Prifysgol Aberystwyth University

Department of Computer Science
Undergraduate Studies

Contents

Department of Computer Science
Llandinam Building
Aberystwyth University
Aberystwyth
UK
SY23 3DB

+44 (0) 1970 622424
cs-admissions@aber.ac.uk

@AberCompSci

Important information

The programme information published in this brochure was correct at time of going to print (September 2019) and may be subject to change. Prospective students are advised to check the definitive programme information, including entry requirements, that is available on our website before making an application, to ensure that the programme meets their needs.

Introduction

Welcome to the Department of Computer Science.

We are proud to be one of the longest established Computer Science Departments in the UK, continuing to lead in technological research and in the delivery of top quality graduates.

Our areas of research and development include robotics, artificial intelligence, bioinformatics, image processing, internet communications and software engineering – with strong links with major international companies.

Most of our degrees are accredited by The Chartered Institute for IT (BCS) on behalf of the Engineering Council, giving you a head start when you enter the competitive job market.

With an Athena SWAN Bronze award, we are committed to promoting gender equality across our department and advancing the careers of women in science and technology.

Aberystwyth is a fantastic place to be a student. The town is set amongst some of the most beautiful countryside in the UK, and the University offers excellent sporting, social and support facilities.

bcs Accredited Degree

Athena SWAN Bronze Award

Why study Computer Science

As the world becomes increasingly reliant on technological advancements, the relevancy of Computer Science will continue to grow. Computer Science plays an integral part in engineering, science, travel, media, communication, commerce and more. This means the knowledge and technical skills you will gain as you study with us are widely applicable to a number of vastly different industries.

The Department of Computer Science places great importance on the quality of teaching, learning environment and the cultural experience it offers its students; where you will become part of a close-knit and inclusive community.

Our exciting and workplace relevant degree schemes are highly regarded by both students and employers; with the option of an integrated year in industry which we strongly encourage our students to take. Our graduates are able to find interesting, well-paid work after graduation.

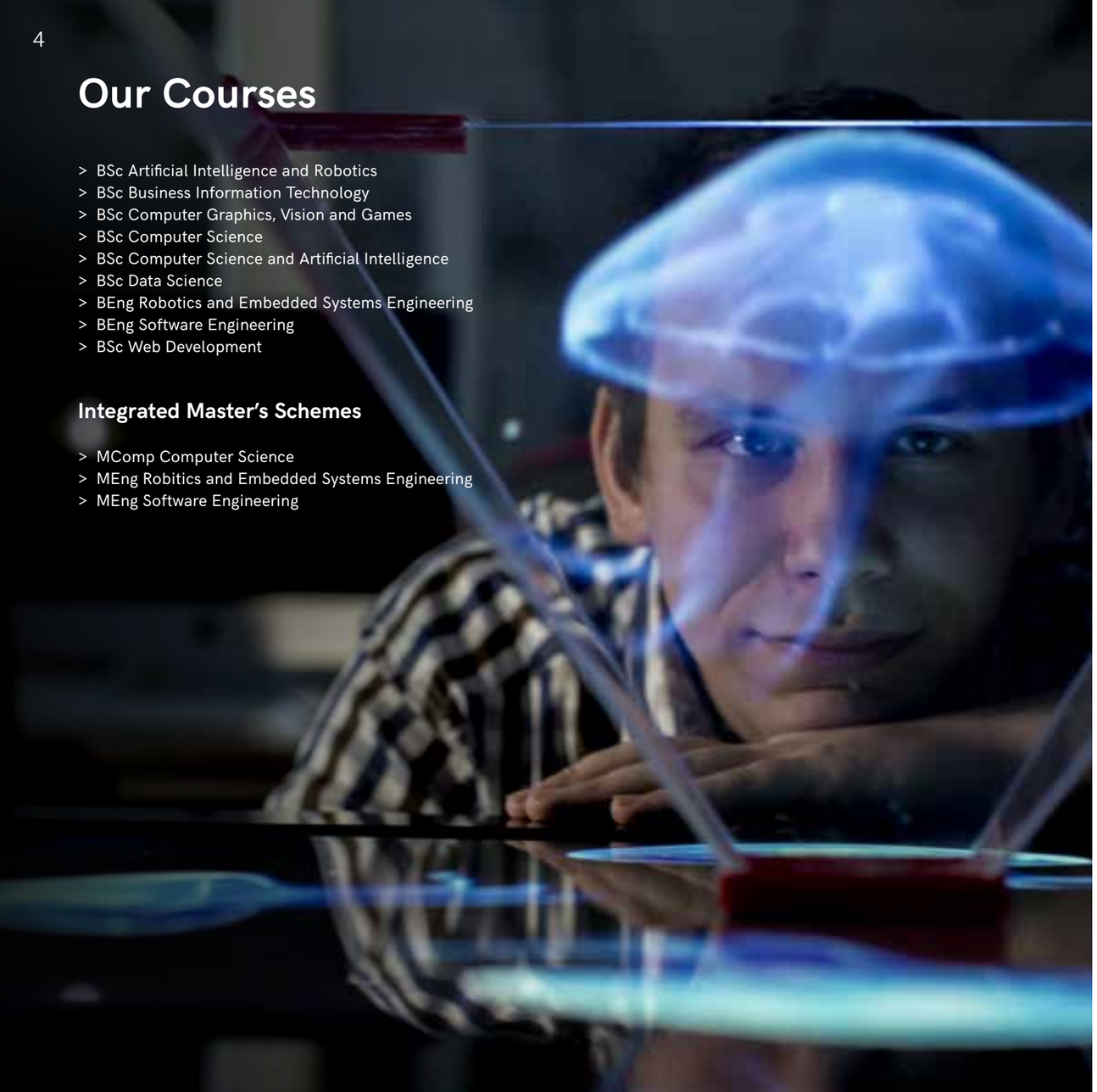
Our degrees will prepare you for a variety of careers that include: Software Design; Communications and Networking; Computer Applications; Web Development; IT Consultancy and Management; Systems Analysis and Development.

