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ABERYSTWYTH
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| Department of Computer Science

Postgraduate studies in

Computer Science

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Important information

The programme information published in this brochure was correct at time of going to print (October 2021) 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.

Welcome

At Aberystwyth, we are proud to be one of the longest established Computer Science departments in the UK, ranked top in Wales for the subject of Computer Science (The Times & The Sunday Times Good University Guide 2020), and we continue to be at the forefront of technological research. 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. All this makes Aberystwyth University the ideal place to pursue both Masters and Doctoral degrees in the field of Computer Science.

The standard of teaching at Aberystwyth is reflected in the Gold award we received in the 2018 Teaching Excellence and Student Outcomes Framework (TEF). Our awards as UK University of the Year for Teaching Quality for both 2018 and 2019 and Welsh University of the Year for 2020 in The Times and Sunday Times Good University Guide speak volumes about the standard of the education we deliver.

Our areas of research and development include robotics, artificial intelligence, bioinformatics, image processing, internet communications and software engineering. From developing cameras for use in space missions to improving ways of screening cancers, our lecturers are making important contributions in the real world. The most recent Research Excellence Framework (2014) assessment found that 100% of the impact research the Department of Computer Science undertakes is world-leading or internationally excellent. Our industrial collaborators include Qinetiq, Ford, Jaguar Cars, Unilever, Daimler Benz, Integral Solutions Ltd., Costain, Glaxo, and the NHS.

Our taught Masters degrees draw on our research foci, and link to the expertise and interests of staff in the department. They are designed to meet the needs of students wanting a foundation for a career in research, and those seeking to expand on their skills to accelerate their industrial career. Some of our degrees are qualifying Masters degrees for Chartered Engineer status.

Our graduates are highly sought after and readily find employment in areas such as software design; communications and networking; computer applications; web development; IT consultancy and management; and systems analysis and development.

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. Read through this brochure to discover more about our postgraduate courses and find out what makes Aberystwyth such an incredible place to live and study. Please do not hesitate to contact us if you require more information.

Dr Thomas Jansen
Head of Department

Our courses

Taught degrees

Distance learning

Research degrees

Advanced Computer Science

MSc

With its emphasis on professional software engineering, this degree is suitable for students intending to pursue a career in the software industry. It can also lead to a career in research and academia.

Topics you may study on this course include advanced software engineering, intelligent systems, statistical methods and data management. Recent MSc project topics include: machine learning for the internet of things, augmented reality applications for tourism, analysis and management of agricultural emissions data, network intrusion detection and supply chain management.

In studying this course you will develop specialised technical skills and will gain practical experience in agile software development and in using a variety of techniques to present the latest research to mixed audiences.

Employability

Our students go on to a vast and continuously expanding range of careers. Recent graduates have found employment with companies such as Google and MarkLogic, and investment banks. Some have become product managers, and other have set up their own companies.

Modules

Modules that you may study on this course include:

- Research Topics in Computing
- Agile Software Development Project
- Fundamentals of Intelligent Systems
- Internet Technologies
- Individual Project
- Statistical Concepts, Methods and Tools.

Research Topics in Computing
Focuses on current issues in the field of software engineering with significant emphasis placed on student discussion and peer review.

Agile Software Development Project
Provides a strong foundation in agile software engineering that will inform your software development practice and prepare you to work in the software industry.

Fundamentals of Intelligent Systems
Introduces the key ideas in Artificial Intelligence. On completion, you should be able to describe and use the basic principles of Artificial Intelligence and Machine Learning, reflect on project needs and apply AI and ML principles to meet those needs.

Statistical Concepts, Methods and Tools
Provides you with a foundation in statistics, including design of experiments, discrete and continuous probability distributions, linear modelling and hypothesis testing.

For more details and the latest information on our modules, see our website.

Key Facts

Degree type: MSc.

Course Code: G493 (G498 with year in industry).

