POSTGRADUATE STUDIES
IN COMPUTER SCIENCE
Welcome to the School of Computer Science

TAKE ADVANTAGE OF STATE-OF-THE-ART FACILITIES, FIRST-CLASS TEACHING AND RESEARCH THAT MAKES A DIFFERENCE TO OUR WORLD.

'I am delighted that you are considering postgraduate study at Birmingham. Birmingham is a research-led university, and postgraduate students are central to our learning community. Our wide portfolio of research makes Birmingham one of the most popular universities for postgraduate study in the UK, and we hope that you will find this brochure of use when making your decision on where to study.'

Professor Andrew Howes
Head of School
Computer Science

About us
The School of Computer Science was established in the late 1950s and became one of the first academic departments in the UK to undertake research and teaching in this area. Some 60 years later, we now provide specialist teaching and conduct world-leading research in fundamental and applied computer science, artificial intelligence, optimisation, machine learning, security and privacy, medical imaging, software engineering, human-centred computing and robotics.

Why choose Birmingham?
- Birmingham is a research-intensive, Russell Group university and our academic community consists of staff working with us at the forefront of their subject from across the world. Their cutting-edge research feeds into our postgraduate teaching directly, giving you the chance to learn from innovative developments as they are being made.
- We offer a dedicated MSc: Computer Science conversion degree, giving non-computing graduates the chance to become computer scientists. We also offer a range of specialist MSc programmes across various areas in computer science – designed to allow you to become an expert in a particular field or advance in your current career.
- We are a partner in The Alan Turing Institute, the UK’s national institute for data science and artificial intelligence.
- We regularly review our curriculum and suite of degree programmes, to ensure we are responding to what our students want and industry requires.
- We can offer you state-of-the-art, multi-million-pound facilities, including dedicated computing labs for computer science students, a teaching laboratory for Robotics, and research laboratories for Security, Medical Imaging and Intelligent Robotics.
- Our new Centre for Cyber Security and Privacy is recognised as an EPSRC/GCHQ Academic Centre of Excellence in Cyber Security Research.
- Our School has a strong reputation for high-quality research and is home to a variety of research themes: Artificial Intelligence, Security and Privacy, Human-Centred Computing and Theory of Computation.
- Our School is consistently ranked to a high degree in reputable league tables, and we have the highest possible rating for our teaching from the Quality Assurance Agency for Higher Education.

Award-winning development
At the School of Computer Science, we are not just renowned for teaching and research excellence. We also produce novel solutions for real-world applications, including:
- Working with Jaguar Land Rover to make their vehicles more secure
- Contributing to the development of the Trusted Platform Module which makes many of our computers capable of secure cryptographic operations
- Deploying autonomous, intelligent robots in security and health support facilities
- Developing a revolutionary, award-winning method for diagnosing skin cancer
- Highlighting important vulnerabilities in UK online banking
CONTENTS
Welcome to the School of Computer Science 2
Your future in computer science 4
Our School 5
Advanced Computer Science MSc 6
Artificial Intelligence and Machine Learning MSc 7
Computer Science MSc 8
Cyber Security MSc 9
Data Science MSc 10
Human Computer Interaction MSc 11
Robotics MSc 12
Computer Science PhD 13
Careers support and employability 14
Scholarships 15
Useful information 16
The city of Birmingham 17
What our postgraduate students say 18

ANY QUESTIONS?
If you have any questions about the School of Computer Science or want to chat to current postgraduate students via our Facebook Group, get in touch:

Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
Email: phd-admissions@cs.bham.ac.uk
www.facebook.com/uobcompsci
www.twitter.com/uobcompsci
Your future in computer science

From choosing to become a computer scientist with our conversion programme, to studying one of our specialist MScs at Birmingham, you’ll be equipped to enter a dynamic, fast-moving sector that offers exciting careers with excellent rewards.

At its most basic level, computer science is about information: how to represent, store, communicate, manipulate, understand and make use of it. Computer science is also at the heart of commerce and industry, with virtually every company either developing new technology or making use of it. Cutting-edge research in areas like cyber security, human-computer interaction and artificial intelligence is increasingly being put to practical use in businesses. We are at an exciting point in time for computer science, and new computer scientists or computing graduates with further expertise in a particular field are in high demand.

What can I do with a postgraduate degree in Computer Science?

Our graduates find themselves in a variety of environments within academia, research, industry, government and private organisations. The following is a short list of research and vocational areas:

- **Artificial Intelligence:** developing computers that simulate human learning and reasoning ability
- **Computer/Cyber Security:** covers all the processes and mechanisms by which computer-based equipment, information and services are protected from unintended and unauthorised access, change or destruction
- **Data Science:** developing methods for visualising, sorting and managing data to find patterns and draw insights
- **Information Technology:** developing and managing information systems that support a business or organisation
- **Operating Systems and Networks:** developing the basic software computers use to organise themselves or to communicate with other computers
- **Software Applications:** applying computer science and technology to solving problems outside the field (in education or medicine, for example)
- **Software Engineering:** developing methods for producing software systems on time, within budget and with few or no defects

- **Theoretical Computer Science:** investigating the fundamental theories of how computers solve problems and applying the results to other areas of computer science

**Where can I work?**

You could join a technology consultancy firm like Accenture, PwC, CHP Consulting, LogicaCMG, BAE Systems, PA Consulting or Capgemini, or one of the global IT giants, such as Microsoft, Google, Oracle, Hewlett Packard, IBM, Cisco Systems and Apple, amongst many others. There are a huge number of IT-focused UK companies, not to mention opportunities in investment, retail banking and financial computing and analytics (Goldman Sachs, Deloitte, J.P. Morgan, Morgan Stanley, Bank of England, Bank of America, HSBC, Barclays, RBS); telecommunications companies (BT, Vodafone, Orange, AT&T); IT for retail businesses (eBay, Amazon, Tesco, Argos, Expedia) and public sector organisations (NHS, GCHQ, the Home Office).

Some students choose careers in teaching, research or technology development at universities both in the UK and overseas. There is a great deal of potential for postgraduates looking to put their computing skills to good use.