Our Courses

- BSc Artificial Intelligence and Robotics
- BSc Business Information Technology
- BSc Computer Graphics, Vision and Games
- BSc Computer Science
- BSc Computer Science and Artificial Intelligence
- BSc Data Science
- BEng Robotics and Embedded Systems Engineering
- BEng Software Engineering
- BSc Web Development

Integrated Master's Schemes

- MComp Computer Science
- MEng Robitics and Embedded Systems Engineering
- MEng Software Engineering



Artificial Intelligence and Robotics

BSc (Hons)

BCS Accredited Degree

At Aberystwyth we'll help you to develop your knowledge of the underlying technologies, and the vocational skills involved with Artificial Intelligence and Robotics.

This degree will give you a firm foundation in programming, software design and computer architecture; and you'll also specialise in the theory of artificial intelligence and robotics, the development of practical applications, and tools that assist development. This opens up many pathways for our graduates and creates a dynamic learning environment in which our students can discover their potential.

At Aberystwyth Artificial Intelligence and Robotics students have access to:

- a dedicated robotics laboratory;
- a robotics workshop;
- a range of specialised research equipment including electric cars, robotic rovers, sailing robots, robotic arms, UAVs.

Employability

This degree provides the appropriate skills for any typical job in the software industry. Its particular emphasis also gives you a head start when applying for jobs in areas like industrial robotics or machine learning; medical robotics; programming of softbot applications for commercial problems; and intelligent robotic design and programming.

Core Modules and teaching structure on this course includes:

Year 1

- Introduction to Computer Infrastructure
- Introduction to Programming
- Problems and Solutions
- Professional and Personal Development
- Programming Using an Object-oriented Language

Year 2

- Artificial Intelligence
- C and C++
- Modelling Persistent Data
- Program Design, Data Structures and Algorithms
- Robots and Embedded Systems
- Software Engineering

Year 3

- Machine Learning
- Major Project
- Professional Issues in the Computing Industry
- Space Robotics
- Robotics Applications
- Ubiquitous Computing

Degree type: BSc

UCAS Code: GH76 (GH7P with integrated year in industry).

Duration: 3 years (GH7P is 4 years).

Business Information Technology

BSc (Hons)

In choosing to study this Business Information Technology degree you'll become skilled in the ways in which professionals apply technology to answer business problems.

With exposure to the key building blocks for business efficiency, including systems analysis, database applications, business environment, e-commerce and e-business systems, web programming and web tools, you will learn how to analyse business requirements and translate them into effective business systems.

