK/QUANTUM-PATHWAYS

KEY INFORMATION

ENTRY REQUIREMENTS

The typical entry requirements require you to have an undergraduate honours degree or above from any UK university or international equivalent, with a grade of:

- a lower second-class (2.2) in STEM subjects including physics, mathematics, computer science, and engineering
- a higher second-class (2.1) in STEM subjects not listed above.

You can also be considered entry for this course if you have:

- three years of professional experience in a related industry or
- three years of professional experience in a related business or
- a lower second-class (2.2) undergraduate honours degree or above from any UK university or international equivalent in Economics, Finance, Business, or other related degree with proof of mathematical aptitude (additional documents will be required).

Applicants whose first language is not English (and whose first degree was not taught in English) need to supply evidence of IELTS (Academic) high level (6.5 overall, including at least 6.0 in each component).

FEES AND FUNDING

Masters course fee: £12,660

Cost per module: £1,055*

Flexibility is at the heart of our online courses: fees can be paid on a module-by-module basis, or as a single fee at the start of the course.

You may also consider corporate sponsorship and employer funding. Please email our Admissions Team at **studyonlineadmissions@sussex.ac.uk** to receive assistance with next steps for this method of payment. Course fees will remain fixed for 24 months from your initial course start date. Thereafter, the course fee will rise at a rate of 2.5% per calendar year (subject to rounding for administration purposes).

**Modules 1 – 10 (15 credits each) cost £1,055 and module 11 (30 credits) costs £2,110.*

Module 11 can be paid in two instalments (£1,055 per instalment). If you choose to pay in two instalments, you'll need to:

- pay the first half at the start of the module
- pay the balance by the final week of teaching. If you have not paid by this time your final assessment and overall module mark will be withheld until payment has been made.

20% ALUMNI DISCOUNT

If you have previously graduated from an undergraduate, postgraduate, or PhD course with the University of Sussex you will be eligible* for a 20% discount on this online course.

*T&Cs apply.

Please visit our Fees and Funding page for more information on funding for your studies.

STUDY-ONLINE.SUSSEX.AC.UK/FEES

UNIVERSITY OF SUSSEX

Visit the course page to learn more.

STUDY-ONLINE.SUSSEX.AC.UK/QUANTUM-TECHNOLOGY

Disclaimer: This brochure was updated June 2023. The University of Sussex has made every effort to ensure that this information is both helpful and accurate but some changes, for example to courses, facilities or fees, may become necessary due to legitimate staffing, financial, regulatory or academic reasons.