What skills will I develop?

We will broaden your knowledge of selected areas of computing by a combination of taught modules and individual project work, supervised by research-active members of staff who will help you to develop appropriate investigative and study skills. Your course will give you a disciplined approach to analysing problems and the ability to design creative solutions, whilst critically evaluating the results. You will also develop management skills such as communication, teamwork, time management and report writing.

Through further study at an advanced level, you will get into the habit of questioning and conceptualising, and these practices transfer well into the workplace. Your prospective employers will be interested in both the technical skills (for example, in programming) you develop and your transferable skills (which could include report writing and preparing and delivering presentations).

What does the future hold?

Your career and employment prospects are excellent, and computer science graduates from Birmingham are in high demand. The increasing number of graduate roles in all areas of computer science, coupled with the growing need for specialised experts will open up a world of opportunity to you, both in the UK and globally.
Our School

COMMUNITY ENVIRONMENT
The School of Computer Science is an incredibly friendly place. Our students and staff join us from across the world, and we are a very inclusive department. The School holds regular community events, and encourages staff and students to interact and discuss.

STUDENT SUPPORT
You will be allocated a personal tutor for the duration of your programme, and all of our staff have daily office hours, where you can visit and ask questions.

We have teaching assistants that work with our lecturers, and regular tutorial and lab sessions for our modules.

We place great importance on the wellbeing of our students, and have an extensive support network available.

We have a dedicated wellbeing officer just for our School, who provides specific sessions each day, where students can visit, talk through any concerns and access support and guidance. Find out more: https://intranet.birmingham.ac.uk/student/Your-Wellbeing/Index.aspx

POSTGRADUATE STUDY ASSISTANCE
At Birmingham, postgraduate study and research is not just attending lectures – it’s about challenging and venturing further, and we give you support to do this. Find out more:

Postgraduate Taught: www.birmingham.ac.uk/postgraduate/pgt/support/index.aspx
Postgraduate Research: www.birmingham.ac.uk/postgraduate/pgr/support/index.aspx

STUDENT SOCIETIES AND FORUMS
We hold a regular Staff Student Forum, where issues can be raised and resolved, and The Guild of Students hosts over 250 student societies. Find out more: www.guildofstudents.com/studentsgroups/

Our Computer Science Society (CSS) offers support and organises various social and professional events (including hackathons, conferences, industry presentations, a Halloween Quiz and the Summer Ball).

AFNOM is our student-led hacking club, who meet to look at ethical hacking and cyber security, and our Games Development Society meets regularly to develop and build games. Find out more: https://cssbham.com https://afnom.net www.twitter.com/UoBGamesDev

RESEARCH AREAS
The School of Computer Science is home to academics working at the forefront of their areas of expertise. Our Centre for Cyber Security and Privacy (www.birmingham.ac.uk/CyberSecurityCentre) is recognised as an EPSRC/GCHQ Academic Centre of Excellence in Cyber Security Research, and the School is also home to staff specialising in Artificial Intelligence, Computational Theory and Human-Centred Computing. We also collaborate with various departments across the University. Find out more: www.birmingham.ac.uk/CSresearch

SCHOOL FACILITIES
As a postgraduate student in the School of Computer Science, you will be based within a purpose-built multi-million-pound building with an impressive range of modern facilities.

These include:
- Dedicated exclusive computing labs for just our students, with ultrawide monitors, dual working spaces for PC and laptop use, and a new GPU lab, where each machine has a latest generation Nvidia GPU
- Teaching labs for Robotics
- Research labs for Medical Imaging, Intelligent Robotics and Security
- Full wireless network
- Bookable seminar and meeting rooms with plasma screens
- Collaborative student/staff teaching space
- Student areas (with power access and presentation screens)

Student area, School of Computer Science

Atrium, School of Computer Science

The School of Computer Science

Student area, School of Computer Science

Atrium, School of Computer Science

The School of Computer Science
Advanced Computer Science
MSc

Want to expand on and broaden your knowledge of cutting-edge areas in computer science, and become an expert in your field? This programme is designed for you – a graduate with a degree in computer science or closely related discipline, and a solid foundation in programming.

Drawing on the School’s international research reputation, you will have the opportunity to select from a broad range of advanced modules, to build on your knowledge and experience and advance your career prospects, either in a current field or in a new area of interest. You will also undertake your own software-development project (which may be research-focused) to deepen your knowledge even further.

Course content
The course consists of 180 credits. In the first eight months of the course you study your choice of 120 credits’ worth of taught modules, to build on your knowledge and experience and advance your career prospects, either in a current field or in a new area of interest. You will also undertake your own software-development project (which may be research-focused) to deepen your knowledge even further.

Core module
- Project (60 credits)

Optional modules
We offer a wide range of optional 20-credit modules, which include:
- Complex Adaptive Systems (Extended)
- Computer-Aided Verification (Extended)
- Human-Computer Interaction (HCI)
- Individual Studies (Extended)
- Intelligent Robotics (Extended)
- Machine Learning and Intelligent Data Analysis (Extended)
- Mini Project
- Mobile and Ubiquitous Computing (Extended)
- Network Security and Cryptography
- Programming Languages and Principles, Design and Implementation (Extended)
- Research Skills, Evaluation Methods and Statistics
- Research Topics in HCI

Teaching and assessment
Taught modules are assessed in a variety of ways: written examinations, practical assessment during the semesters, or a mixture of both, whilst the project is assessed by a supervisor and a moderator.

In previous years, students have surprised themselves by their achievement, regularly producing project work at the level expected of a very good first-year research student. Your project supervisors are able to draw on their research experience to help you develop your ability to work confidently on difficult tasks.

In addition to the opportunity to learn from staff who are experts in their fields and working at the cutting edge of computer science research, we also support you by providing training in transferable skills relevant to your project work and in your future career.

Achieving this MSc allows our graduates to progress into more specific or advanced computer science roles. Having studied and achieved knowledge in more advanced modules, our graduates are exposed to an even wider range of technically enhanced roles within the industry.

