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Information provided by the University, such as in presentations, University brochures and on the University website, is accurate at the time of first disclosure. However, courses, University services and content of publications remain subject to change. Changes may be necessary to comply with the requirements of accrediting bodies or to keep courses contemporary through updating practices or areas of study. Circumstances may arise outside the reasonable control of the University leading to required changes. Such circumstances include industrial action, unexpected student numbers, significant staff illness (where a course is reliant upon a person’s expertise), unexpected lack of funding, severe weather, fire, civil disorder, political unrest, government restrictions and serious concern with regard to the transmission of serious illness making a course unsafe to deliver. After a student has taken up a place with the University, the University will look to give early notification of any changes and try to minimise their impact, offering suitable alternative arrangements or forms of compensation where it believes there is a fair case to do so. Offers of a place to study at the University will provide up-to-date information on courses. The latest key information on courses, entry requirements and fees can be found at courses.leeds.ac.uk. Please check this website before making any decisions.

Computing underpins modern life. The link between current research in computing and commercial product is critical to the continuing success of the IT industry. Our students are well placed to have both the background knowledge in the research areas and the technical and professional skills required to lead the design and development of future applications.

An active research environment enables us to offer a range of exciting courses taught by experts who are leaders in their fields. Our research themes – which cover fundamental work in computational systems science, artificial intelligence and applied computing in biology, medicine and health – feature prominently in the curriculum. This allows you to gain insights into cutting-edge problems and their solutions.

**REPUTATION**

We are one of the longest established computing schools in the country, with an international reputation for teaching, research and engagement with industry. We are ranked in the top 15 by The Complete University Guide 2019, and top 10 in the Guardian university league tables 2018.

In recognition of our strong and continued commitment to gender equality, we have received a prestigious Athena SWAN Silver Award.

This is awarded by the Equality Challenge Unit, the national body that promotes equality in the higher education sector.

**OUR DEGREES:**

- **APPLIED COMPUTER SCIENCE**
- **COMPUTER SCIENCE**
- **COMPUTER SCIENCE WITH ARTIFICIAL INTELLIGENCE**
- **COMPUTER SCIENCE WITH HIGH-PERFORMANCE GRAPHICS AND GAMES ENGINEERING**
- **COMPUTER SCIENCE (DIGITAL & TECHNOLOGY SOLUTIONS) BSc**

**JOINT DEGREES:**

- **ELECTRONICS AND COMPUTER ENGINEERING**
- **COMPUTER SCIENCE WITH MATHEMATICS**

To view all undergraduate degrees offered by the Faculty of Engineering visit engineering.leeds.ac.uk
All our degree courses stem from our research activities, which focus on both the application and the scientific aspects of computing. Our research themes of computational systems science and artificial intelligence feature prominently in the curriculum, enabling you to gain insights into cutting-edge problems and their solutions.

Our courses have a common core of programming, software engineering and computer networking: generic skills for this subject area that support the subjects studied in later years and the specialist project undertaken in year three.

**INDUSTRY-RELEVANT COURSES**
Our engagement with industry is one of the main reasons our graduates are so highly valued. The School has an active Industrial Advisory Committee, which helps ensure our courses are up to date with the modern practices and techniques that will enable you to succeed in industry upon graduation.

Our High-Performance Graphics and Games Engineering course was developed in collaboration with a prestigious steering group from industry.

If you choose to join our new cutting-edge Technology Degree Apprenticeship, offered in partnership with PricewaterhouseCoopers (PwC), you’ll become an employee of PwC and get paid a salary.

**FLEXIBLE DEGREES**
Our courses share a common first year. This means you have the freedom to switch courses up until the end of your first year.

You also have the option of extending your studies by taking an industrial placement year or studying abroad. Visit the ‘Careers and employability’ section on page 6 to find out more about these options.

All our courses have a modular structure where you will be required to study 120 credits per year. A standard module is typically worth 20 credits.

**INTEGRATED MASTERS**
All our courses (excluding Computer Science (Digital & Technology Solutions) BSc) are Integrated Masters (MEng, BSc or MSci, BSc) degrees, meaning they provide you with great breadth and depth of study.

If you study for four years, you can graduate with a Masters qualification, which offers you the opportunity to work on a wider range of projects with a high level of industrial involvement. Integrated Masters graduates also typically command higher salaries than those who leave with a BSc degree.

Should you wish to graduate early, you may decide at any point until the middle of the third year to graduate after three years with a BSc.

If you are sure from the start that you only want to study for three years, it is also possible to apply for the BSc version of our courses. The BSc is identical to the first three years of the MEng/MSci course and has the same entry requirements.

**FACILITIES**
You will have access to specialist facilities, including a variety of superbly equipped laboratories containing both Linux and Microsoft platforms. Research facilities are especially important to undergraduates undertaking internships and final-year projects. For example, project students have access to a 53 megapixel powerwall display and a dedicated 3D virtual reality suite, a new cloud computing testbed and dedicated laboratories providing high-specification, dual-display Linux workstations, iPad, Mac and Android development areas.