Duration: 1 year (full-time). G498 is 2 years.

Artificial Intelligence

MSc

Artificial Intelligence is changing the way we live. Applications permeate all aspects of our lives, ranging from health and social care through fraud prevention and computer games to digital assistants.

Topics you may study on this course include machine learning and computational intelligence, applied data mining, and statistical concepts, methods and tools.

By studying this course you will develop specialised technical skills in the areas of intelligent systems, deep learning, big data and computational intelligence.

Employability

Our graduates go on to a vast and continuously expanding range of careers. Recent graduates have found employment with companies such as Google and MarkLogic, and investment banks. Some have become product managers, and other have set up their own companies.

Modules

Core modules that you may study on this course include:

- Fundamentals of Intelligent Systems
- Statistical Concepts, Methods and Tools
- Computational Intelligence
- Applied Data Mining
- Machine Learning for Intelligent Systems.

Fundamentals of Intelligent Systems
Introduces the key ideas in Artificial Intelligence. On completion, you should be able to describe and use the basic principles of Artificial Intelligence and Machine Learning, reflect on project needs and apply AI and ML principles to meet those needs.

Statistical Concepts, Methods and Tools
Provides you with a foundation in statistics, including design of experiments, discrete and continuous probability distributions, linear modelling and hypothesis testing.

Applied Data Mining
Gives you practical knowledge of data mining using modern data management systems. Querying, searching, mining and analysing very large amounts of data demands procedural and technological approaches that go beyond those typical of relational database systems.

Machine Learning for Intelligent Systems
Introduces you to the main concepts of machine learning. You will learn how to practically investigate the issues involved in applying two machine learning methods to an appropriate data set.

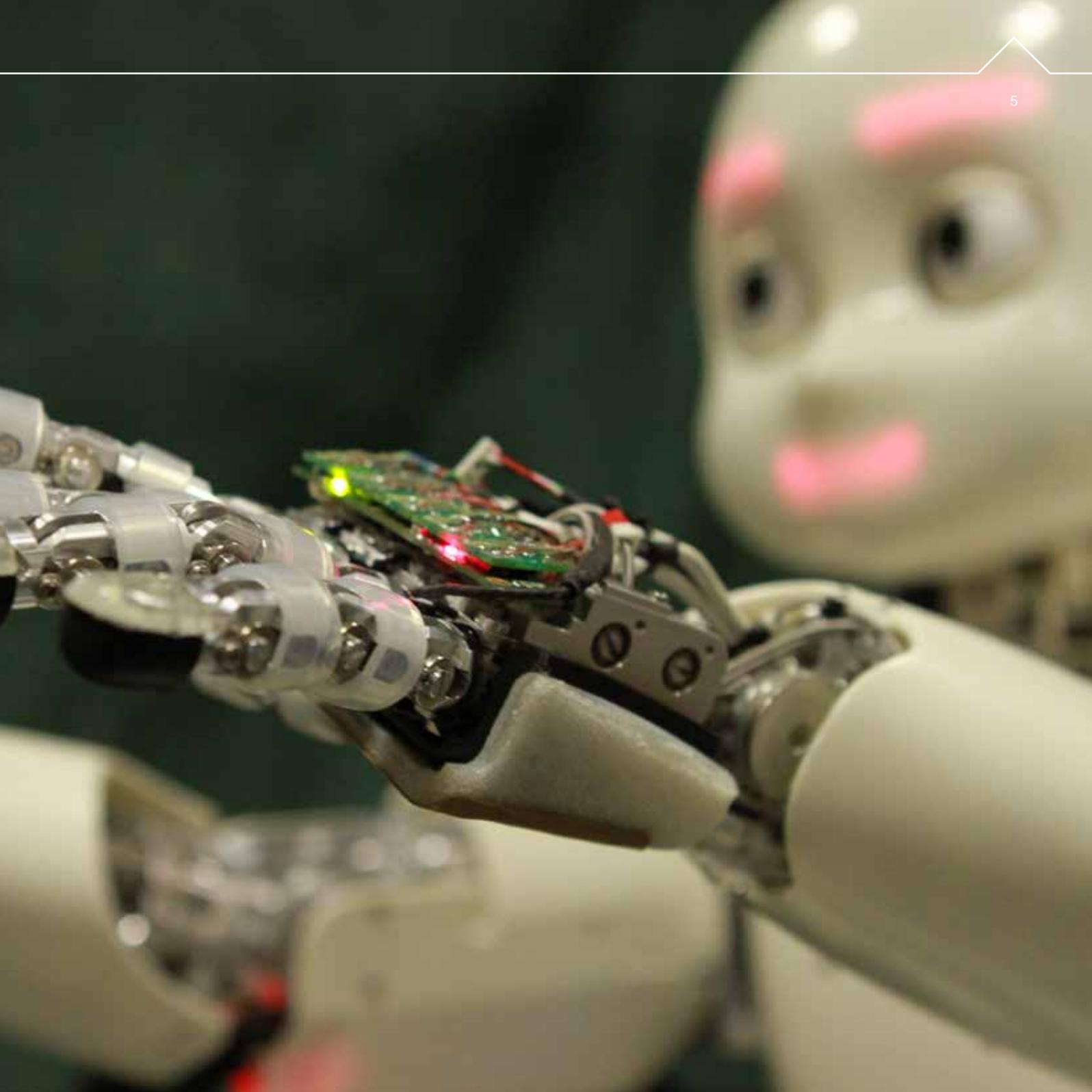For more details and the latest information on our modules, see our website.