The importance of project work, together with a very wide range of options, also makes this MSc unusually suited as a preparation for a research career in computer science. Students graduating from this programme have usually developed a taste for working on difficult problems and look for a career where they will be able to apply their honed analytical and technical skills.

FACT FILE
Start date: September/October
Duration: 1 year full-time
Tuition fees: Visit www.birmingham.ac.uk/pgfees for latest fees
Entry requirements: 2:1 Honours degree in a relevant subject (eg, computing or a closely related discipline); plus a solid foundation in programming

Achieving this MSc allows our graduates to progress into more specific or advanced computer science roles. Having studied and achieved knowledge in more advanced modules, our graduates are exposed to an even wider range of technically enhanced roles within the industry.

The importance of project work, together with a very wide range of options, also makes this MSc unusually suited as a preparation for a research career in computer science. Students graduating from this programme have usually developed a taste for working on difficult problems and look for a career where they will be able to apply their honed analytical and technical skills.

LEARN MORE
For more information and how to apply, or to talk to our Admissions Team and current students via our ‘PG Comp Sci Facebook Group’, please get in touch:

Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
www.birmingham.ac.uk/adv-computer-science
Artificial Intelligence and Machine Learning MSc

Understand the fundamental principles of artificial intelligence and machine learning. This specialist MSc programme will allow you to apply your knowledge to real-world problems.

Core modules (20 credits)
Compulsory modules include:
- Artificial Intelligence and Machine Learning Project (60 credits)
- Current Topics in Artificial Intelligence and Machine Learning
- Mathematical Foundations of Artificial Intelligence and Machine Learning

Optional modules
You will choose between 40–80 credits’ worth of the following 20-credit modules:
- Complex Adaptive Systems (Extended)
- Computer Vision and Imaging (Extended)
- Game Theory and Computer Simulation
- Intelligent Robotics (Extended)
- Machine Learning and Intelligent Data Analysis (Extended)
- Robot Vision

You could also choose up to 40 credits’ worth of the following 20-credit modules:
- Mini Project
- Programming for Data Science
- Research Skills, Evaluation Methods and Statistics
- Storing and Managing Data
- Visualisation

More about the course
You will gain knowledge and understanding of:
- The theoretical principles of the core techniques of artificial intelligence and machine learning
- Software tools and frameworks for artificial intelligence and machine learning
- The application of artificial intelligence and machine learning to practical problems

Teaching and assessment
The programme includes lectures, tutorials, exercise classes, practical work, projects and independent study, and will be assessed by examinations, coursework and project submission.

Graduates with a degree in AI and Machine Learning have a wealth of career opportunities to choose from. You may choose one of the following graduate roles:
- Machine Learning Engineer
- AI Developer
- Research Scientist
- Technology Consultant
- Data Scientist

FACT FILE
Start date: September/October
Duration: 1 year full-time
Tuition fees: Visit www.birmingham.ac.uk/pgfees for latest fees
Entry requirements: 2:1 Honours degree in a numerate discipline (computer science, mathematics, physics, engineering, economics or another programme with substantial mathematics content)

The past ten years have seen astonishing advances in artificial intelligence (AI) and machine learning (ML) that are promising to transform the way we interpret and use data. These advances are already finding their way into our daily lives in areas that include language translation, self-driving cars, face recognition, recommender systems, healthcare and finance.

By studying this MSc, you will learn about the fundamental principles of AI and ML and how machines can perceive, explore and understand the world around us. You will extend and apply your knowledge to practical problems in a substantial individual project working with one of our world-leading researchers, many of whom are collaborating with the Alan Turing Institute, the UK national institute for AI and Data Science, of which the University of Birmingham is a member. You will learn about what current generation AIs can and cannot do, about contemporary challenges and about societal and ethical considerations so that you can make informed decisions about how AI techniques should be used in the real world.

Course content
The course consists of 180 credits. As well as two 20-credit compulsory modules and one 60-credit compulsory project, you also have the chance to choose up to 80 credits from a range of optional, specialist 20-credit modules.

For more information and how to apply, or to talk to our Admissions team and current students via our ‘PG Comp Sci Facebook Group’, please get in touch:
Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
www.birmingham.ac.uk/postgraduate/courses/taught/computer-science/artificial-intelligence.aspx
Already have a degree but want to become a computer scientist? Our 'conversion' MSc will open up a whole new world of career prospects and opportunities in computing to you.

Our conversion MSc is designed for students with a first degree in a subject other than computing who now wish to pursue a career in computer science. Competency should be demonstrated in mathematics and scientific subjects, for example at an 'advanced' high school level, which should allow a better understanding of the new computer science subjects.

Established in 1969, it is now the longest-running conversion programme to computer science in the UK. It is designed to give you a grounding in both the fundamentals of computer science and practical software development skills, and opens the door to exciting new career opportunities in computer science and technology, as the field expands into the future.

Course content
The course consists of 180 credits. As well as your core 20-credit modules (that include software workshops), you will also undertake a 60-credit project. The software workshop involves two terms of intensive training in Java programming, including lectures, supervised laboratory work and small-group tutorials.

The four summer months are spent working on your project. Projects vary from applied software engineering through to work that is linked to our research groups. The common factor is that almost all projects involve the development of a large software system. Usually, projects are selected from a list of topics proposed by the teaching staff (possibly on behalf of an external customer) or you can suggest your own project, providing it is appropriate.

Core modules (20 credits)
- Artificial Intelligence and Machine Learning
- Building Useable Software
- Computer Systems
- Data Structures, Algorithms and Databases
- Software Workshop 1
- Software Workshop 2
- Project (60 credits)

Teaching and assessment
The Software Workshop module is currently assessed by assignments in the practical sessions, team project and a final examination. Taught modules are assessed in a variety of ways: written examinations, practical assessment or a mixture of both. The project is assessed by a report, supported by a practical demonstration.

FACT FILE
- Start date: September/October
- Duration: 1 year full-time
- Tuition fees: Visit www.birmingham.ac.uk/pgfees for latest fees
- Entry requirements: 2:1 Honours degree in any subject other than computing

Graduates with a degree in computer science from Birmingham are in high demand. Many of our students move into a wide variety of roles within industry and commerce both in the UK and globally. Others use their new computing skills to start their own companies or decide to pursue further study in the field or go into academia.