On successful completion of the Business Information Technology degree you'll have amassed the range of core and essential skills and capabilities sought by employers of this discipline.

At Aberystwyth, Business Information Technology students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- modules on business processes, building websites, HCI, and e-commerce.

Employability

Our graduates have a good understanding of the demands of the commercial world for computer systems and a professional approach to building those systems from standard database, web and office components. The scheme will provide an advantage when applying for jobs involving the creation of commercial systems using different tools and building blocks, using analytical techniques to introduce Information Technology (IT) into business problem solving, providing database and web-enabled commercial solutions, and supporting IT users.

Core Modules and teaching structure on this course includes:

Year 1

> Introduction to Computer Infrastructure
> Introduction to Programming
> Professional and Personal Development
> Programming Using an Object-oriented Language
> Web Development Tools

Year 2

> Business Systems Analysis
> Management Information Systems
> Modelling Persistent Data
> Programming for the Web
> Applied Graphics
> Software Engineering for the Web
> Web Design and the User Experience

Year 3

> Management of Organisations
> Web-based Major Project
> Professional Issues in the Computing Industry

Degree type: BSc

UCAS Code: G500 (G501 with integrated year in industry).

Duration: 3 years (G501 is 4 years).

Computer Graphics, Vision and Games

BSc (Hons)

Our Computer Graphics, Vision and Games degree combines core computer science with the technical end of digital arts.

This scheme will give you a firm foundation in programming, software design and computer architecture; and you'll also specialise in digital arts. Our courses cover the technical side of understanding how images are created (computer graphics) and how machines can understand and interact with images (vision). You will also study video games, their design core algorithms and implementation.

At Aberystwyth our staff actively research in these crucial areas so they can confidently and passionately give you a sound grounding in the underlying technologies as well as vocational skills that include programming, software design, information search and query, data analysis and classification, and intelligent decision-making.

At Aberystwyth our Computer Graphics, Vision and Games students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- use of research equipment, including mobile robots, sailing robots and manipulator arms, vision and motion tracking systems and a VR laboratory;
- lecturing staff who are active in computer vision research and specialise in the areas of this degree.

Employability

Graduates of this degree will be particularly well-suited to jobs in games development, data analysis and classification, visualisation, image and video processing. You will also gain the knowledge needed for other roles in software design, systems analysis and development, communications and networking, web development and IT consultancy.

Core Modules and teaching structure on this course includes:

Year 1

> Introduction to Computer Infrastructure
> Introduction to Programming
> Problems and Solutions
> Professional and Personal Development
> Programming Using an Object-oriented Language
> Web Development Tools

Year 2

> Applied Graphics
> Artificial Intelligence
> Modelling Persistent Data
> Program Design, Data Structures and Algorithms
> Software Engineering

Year 3

> Computer Graphics and Games
> Computer Vision
> Machine Learning
> Major Project
> Professional Issues in the Computing Industry

Degree type: BSc

UCAS Code: G450 (G451 with integrated year in industry).

Duration: 3 years (G451 is 4 years).

Computer Science

BSc (Hons)

Computer Science covers a vast range of topics including programming, software design, and the engineering of large software systems; meaning it is our Department's most flexible degree, providing core modules that are key for a career in Computer Science.

You will acquire specialist skills such as software engineering, graphics and visualisation, artificial intelligence, robotics, telematics, mobile computing, web development and open source computing, that are highly sought after by employers in this industry.

At Aberystwyth our Computer Science students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- core modules in computer science and a wide range of optional modules;
- use of research equipment, including mobile robots, sailing robots and manipulator arms, vision and motion tracking systems.

Employability

Our graduates and industrial year students are eagerly sought by employers. These include: the BBC, Google, Amadeus Germany GmbH, CAP Gemini, Ethos Digital Technology, Fidessa, Logica and Renishaw Plc. Example jobs entered include: analyst programmer, graduate software developer, IT officer, programmer, research assistant, software engineer, systems developer and website designer.