Key Facts

Degree type: MSc.

Course Code: G790.

Duration: 1 year (full-time)

Computer Science

MSc

This degree aims to provide an intensive, professionally-oriented introduction to computing for able graduates in other disciplines (especially the humanities) to enable them to enter the software industry. No previous experience of computing is required.

Topics you may study on this course include computer programming, data management and intelligent systems. Recent MSc project topics include: machine learning for the internet of things, augmented reality applications for tourism, analysis and management of agricultural emissions data, network intrusion detection and supply chain management.

You will be introduced to programming to learn the foundational skills that you can expand and apply in the more advanced modules including Advanced Software Engineering and an Agile Software Development Project. The course also includes introductions to other important areas of Computer Science like Artificial Intelligence and data management.

Employability
Our students go on to a vast and continuously expanding range of careers. Recent graduates have found employment with companies such as Google and MarkLogic, and investment banks. Some have become product managers, and other have set up their own companies.

Modules

Modules that you may study on this course include:

- Research Topics in Computing
- Agile Software Development Project
- Fundamentals of Intelligent Systems
- Programming for Scientists
- Modelling, Managing and Securing Data
- Applied Data Mining.

Agile Software Development Project
Provides a strong foundation in agile software engineering that will inform your software development practice and prepare you to work in the software industry.

Modelling, Managing and Securing Data
Looks at a range of issues related to performance and security in the context of computer systems storing and handling data. It will address not only confidentiality and privacy of data but also the integrity of data and guaranteeing reproducibility.

Programming for Scientists
Teaches you the basics of programming using the Python programming language, and how to manipulate and organise relevant data.

For more details and the latest information on our modules, see our website.

Key Facts

Degree type: MSc.

Course Code: G480.

Duration: 1 year (full-time) or 2 years (part-time).

Idris is a four wheel drive and steering electric vehicle. The main use of Idris is for the Department of Computer Science's research in field robotics and visual navigation in particular.

Data Science

MSc

Data Science is a rapidly growing specialism, with applications in business, government and science. Applications range from identifying customers' buying patterns to tracking the spread of a disease, from monitoring expensive machinery to logging and improving an individual's health. There is a huge demand for graduates with skills in 'Big Data'.