LEARN MORE
For more information and how to apply, or to talk to our Admissions Team and current students via our “PG Comp Sci Facebook Group”, please get in touch:

Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
www.birmingham.ac.uk/msc-computer-science
Cyber Security
MSc

Do you want to develop skills and knowledge to evaluate, design and build secure computer systems and guard against cyber attacks?

Cyber security is about designing systems that resist attack. As computers become ever more prevalent and ever more connected with each other, the opportunities for attackers become even greater, and the need to resist them becomes more urgent.

This one-year MSc will give you the skills you need to deal with current and future cyber security threats. It provides a solid foundation for graduates to pursue a career in the software industry or in research.

You will obtain the knowledge and expertise to evaluate, design and build secure systems and processes in cyber security.

The course covers the theory and practice of designing and building secure systems and gives you a firm grounding in cryptography, network security and secure programming, as well as optional modules in topics such as secure software and hardware systems, programming languages, systems and incident management and forensics.

The programme also gives you practical experience with technologies and toolkits for building internet-based software. All students undertake an individual research project in the final months of the course.

Course content
The MSc consists of 180 credits. All students study 40 credits’ worth of our compulsory 20-credit modules, and can choose 80 credits from a variety of 20-credit optional modules. You will also undertake a 60-credit project in the final months of the course.

Core modules
Compulsory 20-credit modules include:
- Designing and Managing Secure Systems
- Network Security and Cryptography
- Project (60 credits)

Optional modules
Optional 20-credit modules include:
- Computer Systems
- Computer Aided Verification (Extended)
- Forensics, Malware and Penetration Testing
- Individual Studies (Extended)
- Programming Language, Principles, Design and Implementation (Extended)
- Secure Software and Hardware Systems

More about the course
Our curriculum has been developed with the involvement of key individuals in the cyber security industry. As well as advising us on the skills they seek when recruiting graduates, they also contribute directly to the MSc programme through guest lectures and project supervision. In recent years, we have had guest lecturers from Microsoft, Vodafone, Siemens, IBM and Hewlett Packard.

The programme has received full certification by GCHQ and the University has been officially recognised by NCSC-EPsrc as an ‘Academic Centre of Excellence in Cyber Security Research’ (ACE-CSR) by the UK government; an accolade that is a testament to the School’s first rate research and work.

Teaching and assessment
The programme includes lectures, tutorials, exercise classes, practical work, projects and independent study, and is assessed via coursework, examinations, reports and a project thesis.

FACT FILE
Start date: September/October
Duration: 1 year full-time
Tuition fees: Visit www.birmingham.ac.uk/pgfees for latest fees
Entry requirements: 2:1 Honours degree in computer science or a closely related discipline, which includes object-oriented programming and data structures and algorithms

Our security and privacy graduates are in high demand in an ever-growing industry, and have gone on to work for companies including Accenture, IBM, PwC, BT and Delcam. Our students gain the knowledge to become leaders in the field of cyber security and to shape the technologies that will be developed in the future. They are equipped to work on secure software development within the software and IT industry, or to become cyber security consultants. They may also choose to move on to PhD research.

LEARN MORE
For more information and how to apply, or to talk to our Admissions Team and current students via our ‘PG Comp Sci Facebook Group’, please get in touch:
Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
www.birmingham.ac.uk/msc-cyber-security
Advances in computer science allow us to collect and store more data than ever before. However, making sense of all of this data is a challenge. Our MSc in Data Science will give you the skills to address these challenges through the use of computation.

Data Science
MSc

How do we use algorithms responsibly, ethically and legally? How do we visualise the results? In the very near future, most commercial and governmental organisations will depend on their ability to meet these challenges.

This MSc has been designed to get graduates from a variety of academic backgrounds up to speed with the state-of-the-art techniques in data science.

You'll learn programming and data management skills so that you can collect and manipulate data, advanced techniques for analysing and revealing patterns in data, and visualisation skills so that you can turn large data sets into something decision-makers can make sense of.

Course content
You will study six 20-credit fundamental compulsory modules and a 60-credit data science project. You will come to understand the cutting-edge contemporary challenges in data science, and will try to solve them in a 20-credit group project. You will then complete a substantial individual project, during which you will be able to showcase what you have learned.

By the end of the programme, you'll be ready to apply your knowledge to help organisations understand the huge amounts of data they collect every day.

Core modules
Compulsory 20-credit modules include:
- Algorithms for Data Science
- Current Topics in Data Science
- Data Science Group Project
- Programming for Data Science
- Storing and Managing Data
- Data Science Project (60 credits)
- Visualisation

More about the course
Having an MSc in Data Science will equip you with the right skills and knowledge to tackle immediate, real-world problems in a dynamic, fast-moving sector.

The term computing covers every kind of digital technology that we use to create, store, communicate, exchange and use information. Being able to understand, manipulate and analyse large data sets will make you highly desirable in industry.

Teaching and assessment
The core components of this degree course are taught modules, a group project and an individual project. Taught modules are delivered through lectures, exercise classes, seminars, practical work, lab sessions and independent study.

Assessment will be undertaken via exams, coursework, written reports and presentations.

FACT FILE
Start date: September/October
Duration: 1 year full-time
Tuition fees: Visit www.birmingham.ac.uk/pgfees for latest fees
Entry requirements: 2:1 Honours degree in any subject and Grade A in A level Mathematics (or international equivalent)

Being able to expertly understand and analyse significant data sets and provide advice and solutions is crucial in the world of computer science. Major industry players are in need of data science graduates, and career prospects could include becoming an expert in management of data in modern finance, retail, marketing, social science, development and research, medicine and government.

For more information and how to apply, or to talk to our Admissions Team and current students via our `PG Comp Sci Facebook Group`, please get in touch:

Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
www.birmingham.ac.uk/mscdatascience
 Interested in a multidisciplinary field of study focusing on the design of computer technology and the interaction between humans and computers?