Our new study zones provide you with high-quality space for individual study and group work. They also include online access, flexible space for project meetings and presentations, and room to relax between studies.
STUDENT SUPPORT
Our personal tutorial system provides academic and pastoral support. You will have a designated personal tutor throughout your studies at Leeds, who will be an academic member of staff. You will have weekly academic tutorials with your tutor throughout your first year, in your tutor group (of typically five students), as well as one-to-one meetings twice per semester.

In addition, our excellent Student Support team is based close to where you'll work and study to help with anything from academic advice to timetabling and project submission enquiries.

The web-based student portal will enable you to access the University's student services and information, while our virtual learning environment, Minerva, will allow you access to your personal timetables, course materials, academic and social groups, and much more.

HANDBS-ON LEARNING
The project work you'll carry out on your course will take you one step closer to becoming a confident and self-motivated graduate.

Projects are an important feature of all our courses. They provide you with an excellent opportunity to explore topics in depth and enable you to develop essential skills such as problem-solving, communication and teamwork, all vital to success in your chosen career.

Our close links with industry mean that you'll benefit from industrial input into design projects at a variety of levels.

YEAR ONE
The Programming Project module requires you to individually develop a larger application chosen from a range of suggested projects. This is designed to reinforce your C programming skills and enhance your ability to independently implement code.

YEAR TWO
The second-year project in software engineering is a major software development task undertaken across one semester by teams of five or six students. It’s the first experience that you’ll have of developing a complex piece of software and you’ll do so in close collaboration with others.

YEAR THREE
You’ll be expected to carry out a piece of individual research and will have an academic supervisor who will offer guidance throughout. Recent examples of projects include:

- 3D noughts and crosses with Baxter, a humanoid robot
- Design of quad rotor semi-autonomous flight controller software
- Visualisation of clinical audit data.

YEAR FOUR
If you do the MEng, you’ll undertake a major group project to further develop your teamwork, project management and research skills in addition to your technical knowledge.

Examples of recent projects include:

- Development of a 3D modelling tool using a haptic device
- Design and development of a tool for monitoring energy measurements in cloud computing
- Exploring the use of NI's myRIO C++ API and robotics platform to perform robot navigation and obstacle avoidance.
Careers and employability

A degree from the University of Leeds and the wider experience you’ll gain while you’re studying here will help you to stand out from the crowd and secure that all-important graduate job.

REWARDING CAREERS
97% of our recent graduates have successfully secured a professional or managerial role or are engaged in study within six months of graduating (DLHE, 2015/16).

Our graduates can be found working in roles including:
• Software Developer, Amazon
• Business Consultant, BAE Systems
• Cyber Forensic Investigator, Barclays
• Technology Graduate, BSkyB
• Software Engineer, BT
• Graduate Software Engineer, IBM
• IT Graduate, John Lewis
• IT Graduate Scheme, Lloyd Banking Group
• IT Analyst, Morrisons
• Capital Plan Analyst, National Grid
• Data Associate, PwC
• Software Engineer, Skype
• Software Developer, X-Lab.

Across the industry, IT professionals earn an average of £38,366, and this can be significantly higher in specialist fields and in different parts of the country. The most recent High Fliers Research report (2018) found that starting salaries for graduates throughout the sector ranged between £28,200 and £37,000, with a median graduate starting salary of £30,000 for 2018.

CAREERS SUPPORT
Throughout your time with us, our multi award-winning Faculty Employability team is here to support, guide and advise you.

In addition to specialist face-to-face meetings, you’ll benefit from:
• timetabled employability sessions
• ongoing support to find internships and placements
• presentations and workshops delivered by employers.

Our award-winning Employability team also organises a Technology, Engineering and Science Careers Fair. This will give you the opportunity to meet graduate recruiters to gain an insight into graduate jobs and to explore placement year and summer internship opportunities.

STRONG INDUSTRIAL LINKS
Our reputation with industry ensures that we maintain close working relationships with companies that actively recruit Leeds graduates. Our staff work with various companies on a range of teaching, research and consultancy projects, and we organise industrial visits and offer additional seminars delivered by practising IT professionals. This means that you will have direct contact with industry and potential employers from the beginning.

Examples of our involvement with industry:
• IBM contributes to the assessment of the second-year group software engineering project and awards a prize to the best group.
• Deloitte, IBM, CSC and RNU contribute directly to our first-year Professional Computing module and actively support our courses.
• Ordnance Survey, the British Library, BT, the Department of Health and Reckitt Benckiser have all contributed ideas for projects in recent years.
• CSC, Deloitte, PricewaterhouseCoopers and Lloyds Banking Group have recently made presentations to our students.

INDUSTRIAL PLACEMENT YEAR
An industrial placement year is a great way to help you decide what kind of career you might like when you graduate. As well as giving you the opportunity to develop your own skills, you’ll gain a real insight into working life in a particular company or sector.