Core Modules and teaching structure on this course includes:

Year 1

> Introduction to Computer Infrastructure
> Introduction to Programming
> Problems and Solutions
> Professional and Personal Development
> Programming Using an Object-oriented Language
> Web Development Tools

Year 2

> Modelling Persistent Data
> Program Design, Data Structures and Algorithms
> Software Engineering

Year 3

> Agile Methodologies
> Major Project
> Professional Issues in the Computing Industry

Degree type: BSc

UCAS Code: G400 (G401 with integrated year in industry).

Duration: 3 years (G401 is 4 years).

Computer Science and Artificial Intelligence

BSc (Hons)

In recent years, Artificial Intelligence (AI) techniques have become common place in industry, as a result, there is a strong demand for computer science graduates who have specialist training in Artificial Intelligence.

You will gain a firm foundation in computing skills such as programming, software design, and computer architecture.

You will also develop specialised skills in the area of artificial intelligence, and interaction with related areas of study such as intelligent agents in games programming and mobile computing to solve complex problems including, analysis, design, solution choice and implementation. These skills are highly sought out by employers, equipping you for future success.

At Aberystwyth our Computer Science and Artificial Intelligence students have access to:

- a dedicated robotics laboratory;
- modules including AI, algorithms and machine learning;
- a range of specialised research equipment including electric cars, robotic rovers, sailing robots, robotic arms, flying robotic platforms.

Employability

This degree provides the appropriate skills for any typical job in the software industry. It also gives you a head start when applying for jobs in application areas requiring autonomy or artificial intelligence; medical and/or bioinformatics tasks that require a good background in computational intelligence; programming of softbot applications for commercial/business problems; and design and implementation of intelligent controllers, such as those required in robotics.

Core Modules and teaching structure on this course includes:

Year 1

> Introduction to Computer Infrastructure
> Introduction to Programming
> Problems and Solutions
> Professional and Personal Development
> Programming Using an Object-oriented Language
> Web Development Tools

Year 2

> Artificial Intelligence
> Modelling Persistent Data
> Program Design, Data Structures and Algorithms
> Software Engineering

Year 3

> Agile Methodologies
> Machine Learning
> Major Project
> Professional Issues in the Computing Industry

Degree type: BSc

UCAS Code: GG4R (GG47 with integrated year in industry).

Duration: 3 years (GG47 is 4 years).

Data Science

BSc (Hons)

Data Science is an exciting new discipline where computing and mathematics meet, that addresses how we can make sense of the terabytes of information that our computers are collecting every day. It can be used to predict what people will want to buy or where we need to put more money into the National Health Service to make it more effective, for example.

Taught jointly by research-active academics in the Department of Computer Science and the Department of Mathematics to promote world-class ideas and stimulate learning, this degree gives you a strong grounding in the underlying theory of data science as well as the practical skills to be able to apply that theory in real-world data analytics.

We provide you with the underlying mathematical and statistical understanding and the practical computing skills needed to be able to design and carry out analysis of large sets of data, and to draw implications from the results, giving you the skills needed to succeed in this industry.

At Aberystwyth our Data Science students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- modules from both departments that focus on dealing with patterns in data;
- lecturers whose research specialties include statistics, data analysis and mathematical modelling.

Employability

Our graduates and industrial year students are eagerly sought by employers. These include: the BBC, Google, Amadeus Germany GmbH, CAP Gemini, Ethos Digital Technology, Fidessa, Logica and Renishaw Plc. Example jobs entered include: analyst programmer, graduate software developer, IT officer, programmer, research assistant, software engineer, systems developer and website designer.

Core Modules and teaching structure on this course includes:

Year 1

> Algebra
> Calculus
> Introduction to Computer Infrastructure
> Introduction to Programming
> Profitability
> Further Algebra and Calculus
> Mathematical Analysis
> Programming Using an Object-oriented Language
> Statistics

Year 2

> Applied Statistics
> Distributions and Estimation
> Introduction to Numerical Analysis and its Applications
> Modelling Persistent Data
> Program Design, Data Structures and Algorithms
> Linear Algebra
> Software Engineering

Year 3

> Agile Methodologies
> Linear Statistical Models
> Major Project

Degree type: BSc

UCAS Code: G400 (G401 with integrated year in industry).

Duration: 3 years (G401 is 4 years).