Core modules
Compulsory 20-credit modules include:
- Human Computer Interaction Theory and Practice
- Mini Project
- Mobile and Ubiquitous Computing (Extended)
- Research Skills, Evaluation Methods and Statistics
- Research Topics in HCI
- HCI Project (60 credits)

Optional modules
You can choose a 20-credit module from our suite of subjects, which include:
- Intelligent Robotics (Extended)
- Individual Studies (Extended)
- Machine Learning and Intelligent Data Analysis (Extended)
- Software Workshop 1
- Software Workshop 2
- Teaching Computer Science in Schools (Extended)

Mini projects are a chance to work one-to-one with one of our research-active staff to explore an area of interest in greater depth. Throughout the course you will not only become a specialist in HCI but will also develop your skills in analysis, research, technology and presenting and explaining your work clearly and effectively. In your final semester, you will undertake a piece of research work, that may be based on your mini project, in collaboration with one of our active researchers. You will need to demonstrate an ability to define aims, objectives and plans, manage your project and time, use the results of systematic literature searches and communicate in writing and verbally. The project may also involve the development of software. It is through the mini project and the final project that you can really develop your skills and expertise.

Project content can be varied. They can be design focused; concentrating on building skills for design and building of real-world systems or focusing on the experimental evaluation of systems, or could be research oriented; trying to develop novel techniques or understanding fundamental principles.

Teaching and assessment
Learning is via lecture classes, problem-based workshops and one-to-one supervision. There will be some group work as part of the taught modules and there may be opportunities for industry-based project work. Most importantly, you will be part of a small, highly qualified group of students working closely with researchers within the HCI centre.

Assessment is by both practical and written coursework and examinations. The project is assessed on the basis of a practical demonstration and a written report.

The application of HCI is relevant to a number of industries including health care, games and entertainment and mobile communication. Graduates will have the skills to undertake a wide range of roles, such as user experience, user research, interactive design or information architecture. In addition, graduates of this programme are well prepared to continue their studies through research for a PhD.

For more information and how to apply, or to talk to our Admissions Team and current students via our ‘PG Comp Sci Facebook Group’, please get in touch:
Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
www.birmingham.ac.uk/mschci
Robotics
MSc

Want to excel in exploring the theoretical and practical underpinnings of the science of robotics and technology?

**FACT FILE**

**Start date:** September/October  
**Duration:** 1 year full-time  
**Tuition fees:** Visit www.birmingham.ac.uk/pgfees for latest fees  
**Entry requirements:** 2:1 Honours degree in a relevant subject (such as computer science, electronic engineering, physics, mathematics or mechanical engineering) or another science or engineering subject with a significant computing or mathematics content

This programme is designed for graduates of numerate disciplines who also have experience of programming. You will explore theories of intelligent robotic control and software tools required to implement standard algorithms in mobile robots and robot manipulators. This, along with the chance to learn from world leaders in their fields and to develop research and transferable skills, will effectively prepare you to either work in industry or pursue a research degree in robotics.

**Course content**

This course comprises 180 credits. You will study core compulsory modules (60 credits), and select from a wide range of optional modules (60 credits). In your final semester, you will work on a research or software project (60 credits).

**Core modules**

Compulsory, 20-credit modules include:
- Advanced Robotics
- Intelligent Robotics (Extended)
- Robot Vision
- Project (60 credits)

**Optional modules**

You will be able to choose 60 credits from our range of 20-credit modules, which include:
- Computer Aided Verification
- Complex Adaptive Systems (Extended)
- Current Topics in Artificial Intelligence and Machine Learning
- Machine Learning and Intelligent Data Analysis (Extended)
- Mathematical Foundations of Artificial Intelligence and Machine Learning
- Mini Project
- Research Skills, Evaluation Methods and Statistics

**More about the course**

Mini projects are a chance to work one-to-one with one of our research-active staff to explore an area in great depth – analysing the problem and existing solutions, developing new ideas and building or evaluating prototype systems.

You will develop your skills in analysis, research, technology and also in presenting and explaining your work clearly and effectively. In your third semester, you will work on a research project, again with expert one-to-one supervision. This allows you to demonstrate professional competence in a substantial robotics-related project and to apply material learned in other components of the degree programme.

**Teaching and assessment**

Learning is via small lecture classes, problem-based workshops and one-to-one supervision. There will be some group work as part of the taught modules and there may be opportunities for some industry-based project work. Most importantly, you will be part of a small, highly qualified group of students working closely with researchers within the Robotics lab.

Assessment is by both practical and written coursework and examinations. Projects are assessed on the basis of a practical demonstration and a written report.

**FACT FILE**

**Start date:** September/October  
**Duration:** 1 year full-time  
**Tuition fees:** Visit www.birmingham.ac.uk/pgfees for latest fees  
**Entry requirements:** 2:1 Honours degree in a relevant subject (such as computer science, electronic engineering, physics, mathematics or mechanical engineering) or another science or engineering subject with a significant computing or mathematics content

Through the course, you will become a specialist in robotics. Our graduates are well equipped for software development roles in the robotics industry or research and development roles, and many go on to pursue a research degree in robotics.

**LEARN MORE**

For more information and how to apply, or to talk to our Admissions Team and current students via our ‘PG Comp Sci Facebook Group’, please get in touch:

Tel: +44 (0)121 415 8742  
Email: msc-admissions@cs.bham.ac.uk  
www.birmingham.ac.uk/mscrobotics
Computer Science

PhD

An outstanding and internationally respected place to complete your research degree.

The School of Computer Science welcomes highly motivated and well-qualified graduates to join us to work towards a doctorate. Our work is regularly presented in international conferences and journals, indicating the high standards we achieve in research. At Birmingham, we work closely in small teams of researchers embedded within a broad and lively research culture. This combination means you get the necessary focus, while keeping an eye on the bigger picture in which your work is placed.

Course details
The School’s staff and research students are loosely organised into informal research themes. Researchers are free to contribute to one or more themes and each theme organises its own activities. Cross-disciplinary research is a major feature of the School, and links exist with, for example, psychology, medicine, language studies and electronic engineering.