All our degrees allow you to undertake a placement year alongside your degree (either in the third year of the BSc or the third or fourth year of the MEng/MSci).

If you decide to undertake a placement year, this will extend your degree by 12 months. You will be fully supported by our Employability team prior to and during your placement year. On successfully completing your placement year, you will be awarded the ‘Industrial’ variant in your degree title to demonstrate your unique expertise to future employers.

STUDY ABROAD
You have the opportunity to apply to spend time abroad, usually as an extra academic year. The University has partnerships with more than 400 universities worldwide and popular destinations for our students include Europe, the USA, Canada, Australia, New Zealand, Singapore, Hong Kong, South Africa and Latin America.

Visit our website to find out more about these and other opportunities engineering.leeds.ac.uk/computing/employability

Students are currently undertaking a placement year at the following companies:
• Goldman Sachs
• Novartis
• BT
• UBS
• CGI
• Arm
• BBC
• IBM
• NEXT.
I worked for IBM, which is a multinational technology company providing enterprise technology solutions for large businesses. The department I worked in is called 'Storage', specialising in storage virtualisation solutions. My role was extremely diverse so there was nothing typical about any day. I would usually begin by coordinating with my team leader at the time, depending on which project I was working on.”

YUVAL MASS
BSc Computer Science (Industrial)
Industrial placement year at IBM
Applied Computer Science (MEng, BSc)

Computing is critical to all areas of modern life. This course will give you insight into key theoretical aspects of the subject, as well as emphasising the practical skills needed to develop computing infrastructure and solve computational problems in areas such as engineering, healthcare and the business world.

You’ll learn the fundamentals of software development and how to build secure and efficient systems for desktop, web and mobile environments. You will also be able to develop skills in more specialised areas such as data science, cloud computing, intelligent systems and robotics.

Choose from a wide range of optional modules, which allow you to study topics relating to your own interests and ambitions. You’ll also undertake project work at every level of the course, equipping you with the problem-solving and teamworking skills that you will need in your future career.

In your first year you will study the basic principles of programming, develop your mathematical skills and learn about computer architecture. Optional modules will introduce you to fundamental web technologies.

Year two will build on this knowledge base, taking you deeper into more theoretical areas such as algorithms and artificial intelligence, while also giving you practical skills in software engineering and user interface creation.

In year three you’ll have an even wider choice of modules, giving you the chance to study specialist areas such as data analytics and visualisation, security, distributed systems, mobile computing and robotics. You will also undertake a major individual project – an opportunity for you to specialise in an area of your choice.

If you study the MEng qualification, you’ll continue into year four. Options available here cover advanced topics drawn from our research strengths, including big data systems, machine learning, semantic technologies and cloud computing. You will also take part in a substantial group project on a specific engineering problem that allows you to apply everything you’ve learned during the course.

HANDS-ON LEARNING
Project work is used extensively at all levels to allow students to study individual topics in more depth. Recent examples include:

- Forecasting box office sales revenue from film reviews
- Predicting the popularity of news articles from headlines
- Developing a big data solution to enable analysis of UK-wide company data
- Developing a multi-user management information system for property recovery
- Creating an interactive learning resource for teaching Scratch using Kinect
- Developing an activity-tracking android mobile app with image tagging and web functionalities
- Scheduling train crews via a graphical user interface
- Developing a user-adaptive system to support automated medical appointment scheduling.

REWARDING CAREERS
Our graduates have excellent job prospects. With the continuing application of computer technologies, rapid growth of hardware and software technologies, their allied industries and widespread application, the demand for our graduates is set to continue for the foreseeable future.
This course will equip you with the core technical and problem-solving skills to tackle current and emerging challenges in the crucial and fast-changing field of IT and computing.

Our course includes the core topics of programming, software engineering and computer networking.

In addition, specialist areas focusing on computationally challenging problems are developed and analysed through teaching and project work.

In your first year you will learn about the fundamentals of programming and the underlying mathematical principles of computer science while developing skills in software engineering.

Year two allows you to deepen and broaden your knowledge of computer science, with core modules introducing you to topics such as artificial intelligence and developing your understanding of algorithms, operating systems and computer networks. You’ll also select optional modules to focus on topics that suit your interests or career plans.

If you continue to year four to gain the MEng qualification, you can also select modules on topics such as natural language processing, knowledge representation or biocomputation, and you’ll take part in a substantial group project on a specific engineering problem that allows you to apply everything you’ve learned during the course.

This course is accredited by the British Computer Society.

“I have undertaken several work experience placements in various sectors, including finance and computing. I did a placement at Barclays HO in Canary Wharf in Legal and Compliance Operations and also did a summer placement with a company called Human Recognition Systems at Wavertree Technology Park in Liverpool, where I was a software intern.