Topics you may study on this course include modelling, managing and securing data, machine learning, applied data mining, and statistical concepts, methods and tools.

Data Science is particularly appropriate as a focus for a generalist Masters degree in computing, providing opportunities for graduates of other disciplines to apply their new computing knowledge to their original field of study.

In studying this course you will develop specialised technical skills in the areas of data handling, data management, data analytics and data mining, relational modelling, cryptography, and system security. You will also develop subject-specific expertise, including an awareness of the legal, social, ethical and professional issues involved in handling data, and knowledge of statistical techniques and methods for large data sets.

Employability

In a wide range of situations, from banking to shopping, and from governmental bodies to the NHS, our everyday activities are leaving digital footprints and the world of work is being transformed. There is a high demand for Data Scientists, people skilled in extracting meaning from data and being comfortable working across the disciplines of computer science, mathematics and statistics, who are also able to integrate many streams of data to produce new, insightful syntheses. Our Data Science graduates have gone on to work for companies such as Google and MarkLogic, for investment banks as product managers, and have also set up their own companies.

Modules

Modules that you may study on this course include:

- Modelling, Managing and Securing Data
- Programming for Scientists
- Statistical Concepts, Methods and Tools
- Applied Data Mining
- Machine Learning for Intelligent Systems
- Statistical Techniques for Computational Scientists.

Modelling, Managing and Securing Data
Looks at a range of issues related to performance and security in the context of computer systems storing and handling data. It will address not only confidentiality and privacy of data but also the integrity of data and guaranteeing reproducibility.

Programming for Scientists
Teaches you the basics of programming using the Python programming language, and how to manipulate and organise relevant data.

Statistical Concepts, Methods and Tools
Provides you with a foundation in statistics, including design of experiments, discrete and continuous probability distributions, linear modelling and hypothesis testing.

Machine Learning for Intelligent Systems
Introduces you to the main concepts of machine learning. You will learn how to practically investigate the issues involved in applying two machine learning methods to an appropriate data set.

For more details and the latest information on our modules, see our website.

Key Facts

Degree type: MSc.   **Course Code:** G490.   **Duration:** 1 year (full-time).

Statistics for Computational Biology

MSc

Computational Biology is an area of key strategic interest for interdisciplinary research and for employers in pharmaceuticals, advanced agriculture and in public health. The application of statistics and machine learning to extract useful knowledge from large biological data sets is a key requirement in these fields.

This degree is designed to introduce you to key, practice-based skills in statistics for computational biology. You will learn how to critically evaluate the application of specific statistical techniques to research problems in computational biology and then effectively interpret and report the results of analyses.

This MSc course combines the disciplines of Mathematics, Computer Science, and Biological Sciences, and is suitable for graduates in any of these three subjects. As such you will benefit from the wealth of expertise and knowledge available in these three departments: Mathematics, Computer Science, and the Institute of Biological, Environmental and Rural Sciences (IBERS).

Employability

The rapidly growing pool of large biological datasets is leading to an increase in the demand for people with expertise in thinking about biological problems using computational and statistical tools. Both in industry and academia, graduates with good numeracy skills, some understanding of the underlying biology, and a good grasp of computational methods including programming, have a wide range of employment opportunities. This course will develop skills relevant to advanced agriculture, pharmaceutical software engineering and nanotechnology. Academic opportunities include bioinformatics, drug design and genome sciences. Graduates of this degree now work in areas such as financial data analysis, precision medicine and public health.

Modules

Modules that you may study on this course include:

- Frontiers in Bioscience
- Machine Learning for Intelligent Systems
- Programming for Scientists
- Statistical Concepts, Methods and Tools
- Statistical Techniques for Computational Scientists.

Frontiers in Bioscience
Highlights the integration of topics and research approaches in biology, providing insight into how different researchers, practitioners and users of the information communicate, view and position themselves around a particular topic.