Supervision is arranged on an individual basis in order to closely match the interests of the student with those of the supervisor. We can only offer supervision in the areas in which we have academic expertise, including:

- **Artificial Intelligence**
  - Reasoning and Cognition covers research on architectures for accounting for human mental states and processes as well as recreating them in computer programs.

- **Robotics** research focuses on intelligent robotics and related areas, including cognitive robotics, learning robots, fault diagnosis, machine learning and sequential decision-making.

- **Natural Language Processing** includes metaphor understanding; emotion detection; temporal information analysis and corpus analysis.

- **Nature-inspired Computation**
  Covers both basic and applied research in areas including evolutionary computation, neural computation, artificial life, self-organising systems, emergent behaviours, machine perception, evolutionary robotics, complex adaptive systems, swarm intelligence and real-world applications.

- **Medical Imaging and Image Interpretation**
  Draws upon multidisciplinary research on computational techniques for image interpretation. The core activities relate to medical imaging and aim to develop diagnostic aids, which quantitatively characterise the properties of body tissues and organs.

- **Security and Privacy**
  Covers all aspects of computing security and privacy, tackling problems that are important to society, including government and industry. We are recognised as an EPSRC/GCHQ Academic Centre of Excellence in Cyber Security Research.

- **Human-Computer Interaction**
  Promotes research and development in theories, designs, methodologies, and systems to support people in whatever they want to achieve. Work includes visualisation, intelligent interaction, data mining, ubiquitous and mobile computing. The group acts as a focal point for research, development and expertise in anything that has the user at the core.

- **Software Engineering**
  Focuses on methods and techniques for the development of large and complex software systems, especially in the areas of: cloud, service-oriented architectures, software tools and automated code generation. Our research spans theoretical as well as practical aspects and has resulted in a number of popular software products.

- **Theory of Computation Sciences**
  Explores fundamental concepts in computation and programming language semantics. This often involves profound and surprising connections between different areas of computer science and mathematics. From category theory to λ-calculus and computational effects, topology to constructive mathematics, graph algorithms and complexity to quantum computing, and game semantics to program compilation, our research is diverse and continues to provide new insight and underlying structure.

- **World-class learning and teaching**
  Most of our students are full-time, but a small number are part-time, usually working for UK companies. The supervision process usually takes the form of weekly meetings, (although the frequency will vary according to need), where ideas are exchanged, help is offered and written work is discussed.

Find out more about our research themes: www.birmingham.ac.uk/CSresearch

**FACT FILE**

- **Start date**: September
- **Duration**: 3 years full-time
- **Entry requirements**: 2:1 Honours degree in computer science or a subject relevant to the research topic (eg, mathematics or physics)

**LEARN MORE**

For more information, or to talk to our Admissions Team and current students via our ‘PG Comp Sci Facebook Group’, please get in touch:

- **Tel**: +44 (0)121 414 2653
- **Email**: phd-admissions@cs.bham.ac.uk
- **Website**: www.birmingham.ac.uk/phd-computer-science
Careers support and employability

Supporting you to develop as a person, build your career prospects and even change direction in your career.

Postgraduate study at the University of Birmingham is a chance to learn from world leaders in their fields. This guarantees you a first-class learning and teaching experience, leading to a qualification that is respected and highly regarded the world over, and makes you an extremely attractive prospect in a very competitive job market.

Computer science graduates from Birmingham are highly sought after in an ever-expanding industry, and the opportunities available to you are vast.

Supporting you to achieve a challenging and rewarding career

As a postgraduate student, you are likely to have specific requirements when it comes to planning for your next career step. To support you we offer a wide range of careers and employability services. The College of Engineering and Physical Sciences Careers Network advertises a significant variety of graduate opportunities with companies from across a wide spectrum of industry.

You will also be supported by our own departmental careers officer, who offers regular appointments to our students. We also have specialist College careers and industrial liaison officers, who can offer advice on finding jobs and placements, writing CVs and application forms and succeeding in interviews.

Recruitment fairs, presentations and workshops

In addition to the University recruitment fairs which attract a large number of national and international employers to campus, the School of Computer Science organises its own specialist fairs. These are aimed at careers in software, systems, emerging technologies, consultancy, social, cloud and financial computing.

The School is also contacted on a regular basis by companies hoping to interact with our students by running competitions and hackathons, and to talk to them about graduate opportunities. We regularly invite companies onto campus to spend a day or two in our department, talking exclusively to our student body.

Employers will also often set up a recruitment desk in the School, using the opportunity to promote a vacancy or scheme and ‘headhunt’ the best computer science students. They will also often provide assistance and guidance on their application and assessment processes.

We host some of the top national and international firms including Microsoft, IBM, Cisco, Oracle, BAe Systems, PwC, BT, Deloitte, IBM, Goldman Sachs, Morgan Stanley, Facebook, J.P. Morgan, Bank of America, Bank of England, NHS, UBS, Capgemini, Credit Suisse, amongst many others.

International students returning home also benefit from events where they have the opportunity to meet representatives from high-profile companies and learn about the latest labour market trends.

Employers of our graduates include

Microsoft, IBM, Google, Cisco, Oracle, Apple, HP, Accenture, BT, Cisco, BAe, European Space Agency, Expedia.com, Goldman Sachs, Logica, Honda, Rolls Royce, QinetiQ, Siemens, Deloitte, Sony, Citi, UBS, PwC, GCHQ, Credit Suisse, BAe Systems, Morgan Stanley, J.P. Morgan, Bank of America and Bank of England, among others.

91% of our students are in graduate employment six months after studying with us (DLHE 2016/17).

Computer science graduates are in incredibly high demand, and you could find yourself working across a wide range of areas, from technology, business, finance, education, engineering, government to law and marketing. Examples of roles include:

- Applications Analyst
- Applications Developer
- Artificial Intelligence Engineer
- Cloud Computing Engineer
- Cyber Security Analyst
- Data Scientist
- Financial Computing Analyst
- Forensic Computing Engineer
- Mobile Computing and Software App Developer
- Multimedia Programmer/Computer Games Developer
- Policy Developer
- Robotics Engineer
- Security Software Engineer
- Software Engineer
- Systems Designer

Find out more: www.birmingham.ac.uk/pg-comp-sci-employability
School of Computer Science

Scholarships

Supporting you to achieve your potential.