On these placements I gained insight into how large companies function. I was able to discuss key functions with senior members of staff, and during one of my placements I learnt new programming and computing skills, which worked very well alongside my degree.”

HANNAH HENRY
BSc Computer Science

HANDS-ON LEARNING

Project work is used extensively at all levels to allow you to study individual topics in more depth. Recent examples include:

• Designing high-performance parallel programs
• Developing efficient mathematical algorithms, which can be applied to problems in areas such as finance, weather prediction and biology
• Understanding problem complexity and mathematical techniques for improving the efficiency of solution approaches
• Exploring the uses and security of large-scale system architecture
• Cloud computing
• Mobile app development
• Graphics and visualisation.

REWARDING CAREERS

Our graduates find employment in the IT industry, ranging from startups to international organisations, and across a range of other sectors including technology, retail, finance, public authorities and consultancies.

Recent graduate destinations include Barclays, BT Group – Openreach, CSC, EMIS, Ernst & Young, Fujitsu, Goodrich ISR Systems, Imagination Technologies, Microsoft and PepsiCo.
Computer Science with Artificial Intelligence (MEng, BSc)

Artificial intelligence is increasingly important to computer games, web search, biometric systems and many other areas of modern IT.

This course will allow you to gain fundamental skills such as programming, mathematics, network architectures and project management, while studying specialist artificial intelligence topics such as machine learning, image analysis and text analytics, and their applications in areas from vision to automated reasoning.

Drawing on our internationally leading research and development in the School of Computing and the University’s £4.3m National Facility for Innovative Robotics Systems, you’ll also explore how artificial intelligence is being applied to important economic and societal issues in fields such as medicine, health, transport and smarter cities through case studies from ongoing research projects.

In addition to covering the foundations of artificial intelligence in your first year, you will develop fundamental technical and professional skills such as programming, mathematics, system and network architectures, and project management.

In year two you’ll build on this foundation to develop your knowledge of algorithms and operating systems among other key areas. You’ll also learn about the ideas and techniques involved in different approaches to artificial intelligence, the basics of knowledge representation and key aspects of data mining.

In year three you’ll learn more about robotics and parallel computing while choosing from a wide range of optional modules. You could focus on data science, web services, visualising information or user-adaptive intelligent systems, allowing you to gain a broad base of knowledge and build further specialist skills.

If you continue to year four for the MEng qualification, you’ll take Masters-level modules in areas such as machine learning, image analysis and language processing to enhance your knowledge of the ways in which computer systems can process, represent and analyse different types of complex data.
For my first year programming project I made a game called ‘The Cave’, which is basically about someone rescuing a baby from a cave full of demons. It’s a bit like Pac-Man but a little more sinister. As well as that, I worked in the robotics lab as an intern this summer. I was working with an awesome robot called TIAGo who was new to the lab.

I’ve really enjoyed the content of the course. I particularly liked the individual project at the end of the first year, where I had a lot of freedom to choose what I wanted to do. I learned so much and I’ve acquired some really useful skills. I hadn’t done much programming before I started but now I’ve worked on some great projects.”

ASHLEY OLDERSHAW
MEng, BSc Computer Science with Artificial Intelligence
Computer Science with High-Performance Graphics and Games Engineering (MEng, BSc)

By studying this course you’ll be well placed to join one of the most performance-driven applications of computer science – the multibillion-pound global games industry. As a graduate, you will work at the top-end of the games industry and will develop computer graphics on high-performance platforms, or write engines for the next generation of games.

Developed in collaboration with a prestigious steering group from industry, this course focuses on computer graphics, where programmers must push computing resources to the limit, using deep understanding of architecture and high-performance programming to generate new levels of graphical realism and visual effects on cutting-edge hardware platforms.

You’ll gain proficiency in low-level programming (C++, graphic and compute shaders), a thorough understanding of multicore and many-core programming techniques, game engine and tool development techniques, and fundamental insight into graphics and the practical techniques used in games.

SPECIALIST FACILITIES
You’ll have access to laboratories equipped with high-end Unix workstations with dual monitors and platforms for teaching mobile computing (Android/iOS devices) and robotics.

During your fourth year, you will use workstations with high-end GPUs to act as DirectX12 and Vulkan games development platforms, and you’ll have access to other specialist hardware including the latest virtual reality headsets for experimenting on. For learning games engine design and exploring new rendering techniques, students will be working with the source code of a leading game engine, Epic’s Unreal Engine 4.

This course has been developed in collaboration with a prestigious steering group from industry comprising:
- Barog Game Labs
- Double Eleven
- Epic Games
- NVIDIA
- Team 17
- Sumo Digital
- Weaseltron.

97% OF OUR RECENT GRADUATES HAVE SECURED EMPLOYMENT OR GONE ONTO FURTHER STUDY WITHIN SIX MONTHS OF GRADUATING (DLHE 2015/16)
47% OF UK COMPANIES IN THE GAMES SECTOR ARE EXPERIENCING A SKILLS SHORTAGE

There is a real shortage of technical talent, which is a limiting factor in the growth of the UK games industry. I expect that students on these new programmes will graduate with exemplary expertise in graphics technologies, ready to step into key positions in the gaming and related industries. They’ll be snapped up.”