Machine Learning for Intelligent Systems
Introduces you to the main concepts of machine learning. You will learn how to practically investigate the issues involved in applying two machine learning methods to an appropriate data set.

Programming for Scientists
Teaches you the basics of programming using the Python programming language, and how to manipulate and organise relevant data.

Statistical Concepts, Methods and Tools
Provides you with a foundation in statistics, including design of experiments, discrete and continuous probability distributions, linear modelling and hypothesis testing.

For more details and the latest information on our modules, see our website.

Key Facts

Degree type: MSc.

Course Code: G499.

Duration: 1 year (full-time)

Advanced Media Production

MSc, PGDip, PGCert

Combining practical knowledge of computer programming with media production skills, this course is suitable for individuals who are currently employed, or wish to work, within the creative industries. It will equip you with the theoretical and real-world skills required to work with digital and media technologies.

This is an interdisciplinary degree hosted by the Department of Computer Science and the Department of Theatre, Film and Television Studies. Generous discounts are available to those students working in a relevant industry in the West Wales & Valleys region who meet the eligibility requirements.

Contact time
We have designed our training to be as accessible as possible, particularly for those in full-time employment. Each taught module runs over 14 weeks via distance learning which can be taken for your own continuing professional development or interest or built towards a postgraduate qualification.

A typical postgraduate student is expected to study for 200 hours when taking a 20-credit module. You should anticipate spending between 10-14 hours a week on online lectures, presentations, podcasts, readings and assignments. Wherever possible, the training will be relevant to your day-to-day role.

Most training is by distance learning and web-based which means that as long as you have access to a reasonable broadband connection you can study where and when best suits you. Learning materials for each 14 week module include recorded lectures from academics and industry experts, presentations, podcasts, e-group projects, guided readings, interactive workbooks and discussion forums, as well as assignments and e-tutorials.

Some modules will follow a blended learning programme of short workshops of between 1-3 days, combined with elements of distance learning.

Modules

Modules that you may study on this course include:

- Introduction to Media Production
- Programming for Digital Media
- Web Development
- Applied Graphics
- Digital Cultures
- Big Data
- Advanced Skills in Media Production
- Gender and Media Production
- Extended Reality
- Research Concepts and Skills.

Extended Reality (XR)
Introduces you to the underlying technologies that enable XR, focusing on how they are used and what the future holds.

Digital Cultures
Teaches you how to approach the digital landscape as both a practical tool and a theoretical space through which identity and brand can be constructed. Content includes cyber democracy, gaming, hacking and digital storytelling.

Big Data
Explores how to manage large media files, maintaining the integrity of the data themselves as well as the relationships between them.

Most modules are taught through the medium of Welsh, English or bilingually.

For more details and the latest information on our modules, see
amp.aber.ac.uk

Key Facts

Degree type: MSc, PGDip, PGCert.

Course Code: G4P3D

Duration: Available until April 2023 (Distance learning).

Research Degrees

MPhil, PhD, DProf

Research in the Department is motivated by the needs of industry, business and government; we actively look for opportunities for technology transfer. An important aspect of this is that our research work is reflected in our teaching.

The Department offers PhD and MPhil research degrees and provides supervision in all areas of our research interests and academic expertise, including:

- Advanced Reasoning
- Bioinformatics and Health Informatics
- Vision, Graphics and Visualisation
- Intelligent Robotics

We also have considerable and widely recognised expertise in Software Engineering and Network Technology. Industrial collaborators include Ford, Jaguar Cars, Unilever, Daimler Benz, Integral Solutions Ltd., Costain and Glaxo.

In addition to core transferable skills training, you will receive further technical and research training from the Department. The Department pays for your specialist training courses and encourages you to present peer-refereed papers at conferences. You may also have opportunities to contribute towards teaching, with training provided, which will improve your employability.

MPhil and PhD

These focus on research projects and involve in-depth study within a specific field which is compatible with the research interests of the University. Research produced is original and publishable work, the results of which are presented in a thesis and through an oral examination.