Robotics and Embedded Systems Engineering

BEng (Hons)

Our research-active staff provide hands-on support to guide you through building and running intelligent systems while ensuring reliability in unpredictable real-world situations. Work in this area requires not only a deep understanding of software, but also of the operation in the physical world and the underlying mathematics describing it.

As well as gaining a firm foundation in computing skills, you will develop specialised skills in robotics, Artificial Intelligence and systems engineering. Our optional year in industry is a crucial way for you to gain practical experience of applying the skills acquired in the first two years of study. It will also help you stand out from your competitors when you're applying for work.

At Aberystwyth our Robotics and Embedded Systems Engineering students have access to:

- dedicated robotics laboratory;
- robotics workshop;
- a range of specialised research equipment including electric cars, robotic rovers, sailing robots, robotic arms, flying robotic platforms.

Employability

Graduates will have a strong background in computing that should prepare them for a range of careers in the computing industry. In addition, the specific skills gained on this degree are an ideal preparation for working in the aerospace and automotive industries and the emerging area of the Internet of Things.

Core Modules and teaching structure on this course includes:

Year 1

> Algebra and Differential Equations
> Calculus
> Classical Dynamics
> Introduction to Programming
> Forces and Energy
> Problems and Solutions
> Professional and Personal Development
> Programming Using an Object-oriented Language

Year 2

> Mathematical Physics
> Program Design, Data Structures and Algorithms
> Sensors, Electronics and Instrumentation
> Artificial Intelligence
> Robots and Embedded Systems
> Software Engineering

Year 3

> Major Project
> Professional Issues in the Computing Industry
> Robotics Applications
> Space Robotics

Degree type: BEng

UCAS Code: 132A (132B with integrated year in industry).

Duration: 3 years (132B is 4 years).

Software Engineering

BEng (Hons)

Software Engineering is concerned with the production of large, high-quality, and often long-lived, software systems. Work in this area requires not only a deep understanding of software and related technologies, but also an appreciation of the management and professional issues associated with the development of large systems.

We emphasise professional engineering as well as computing skills on this degree. As well as developing a deep understanding of software and related technologies, you'll also appreciate the management and professional issues associated with the development of large systems. You will develop specialised skills in graphics and visualisation, artificial intelligence, robotics, telematics and mobile computing.

This degree includes an integrated year in industry, on which you'll be able to acquire real-world experience, to challenge yourself and create invaluable networking connections. Many of our students return from this year with employment for when they graduate.

At Aberystwyth our Software Engineering students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- core modules that focus on software engineering scenarios;
- lecturers with close links to the software industry.

Employability

This degree provides appropriate skills for the majority of technical jobs in the software industry. Graduates have obtained positions in companies both large and small and also in government bodies, and our graduates are frequently complimented on their professional approach.

Core Modules and teaching structure on this course includes:

Year 1

> Introduction to Computer Infrastructure
> Introduction to Programming
> Problems and Solutions
> Professional and Personal Development
> Programming Using an Object-oriented Language
> Web Development Tools

Year 2

> C and C++
> Modelling Persistent Data
> Program Design, Data Structures and Algorithms
> Software Engineering

Year 3

> Agile Methodologies
> Major Project
> Mobile Development with Android
> Mobile Development with iOS
> Professional Issues in the Computing Industry

Degree type: BEng

UCAS Code: G600.

Duration: 4 years (with integrated year in industry).

Web Development

BSc (Hons)

There is a huge demand for graduates with the skills to construct effective internet applications to meet modern business needs. On this degree, we combine practical training in building websites to professional standards with study of the commercial, legal and technical context in which the internet operates.

You will be introduced to the fundamental concepts and tools of Computer Science such as programming, algorithms, problems and solutions. You'll also learn about computer infrastructure, mathematics, web programming, e-commerce, systems administration, and databases. You'll develop your web development and software engineering skills, and in your final year, you will be required to develop a piece of software in an area of particular interest for your individual project.

You can also study this course with a year in industry, from which many of our graduates are offered employment upon their graduation.

At Aberystwyth our Web Development students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- modules on systems administration, building industrial specification level web applications, and e-commerce.

Employability

A professional approach to website construction and a good understanding of the business processes behind commercial web applications will give graduates an advantage when applying for jobs that entail building modern database-driven websites using appropriate tools and components; using the web and databases to provide interactive real-time solutions for industry, commerce and the public sector; developing network solutions for organisations; and supporting computer and network users.