Fees and funding – postgraduate taught
The University, where possible, wants to remove financial barriers to postgraduate study. Investing in your future, both financially and educationally, means considering all your options to make the best choice.

Scholarships database
The University operates an extensive postgraduate scholarship and funding database, that contains details of all postgraduate taught scholarship and funding opportunities available for you to apply for, to support your studies at Birmingham. Enter your details and find out more here: www.birmingham.ac.uk/pgfunding

Ramsay MSc Bursary (UK/EU)
We have two generously funded MSc bursaries available to UK/EU students. Applications must be from high-calibre students for whom financial considerations may prevent them from undertaking postgraduate study. Applications can be made via: www.birmingham.ac.uk/ramsay-bursary

MSc Postgraduate Loan (UK/EU)
UK/EU students looking to pursue an MSc programme at Birmingham can apply for a non-means tested loan from the British government via the Student Loans Company (SLC). It is intended to provide a contribution towards the costs of MSc study (fees, maintenance or other costs). Find out more here: www.birmingham.ac.uk/pgloan

International students are advised to contact their home country to determine what financial support is available.

Tuition fees and payment
Latest tuition fees can be found here: www.birmingham.ac.uk/pgfees

At Birmingham, we recognise that students need flexibility when paying fees. We offer a range of payment options to suit everyone. Discover more here: www.birmingham.ac.uk/payments

Birmingham Alumni Scholarship scheme
Graduates from Birmingham may be able to apply for an Alumni Scholarship to aid in their MSc study. Find out more: www.birmingham.ac.uk/alumnischolarship

Living costs
It’s important to consider what studying will cost in terms of living. Much will depend on individual preferences, but you can find an indication here: www.birmingham.ac.uk/budgeting

Part-time work
Some students choose to undertake part-time work alongside their study. Whilst your degree must come first, the University operates Worklink, a student recruitment agency which offers casual, flexible vacancies across campus, designed to fit in with your studies. Find out more: www.birmingham.ac.uk/pgwork

Fees and funding – postgraduate research
Each year, the University invests in research funding to attract outstanding students to our PhD programmes, nationally and internationally. For further information on PhD tuition fees, directly funded PhD opportunities and the University’s research funding database detailing available scholarships, please see: www.birmingham.ac.uk/postgraduate/pgr/dr-fees/index.aspx

Funding for research degrees
Our research students are funded from a variety of sources, and we have a number of School scholarships available. All of our scholarships are by nomination only, and no separate application is required. Other studentships may be available from funding sources under the control of the supervisor, and applicants should discuss this with potential supervisors. To find out about the latest opportunities, please contact: phd-admissions@cs.bham.ac.uk
There can be many things to consider when applying for study – we’re here to point you in the right direction.

How to apply for an MSc
Making an application for postgraduate taught study is different to applying for an undergraduate degree. Applications are made directly to the University via our postgraduate application system.

We advise making an application as soon as possible, as our MScs can be very popular, and as such deadlines may be imposed throughout the recruitment cycle.

After creating an online account, you will be asked to submit your personal details and academic qualifications to date. You will need to provide a personal statement, that explains why you have chosen to apply for a particular MSc, and upload academic transcripts of any qualifications already taken.

You will also be asked to supply contact details for two suitable academic referees. Please tell your referees to expect an email from the University, asking them to write and submit an official reference for you.

If English is not your first language, you may be asked to supply evidence of a recognised English language qualification, or indicate that you are intending to take one in the coming months. English language qualifications must be no more than two years old at the time of admission onto the programme.

To find out more about what English language qualifications are accepted, please see: www.birmingham.ac.uk/pg-int-requirements

Applications can be made here: www.birmingham.ac.uk/pg-apply

How to apply for a PhD
In addition to the details above, you will be required to submit a Research Proposal, detailing the proposed content of your PhD. Details of our research themes and academic staff can be found here: www.birmingham.ac.uk/CSresearch

Receiving an offer and meeting conditions
Once your application has been reviewed for academic suitability by our Admissions Office, it will be sent to our Admissions Tutors for consideration. You should expect to receive a decision within six working weeks.

You can check your status via your online portal: https://pga.bham.ac.uk/

If you have been asked to send official verification of documents to meet conditions, you can do so via various routes: www.birmingham.ac.uk/university/colleges/professional/external/admissions/Verification.aspx

For further information on the Admissions Office processes, and to see a list of FAQs, please visit: www.birmingham.ac.uk/admissions

International students
We look forward to welcoming you if you are coming to study with us from outside the UK. Our School is a very friendly mix of people from across the world. You can find out more about coming to the UK, including information on the University, the city and student life here: www.birmingham.ac.uk/International/students/index.aspx

If you are unsure as to whether your undergraduate degree is suitable for postgraduate study, please access our country information pages for a list of comparisons and grades required here: www.birmingham.ac.uk/International/students/country/index.aspx

Postgraduate and Mature Students Association (PGMSA)
The PGMSA is a voluntary, student-led group at Birmingham, and is free for all postgraduate and mature students to join. The PGMSA operates an active social programme, gathers feedback and acts on behalf of the postgraduate student body. Find out more: www.guildofstudents.com/studentgroups/societies/pgmsa/

University Graduate School
The University Graduate School supports Birmingham’s postgraduate researcher (PGR) community, ensuring our PGR students have access to high-quality supervision, training and facilities. Find out more: www.birmingham.ac.uk/gradschool

If you have any questions about the School of Computer Science, or to chat to current postgraduate students via our PG Comp Sci Facebook Group, get in touch:

Tel: +44 (0)121 415 8742
Email: msc-admissions@cs.bham.ac.uk
Email: phd-admissions@cs.bham.ac.uk
www.facebook.com/uobcompsci
www.twitter.com/uobcompsci
The city of Birmingham

THE CITY
Birmingham is a modern and exciting city famous for its historic past, Peaky Blinders, having more canals than Venice, Cadbury’s chocolate, and being the childhood home of JRR Tolkien. It is now a centre of arts and culture, commerce and entertainment, with a vibrant and diverse community.