Paul Porter, CTO and founder, Sumo Digital

REWARDING CAREERS

There is a shortage of highly skilled graduates in this field, so once you’ve completed this course it’s highly likely that you will be in demand. You’ll be well placed to join the multimillion-pound global games industry in positions such as:

- Software Developer
- Technology Leader for Graphics and Rendering
- Games Development Team Leader
- Technical Director.

Outside the games industry, the programming skills you develop during this course would allow you to secure a position in other performance-driven industries, such as embedded systems. Your computer graphics expertise could lead to opportunities in the animation and visual production industries.

“This new course from the University of Leeds is a way to provide great education early on and gives the entire industry an ever-stronger bed of talent to build on, with the required skill set to lead the next generation of research in many areas.”

Phil Scott, Developer Technology Evangelist, NVIDIA

“I like the atmosphere in lectures, all the networking and the content of the course. The curriculum is really well structured. You learn what you need gradually and the modules are interconnected. The tutors and lecturers are always eager to help you.

I believe that the strong connections the University has with industry, especially with my course, is a great advantage for my future career. I also think that the being able to meet lots of new people through various events such as programming nights and talks has had a positive impact on my future career.”

DIANA MARIN
MEng, BSc Computer Science with High-Performance Graphics and Games Engineering
# Modules

This list modules will give you a flavour of what you will study but may change from time to time.
For a complete list of our latest module information visit courses.leeds.ac.uk

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<th>Year 1</th>
<th>Applied Computer Science</th>
<th>Computer Science</th>
<th>Computer Science with Artificial Intelligence</th>
<th>High-Performance Graphics and Games Engineering</th>
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<td>Databases</td>
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<td>Computer Architecture</td>
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<td>Computer Processors</td>
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<td>Fundamental Mathematical Concepts</td>
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<td>Procedural Programming</td>
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<td>Object-Oriented Programming</td>
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<td>Professional Computing</td>
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<td>Programming Project</td>
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<td>Programming for the Web</td>
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<td>Introduction to Web Technologies</td>
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<th>Year 2</th>
<th>Applied Computer Science</th>
<th>Computer Science</th>
<th>Computer Science with Artificial Intelligence</th>
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<td>Operating Systems</td>
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<td>Networks</td>
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<td>Formal Languages and Finite Automata</td>
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<td>Algorithms and Data Structures I</td>
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<td>Algorithms and Data Structures II</td>
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<td>User Interfaces</td>
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<td>Software Engineering Principles</td>
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<td>Software Engineering Project</td>
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<td>Web Application Development</td>
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<td>Social and Mobile Web Application Development</td>
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<td>Data Mining</td>
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<td>Requirements Engineering</td>
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<td>Systems Thinking</td>
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<td>Compiler Design and Construction</td>
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c = compulsory, o = optional
These are typical modules/components studied and may change from time to time.
Computer Science
(Digital & Technology Solutions)
(BSc)

This four-year degree apprenticeship with PwC will give you a head start in your chosen profession. You will experience university life alongside work experience and skills training.

The degree programme will provide you with the core technical and problem-solving skills required to succeed in industry. You will develop core skills in information systems, data, cyber security, business organisation, systems development, computer and network infrastructure, IT project management and technical knowledge, informed by the School’s research.

A DEGREE FROM A HIGHLY RANKED UNIVERSITY
Leeds is among the top universities in the world and the School of Computing is ranked in the top ten in the UK.

A JOB OFFER FROM PwC
Perform well, and by achieving a 2.1 in your degree apprenticeship, you’ll secure your future with PwC.

WORK EXPERIENCE WITH A LEADING ORGANISATION
During this course, you will undertake two summer placements (after the end of years one and two) and a full-year placement in year three. All these placements will be hosted by PwC.

You’ll get to work with some of the biggest brands in the world on your work placements, and the work itself can often be front-page news. You’ll work hand in hand with PwC clients, across their full digital ecosystem, and gain experience that you won’t find elsewhere. You’ll work with several PwC technology teams, gaining experience that will set you apart from your peers.

EARN WHILE YOU LEARN
Your university tuition fees will be funded by PwC, and as a PwC employee, you’ll receive a salary each month.

WHAT YOU’LL LEARN
You’ll start with the fundamentals of programming and the underlying mathematical principles of computer science, before developing skills in software engineering and algorithm design, and exploring challenges in cloud and mobile computing and robotics and graphics that will shape the future. You’ll learn to work with state-of-the-art technologies and select optional modules in topics that suit your interests and career ambitions, from cloud computing and machine learning to topics in enterprise and innovation.
This list modules will give you a flavour of what you will study but may change from time to time. For a complete list of our latest module information visit courses.leeds.ac.uk

### Year 1

**Compulsory modules:**
- Computer Architecture
- Introduction to Discrete Mathematics
- Procedural Programming
- Professional Computing
- Databases
- Computer Processors
- Fundamental Mathematical Concepts
- Object-oriented Programming
- Programming Project
- Summer Placement (Year 1)

**Optional modules:**
You may study up to 20 credits of discovery modules from the University's Enterprise and Innovation theme.