Core Modules and teaching structure on this course includes:

Year 1

> Introduction to Computer Infrastructure
> Introduction to Programming
> Problems and Solutions
> Professional and Personal Development
> Programming Using an Object-oriented Language
> Web Development Tools

Year 2

> Modelling Persistent Data
> Programming forthe Web
> System and Network Services Administration
> Software Engineering for the Web
> Web Design and the User Experience

Year 3

> E-commerce Implementation, Management and Security
> Web-based Major Project
> Professional Issues in the Computing Industry

Degree type: BSc

UCAS Code: H602 (H603 with integrated year in industry).

Duration: 3 years (H603 is 4 years).

Integrated Master's schemes

Our prestigious MEng and MComp courses are similar to their equivalent Bachelor degrees but provide an extra year of instruction at postgraduate level in the form of an Integrated Master's.

Software Engineering includes an integrated year in industry, while for the other schemes you may opt to take an integrated year in industry, taking courses to 5 years in length. The integrated year in industry forms the third year of your course, followed by a further two years of study to develop your skills and employability further with our supportive teaching. During this time, you will undertake team and individual projects as well as modules at Master's level. Open-ended challenges are a chance for you to explore and test your knowledge, and success demands an independent-minded, but nonetheless strictly professional and well-organised approach to study.

At Aberystwyth our Integrated Master's students have access to:

- regularly updated laboratories providing access to a full range of computing environments including MacOS, Linux and Windows;
- lecturers with close links to the software industry and cutting-edge research;
- research equipment, including mobile robots, manipulator arms, and vision and motion tracking systems.

Employability

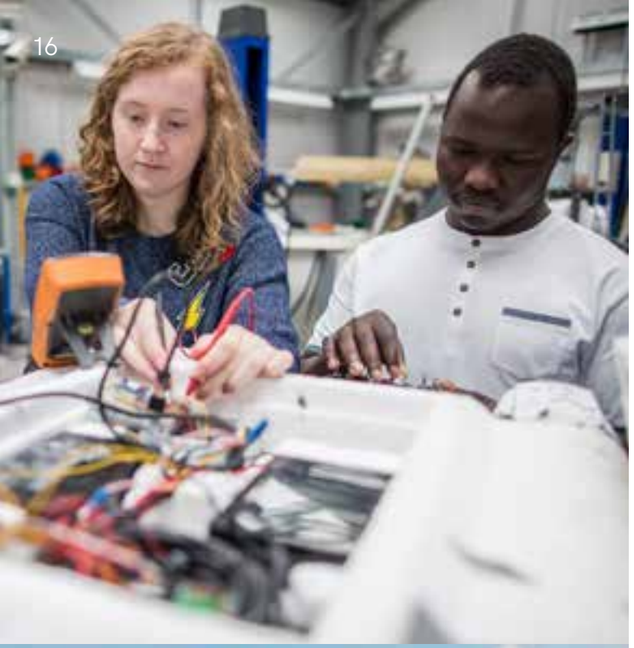
Our graduates are eagerly sought by employers, particularly with a Master's-level qualification. The year in industry means that students can finish their degree having already had a year's experience of working in computing, making them even more attractive to employers.

bcs Accredited Degree

G409, G419 and G601 only

Degree type: MEng or MComp.

Duration: 5 years (132C and G409 are 4 years).



Research

Many of our lecturers are research-active in their respective fields and enjoy helping students develop in their knowledge, understanding and application. There are four research groups where our lecturers use their expertise, nationally and internationally, and students that share the same interests are encouraged to get involved.

- **Advanced Reasoning Group** – conducting innovative research in qualitative and approximate reasoning, including methods of knowledge representation, model generation and refinement, and model-based problem solving; evolutionary computation and heuristic optimisation, including theoretical foundations of advanced computational intelligence techniques;

- **Bioinformatics and Computational Biology Group** – conducting research in areas such genomics/metagenomics, health informatics, metabolomics, information management systems, time series analysis and stringology;

- **Intelligent Robotics** – the largest robotics group in Wales, involved in both national and international research consortia from novel computational models inspired by biology to space missions to Mars; focusing on both software and hardware issues that are key to 'unconstrained environments';

- **Vision, Graphics and Visualisation Group** – focussing on: medical image analysis and understanding; vision for biological analysis of plants and animals; vision for robotics, including navigation and object manipulation; understanding of human vision; and, applications of virtual and augmented reality.