The MPhil is a one-year course (or two years part-time) where you will be expected to produce a thesis of around 50,000-60,000 words. A PhD is awarded upon the satisfactory completion of a thesis of up to 100,000 words followed by a viva voce examination. The normal period of registration is three years (full-time) and it is expected that the thesis will be submitted within four years of your initial registration.

DProf

The Professional Doctorate or DProf is more appropriate for those pursuing professional rather than academic careers and is designed to allow qualified professionals to study towards a doctorate while maintaining their employment.

A DProf will be awarded in recognition of the successful completion of an approved taught programme of study, together with the successful completion of an advanced piece of research. The collaborative aspect facilitated by a work-based research project provides an ideal opportunity to embed new knowledge in the workplace and ensure that your research is relevant to industry.

Our research

The Department's research is organised within four groups, all of which investigate and develop techniques and applications of intelligent systems. There is significant inter-group working, giving a high degree of coherence to the Department's research. The Department has international collaborative projects within all four research groups.

A significant part of the Department's research is driven by end-users needs. Our research strategy reflects the recognition of the significance of such work and the potential impact such research may have in terms of more direct benefits for the public.

The research groups within the Department are:

Advanced Reasoning Group

The group is well-known for its ground-breaking work on automated diagnosis and failure analysis, and its invention of approximate reasoning techniques for knowledge model formulation and simplification. It plays a leading role in the international community of computational intelligence research, especially in feature selection, interpolative reasoning, imprecise data modelling and analysis, and theoretical properties of evolutionary computation. Supported by EPSRC and substantial third mission income, we have developed a number of novel techniques tailored to tackling current challenging real-world problems, e.g. serious crime analysis, academic performance analysis, systems monitoring and diagnosis.