### Year 2

**Compulsory modules:**
- Operating Systems
- User Interfaces
- Artificial Intelligence
- Software Engineering
- Networks
- Formal Languages and Finite Automata
- Numerical Computation
- Algorithms and Data Structures I
- Algorithms and Data Structures II
- Summer Placement (Year 2)

**Optional modules:**
- Data Mining
- Systems Thinking
You may also study up to 20 credits of discovery modules from the University’s Enterprise and Innovation theme.

### Year 3

You will undertake a 12-month placement with PwC.

### Year 4

**Compulsory modules:**
- Final Project
- Secure Computing

**Optional modules:**
- Computer Graphics
- Mobile Application Development
- Cryptography
- Information Visualisation
- Distributed Systems
- Web Services and Web Data
- Combinatorial Optimisation
- Machine Learning
- Intelligent Systems and Robotics
- User-adaptive Intelligent Systems
- Parallel Computation
- Graph Algorithms and Complexity Theory
- Programming Languages and Compilation
- Big Data Systems
- Data Science
- Cloud Computing
Communications, information, visualisation and sensing technologies are becoming increasingly integrated into smartphones, smart homes, electronic healthcare and other areas. As a result, the interface between electronics and computing is a key growth area for the technology industry.

Taught by the School of Electronic and Electrical Engineering alongside the School of Computing, this course has been designed to meet this need. You’ll study the foundations of electronics and computing, from programming languages to electronic circuit design, and learn how the whole hierarchy of electronic hardware and software fits together.

During the first two years, you’ll study the foundations of electronics and computing, covering topics such as electronic circuit design, digital electronics, computing systems, software design and programming. You’ll learn how we go from individual transistors to microprocessors, and on to full computer systems, communication networks, data routing and software applications.

This learning will provide the basis for your studies in year three, when you’ll take more specialised modules in fields like digital communications and embedded systems. You’ll also have the chance to select optional modules that suit your interests and career ambitions on topics such as secure computing, mobile application development and computer graphics.

For MEng students, the fourth year provides a wide range of choice in advanced areas such as FPGAs, embedded microprocessors and cloud computing. You’ll also complete a dissertation on a particular aspect of the industry to help you prepare for professional life.

HANDS-ON LEARNING
Potential student projects cover a broad range of topics owing to the close relationship between electronics and computer engineering. The integration of powerful computing systems with smart electronic hardware means students can develop high-functionality projects.

Project examples include:
- Autonomous mobile robot tour guide
- Augmented reality modelling with a haptic-feedback glove
- Internet-of-Things smart home monitoring system
- Handheld gaming platform.
This is a great course, which combines both electronics and computer science, the two fields I am most interested in. Moreover, the university is very highly ranked for Electrical and Electronic Engineering and has a very good reputation.

I thoroughly enjoy studying my electronics modules and my computing modules. The best aspect of my course is that it combines knowledge in the two subjects and allows me to further my understanding and ability in both fields.

**ALEKSANDAR KORNOV**  
MEng, BEng Electronics and Computer Engineering

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**UNDERGRADUATE DEGREES**

**SCHOOL OF COMPUTING**

This list modules will give you a flavour of what you will study but may change from time to time. For a complete list of our latest module information visit courses.leeds.ac.uk

### Year 1

**Compulsory modules:**

- Computer Architecture
- Introduction to Discrete Mathematics
- Procedural Programming
- Object-Oriented Programming
- Programming Project
- Circuit Analysis and Design
- Communications Networks and Signals
- Communications Systems
- Digital Electronics and Microcontrollers
- Engineering Mathematics

### Year 2

**Compulsory modules:**

- Formal Languages and Finite Automata
- Algorithms and Data Structures I
- User Interfaces
- Electronic Circuit Design
- Communications Theory
- Embedded Systems Project
- Networks
- Compiler Design and Construction
- Microprocessors and Programmable Logic

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**Year 3**

**Compulsory modules:**

- Professional Studies
- Digital Communications
- Embedded Systems
- Group Design Project

**Optional modules:**

- Distributed Systems
- Parallel Computation
- Mobile Application Development
- Secure Computing
- Computer Graphics
- Digital Media Engineering

**Year 4**

**Compulsory modules:**

- Industry Dissertation
- MEng Individual Project

**Optional modules:**

- High speed Internet Architecture
- FPGA Design for System-on-Chip
- Embedded Microprocessor System Design
- Medical Electronics and e-Health
- Parallel and Concurrent Programming
- Foundations of Modelling and Rendering
- High-Performance Graphics
- Cloud Computing

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These are typical modules/components studied and may change from time to time.
Computer Science with Mathematics (MSci, BSc)

Mathematics is the underlying language of computer science, and many of its applications are in the field of computer science. Historically, computer science is unthinkable without mathematics, and many breakthrough discoveries were made at the intersection of both fields. Nowadays, the rapid evolution of computer science poses numerous exciting challenges that can only be solved by both disciplines hand in hand. Taught by the School of Computing and the School of Mathematics, this course allows you to study core topics in both subjects while specialising in areas that link the two at Leeds.