ENTERTAINMENT, ARTS AND CULTURE
Aside from its industrial past, Birmingham has also long been noted for its cultural heritage. The Hippodrome, Alexandra and Birmingham Repertory Theatres between them stage touring productions and West End shows, ballets, operas, pantomimes and stand-up comedy.

In addition to theatres, there is an excellent choice of cafés and restaurants providing culinary experiences from a variety of cultures, most notably in the Balti Triangle and the Chinese Quarter. There are museums, cinemas, nightclubs, pubs and coffee shops in abundance.

If you like live entertainment, then take your pick from comedy clubs, local music gigs and top shows at Birmingham’s principal theatres, Arena Birmingham and Resorts World Arena regularly showcase headlining music and comedy gigs and sport events. The world-famous City of Birmingham Symphony Orchestra (CBSO) has its home in Symphony Hall.

SPORT
Birmingham is home to football clubs Aston Villa and Birmingham City, with West Bromwich Albion just up the road and in recent years it has staged more sporting championships than any other UK city. The Edgbaston Cricket Ground, close to the University, regularly hosts test matches and international tournaments including the Cricket World Cup. The city also boasts many golf courses, including The Belfry, which has hosted the Ryder Cup four times.

THE HEART OF ENGLAND
Located in the heart of the country, Birmingham has so much to offer visitors. With Warwickshire, the Malvern Hills and the Ironbridge Gorge all nearby, you are never more than a short drive from some of the UK’s most scenic countryside.

Birmingham is at the centre of the motorway, rail and canal network, with its own international airport – you can get almost anywhere in the world from here. London can be reached in just under 90 minutes and we have excellent transport links.

RETAIL THERAPY
The city centre offers a first-class retail experience; from famous brands to independent stores, Birmingham has every shop you could ever need. You’ll find a wealth of choices, including the Bullring and Grand Central for your big brands and high-street needs, and diverse vintage clothing stores in the historic industrial district of Digbeth. Make sure you venture further and explore the hidden gems of Birmingham.
What our postgraduate students say

‘I chose the Human Computer Interaction (HCI) MSc at Birmingham because it gave me the opportunity to develop skills directly related to user experience job roles, but also to pick optional modules that would support my journey through my professional career and allow me to express myself through academic research.

‘Birmingham is a great city for students, with the rest of the UK at your doorstep, and everyone in the School of Computer Science is friendly and accessible. Lecturers in the HCI Centre are open-minded and responsive to your own ideas, while also providing clear feedback. The School provides many opportunities to meet one another, through events and the facilities themselves.

‘I would definitely recommend the MSc HCI at Birmingham. The University is beautiful, the modules challenge you, and Birmingham itself is growing more every year.’

SPENCER, MSc Human Computer Interaction graduate

‘I chose the MSc Cyber Security programme at Birmingham as it is very flexible. The programme is recognised as a high-quality programme in the cyber security field and the University as an Academic Centre of Excellence in Cyber Security by the NCSC. In addition, Birmingham is highly recognised worldwide.

‘The School of Computer Science is amazing. It has all the facilities that a student would need. The staff are very helpful – the professors are highly knowledgeable in their subjects and the content they teach is very important. There are a lot of social and academic activities that help you in your formation and to make friends.

‘I would definitely recommend the MSc Cyber Security at Birmingham – I think it’s one of the best cyber security programmes and one of the best universities to attend.’

RODRIGO, MSc Cyber Security graduate

‘I applied to Birmingham for an MSc because I absolutely loved the flexibility of the programme and the diversity of subjects I could choose. I could create a degree that had a really good mix of new subjects and modules that reinforced my existing knowledge, tailored to the industry jobs I was interested at the time.

‘I actually ended up studying my PhD at Birmingham in Security – which I decided on after studying the Computer Security module.

‘I chose my PhD with the Security Group because they work on problems with real-world impact. Cars, e-voting, all the connected devices we have in our own homes – they are all topics that are relatable to everyone. We all benefit from this type of research.’

ANDREEA, MSc Computer Science and PhD in Security graduate

‘I decided to study MSc Computer Science because of the rapid adoption of technology across many industries. I chose the University of Birmingham because of their great resources and teaching facilities available. During my year at the School of Computer Science, I gained core technical skills that are easily transferable in the workplace and knowledge to build applications using multiple programming languages.

‘The culture of the School also allowed me to settle in quickly and I felt very welcomed. I would definitely recommend studying Computer Science at the University of Birmingham and loved every minute of my time here!

‘I’m now working in cyber security as a Security Analyst, thanks to the MSc Computer Science course!’

MARIA, MSc Computer Science graduate

‘I studied my BSc in Computer Science at Birmingham, but I wanted to explore a deeper understanding of the topics I loved. For me, this is where the Advanced Computer Science MSc shone, as I was able to tailor my degree to get the most out of it based on what I wanted to look further into.

‘My experience of the School was so positive. The facilities that are offered were perfect for both personal and group study throughout the year, and the staff (both academic and non-academic) were always free to explain topics I didn’t quite grasp at first, and help sort out any issues I had.

‘I would definitely recommend choosing Birmingham for postgraduate study – the course allowed me to get everything I wanted out of it, whilst the School made me feel welcomed and safe. I have definitely missed it during my time in the working world!’

TOM, MSc Advanced Computer Science graduate
I chose Birmingham because it is one of the few schools internationally that would allow me to pursue a degree specifically in Robotics. The MSc in Robotics has given me a solid foundation in Robotics and some practical experience conducting human–robot interaction research. I think that this will serve me well in my future career as a researcher.

EMMANUEL, MSc Robotics alumnus

Emmanuel is pictured in the University’s Robotics Lab.

ASK US A QUESTION: www.pg.bham.ac.uk/ask
This leaflet was written several months in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that not all programmes or all courses are offered every year. Also, because our research is constantly exploring new areas and directions of study some courses may be discontinued and new ones offered in their place.

Please note the information in this brochure is correct at time of publication but may be subject to change (November 2019).