Departmental Scholarship

We are committed to encouraging high-calibre and enthusiastic applicants to pursue studies in Computer Science. That is why we offer a Departmental Scholarship for applicants who achieve excellent (A*) grades on their A-Levels, or other relevant qualifications.

The level of the award is £500 per year for the duration of your degree scheme (three or four years giving a total award of up to £6,800 (if a University Entrance Scholarship is included on top). The award is retained providing that an exam average of 70% or above is achieved each year. Joint honours students are eligible for £250 per year.

Additional awards may also be made at the discretion of the Department.

Departmental Life and Aberystwyth

Aberystwyth is a vibrant and cosmopolitan seaside town, with lots to offer our students. Situated in a stunning landscape including sea, beach, valleys and hills it is a unique place to live and study.

Alongside your studies in Computer Science we encourage all our students to explore the various clubs and societies that the University offers. There are several societies and clubs that are related the Computer Science, such as:

- **AberCompSoc** – our student computer science society organises regular events and trips, as well as weekly socials.
- **Aberystwyth Community Of Gamers (ACOG)** – devoted to providing a social and competitive platform for the gamers of Aberystwyth. ACOG frequently holds gaming events in the student union, runs weekly socials around town and competes nationally with other universities. Over the last few years, ACOG has continued to grow and is now one of the largest and most successful societies in Aberystwyth.
- **Aberystwyth Robotics Club** – supported by the Infinity Exhibition and Aberystwyth Robotics Club (outreach), this society meets every Wednesday afternoon to work together as groups or as individuals to create the hardware and software for all things robotics related. No experience is required, just enthusiasm!

What our students say

Robert Buchan Terrey

BSc Computer Science (G400), 2015-2018

I liked how the course was a good mix of practical hands on work, and theory. The project work gives you a chance to self-learn and troubleshoot. These skills come in useful once you're in the workplace. I now write code to test high-performance motor controllers, using an industry standard language which I was able to learn from scratch using the skills from the course.

Samantha Pendleton

BSc Business Information Technology (G500) then MSc Data Science (G490), 2014-2018

I love data, and this Masters degree showed me how to combine programming and statistical analysis to study the science of data! I was worried that my previous lack of programming skills might have held me back, but the innovative methods of teaching made my transition into a data scientist an enjoyable experience. In particular, I enjoyed the live-coding Python module lectures, and also the dissertation process allowed me to branch out and explore different aspects of data science.

The computer science department was my home for the duration of my Masters! There were plenty of comfortable spaces to work and I had all the resources I needed. I loved working in the IMPACS library as the view is so nice!

Studying Data Science has opened so many doors for me, but ultimately this course inspired me to study further, so I am currently pursuing a PhD in Clinical Informatics. I work with clinical patient data: seeking out patterns, trends, and groups of patients for further analysis. Hopefully my work will help to improve medical research by linking together large collections of textual data to make them more usable.

How to apply

Once you have decided what course you want to study and where, you'll be able to start the university application process. Here's a brief overview of the process and our procedures here at Aberystwyth.

1 Apply through UCAS.com

Deadline 15 January. Aberystwyth University institution code: A40.

TOP TIP: You'll be given a 10 digit UCAS ID number. Keep this to hand as you'll be asked for it many times.

2 The university will consider your offer

TOP TIP: Use UCAS Track to keep an eye on your application. At Aberystwyth we aim to make a decision within 4 weeks.

3 The offer will show on UCAS track

4 Decide where to go

Once you've received all your offers, you'll need to decide which university you want to go to, within a set time. This is when you'll need to note which universities will be your firm and insurance choices.

5 Accommodation

Once you've chosen your firm/insurance choice you'll be able to apply for your accommodation (April 1st onwards).

6 Results day

UCAS Track will confirm your offer of a place. If you're not clear what the offer is, contact the university directly. Make sure you're not on holiday on results day. If you don't get the grades you've hoped for, you may want to consider entering Clearing.

7 Start packing!

1872 PRIFYSGOL ABERYSTWYTH UNIVERSITY