You'll explore topics such as logic, algorithms, graph theory, optimisation, scientific computing, big data and complexity science in depth, and consider how they are applied to meet some of the major challenges facing the modern world. Optional modules will allow you to focus on one of three individual specialisms: discrete mathematics, scientific computation or complex systems.

Your first year will introduce you to a range of fundamental topics in both computing and mathematics, including computer programming, systems, modelling, applied mathematics, pure mathematics and statistics.

This will lay the foundations for the next two years, when you'll build on your skills in core modules, focusing on numerical computation and algorithms.

Your third year will also give you the chance to research a related topic in depth when you complete an individual project under the guidance of your academic supervisor.

In your fourth year, you have a wide range of choices from specialised modules in mathematics and computing. These modules expose you to current research developments and equip you with analytic skills and in-depth knowledge in one of the three specialisms: discrete mathematics, scientific computation or complex systems.

HANDS-ON LEARNING
Project work is used extensively at all levels to allow students to study individual topics in more depth.

Recent examples include:
• Analysis of shortest path algorithms
• Parallel contour tree computation
• Graphs with no cycle with a unique chord
• Algorithms for graphs of bounded tree width.

REWARDING CAREERS
This course is ideal if you are wishing to pursue a career in, for example, the Met Office, GCHQ or Shell, or in engineering, government or finance, including the stock market. It draws together a practical understanding of software engineering and systems, and the skills of analysis and modelling, to investigate particular problems in computing.

THIS COURSE IS TAUGHT BY BOTH THE SCHOOL OF COMPUTING AND THE SCHOOL OF MATHEMATICS
### Year 1

<table>
<thead>
<tr>
<th>Compulsory modules:</th>
<th>Optional modules:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Computer Architecture</td>
<td>• Procedural Programming</td>
</tr>
<tr>
<td>• Computer Processors</td>
<td>• Object-Oriented Programming</td>
</tr>
<tr>
<td>• Fundamental Mathematical Concepts</td>
<td>• Numbers and Vectors</td>
</tr>
<tr>
<td>• Introduction to Discrete Mathematics</td>
<td>• Introduction to Discrete Mathematics</td>
</tr>
<tr>
<td>• Fundamental Mathematical Concepts</td>
<td>• Programming for the Web</td>
</tr>
<tr>
<td>• Introduction to Discrete Mathematics</td>
<td>• Numbers and Vectors</td>
</tr>
<tr>
<td>• Numbers and Vectors</td>
<td>• Numbers and Vectors</td>
</tr>
<tr>
<td>• Introductory Linear Algebra</td>
<td>• Numbers and Vectors</td>
</tr>
</tbody>
</table>

### Year 2

<table>
<thead>
<tr>
<th>Compulsory modules:</th>
<th>Optional modules:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Numerical Computation</td>
<td>• Real Analysis</td>
</tr>
<tr>
<td>• Algorithms and Data Structures I</td>
<td>• Groups and Vector Spaces</td>
</tr>
<tr>
<td>• Algorithms and Data Structures II</td>
<td>• Rings, Fields and Polynomials</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Vector Calculus</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Linear Differential Equations and Transforms</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Nonlinear Differential Equations</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Numerical Analysis</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Numerical Analysis with Computation</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Introduction to Optimisation</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Calculus of Variations</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Computational Mathematics</td>
</tr>
<tr>
<td>• Mathematical Logic 1</td>
<td>• Operating Systems</td>
</tr>
</tbody>
</table>

### Year 3

<table>
<thead>
<tr>
<th>Compulsory modules:</th>
<th>Optional modules:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Individual Project</td>
<td>• Distributed Systems</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Parallel Computation</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Cryptography</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Programming Languages and Compilation</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Computer Graphics</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Combinatorial Optimisation</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Graph Theory</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Number Theory</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Proof and Computation</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Models and Sets</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Combinatorics</td>
</tr>
<tr>
<td>• Graph Algorithms and Complexity Theory</td>
<td>• Coding Theory</td>
</tr>
</tbody>
</table>

### Year 4

<table>
<thead>
<tr>
<th>Compulsory modules:</th>
<th>Optional modules:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Algorithms</td>
<td>• up to 60 credits of optional modules from the School of Computing,</td>
</tr>
<tr>
<td>• Algorithms</td>
<td>• up to 70 credits of optional modules from the School of Mathematics.</td>
</tr>
</tbody>
</table>

These are typical modules/components studied and may change from time to time. For a complete list of our latest module information visit [courses.leeds.ac.uk](http://courses.leeds.ac.uk).
## Entry requirements and how to apply

**Table:**

<table>
<thead>
<tr>
<th>Degree title</th>
<th>UCAS code</th>
<th>Duration (years)</th>
<th>A-level</th>
<th>BTEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEng, BSc Applied Computer Science</td>
<td>I400</td>
<td>4</td>
<td>AAA, GCSE Mathematics grade B (6) or above is also required. Excluding General Studies and Critical Thinking.</td>
<td>D<em>D</em>D and GCSE Mathematics grade B or above.</td>
</tr>
<tr>
<td>BSc Applied Computer Science</td>
<td>I402</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEng, BSc Computer Science</td>
<td>G402</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSc Computer Science</td>
<td>G400</td>
<td>3</td>
<td>AAA, including Mathematics or Computing. Grade B (6) or above in GCSE Mathematics is required if no Mathematics A-level is taken. Excluding General Studies and Critical Thinking.</td>
<td>D<em>D</em>D with distinctions in all mathematics units. Mathematics units must usually include Further Maths and/or other appropriate mathematics units. Some may be optional on your BTEC but are required by the Faculty. Please contact us for further information.</td>
</tr>
<tr>
<td>MEng, BSc Computer Science with Artificial Intelligence</td>
<td>G702</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSc Computer Science with Artificial Intelligence</td>
<td>G700</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEng, BSc Computer Science with High-Performance Graphics and Games Engineering</td>
<td>I6K8</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSc Computer Science (Digital &amp; Technology Solutions)</td>
<td>G404</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSci, BSc Computer Science with Mathematics</td>
<td>G4G2</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BSc Computer Science with Mathematics</td>
<td>G4G1</td>
<td>3</td>
<td>AAA, including Mathematics. Excluding General Studies and Critical Thinking.</td>
<td>DDD with distinctions in all mathematics units plus grade A in A-level Mathematics. Mathematics units must usually include Further Maths and/or other appropriate mathematics units. Some may be optional on your BTEC but are required by the Faculty. Please contact us for further information.</td>
</tr>
<tr>
<td>MEng, BEng Electronics and Computer Engineering</td>
<td>H6BB</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEng Electronics and Computer Engineering</td>
<td>H6B7</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Lower offers may be made based on demonstrated interest and aptitude for the subject (typically AAB). Where Mathematics or Computing are required, these must be at grade A. Where an A-level science subject is taken, we require a pass in the practical science element alongside the achievement of the A-level at the stated grade.*

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**EQUIVALENT QUALIFICATIONS**

We welcome students with a range of qualifications and these are listed on our website. engineering.leeds.ac.uk/computing/ug-equivalents

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**ENGLISH LANGUAGE REQUIREMENTS**

English Language at grade C (4) or above, or an appropriate English language qualification, e.g. IELTS 6.0 with no less than 5.5 in each section.
ACCESS TO LEEDS
The University of Leeds has a policy of welcoming applicants from non-traditional academic backgrounds. If you do not meet our entry criteria above, you may be eligible through the Access to Leeds scheme.
leeds.ac.uk/a2l

INTERNATIONAL FOUNDATION YEAR
Our International Foundation Year (IFY) is intended for international students who do not yet have the formal qualifications required for entry to year one of our degree courses.
internationalfoundationyear.leeds.ac.uk

LANGUAGE CENTRE
Our Language Centre provides the Academic English for Undergraduate Studies pre-sessional course, which is designed to help international students develop the necessary language and academic study skills for undergraduate study.
www.leeds.ac.uk/languages

HOW TO APPLY
All undergraduate applications should be made through the Universities and Colleges Admissions Service (UCAS). Full instructions on how to apply are available at ucas.com.

OFFER PROCESS
Suitable applicants will be invited to an applicant day, for which we encourage attendance, as this gives you the opportunity to meet our students, academic and admissions staff, and find out more about your course. You’ll take part in a practical computing activity followed by a student-led tour.

During the day you’ll have a discussion with an academic member of staff, to check that it’s the right course for you and your career plans, have your questions answered and find out more about studying at Leeds.

We offer a number of scholarships within the School. Please visit our website for further details.
engineering.leeds.ac.uk/scholarships

CONTACT US
If you require any further information prior to making a formal application, please contact our Undergraduate Admissions team.

School of Computing
University of Leeds
Leeds LS2 9JT, UK
tel: +44 (0)113 343 5440
email: ugcomp@leeds.ac.uk

FIND US ONLINE
To find out more about the University and the School of Computing visit:
engineering.leeds.ac.uk/computing

facultyofengineeringleeds
@LeedsUniEng
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engineeringleeds
leedsuniengineering