Bioinformatics and Health Informatics Group

This interdisciplinary group conducts leading research in formalisation of biological data, and integrative data analysis in systems biology.
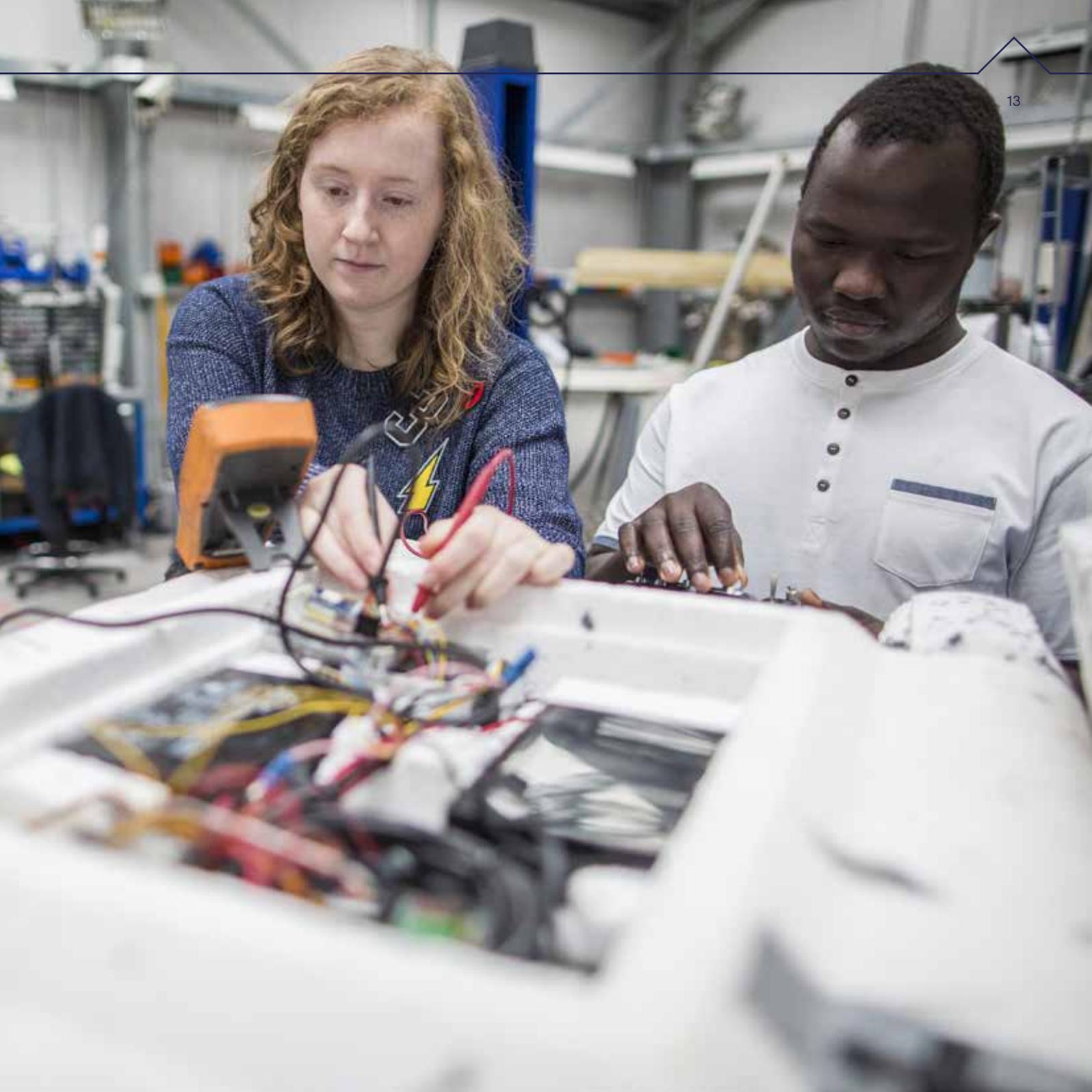
It works at the interface between computing, biological and medical applications. We have our own wet laboratory, access to University computer clusters and close ties to the Institute of Biological, Environmental and Rural Sciences (IBERS). Supported by the BBSRC, RAEng/EPSRC and the EU, we have developed methods, techniques and tools in the following areas: laboratory automation, analysis of large scale biological data, formalisation of biological/chemical data, systems biology, biomedical informatics and genomics.

Intelligent Robotics Group

This is one of the best-known robotics groups in the UK, and is involved in both national and international research consortia from novel computational models to space missions to Mars. It focuses on both software and hardware issues that are key to unconstrained environments. It has an international reputation, especially with respect to field, space and cognitive robotics, covering autonomous survey and unmanned surface craft, long-term autonomy and power management, design of neuro-controllers for autonomous robots, planetary exploration and image processing, evolutionary robotics and cognitive robotics, robot visual navigation, and robotic platforms. Supported by EPSRC, EU-FP7, TSB, STFC and funded commercial collaboration, we have developed the following areas: explosive and chemical agent detection, power management for hybrid power systems, automated asset recognition in laser scans of roads, bio-inspired developmental robotics, mobile ad-hoc network and design of control systems for autonomous robots.

Vision, Graphics and Visualisation Group

The group carries out research in image analysis and geometrical and topological understanding of visual information, with applications concentrated on medical and psychology analysis, environmental and heritage data analysis, vision for robotics, facial analysis and 3D data analysis. It has built up an international reputation in computer vision, especially in 2D/3D data modelling and registration, dynamic processes, texture classification and modelling, facial modelling, and texture and shape based segmentation. We have developed novel approaches in close collaboration with end-users, including medical image analysis, the National Plant Phenomics Centre investigating plant modelling, vision for robotics, 3D heritage modelling, and art-related research. The research has been supported by EPSRC, ESRC, AHRC, NISCHR, BBSRC, HEFCW, and Prostate Cancer Charity.

Employability

Our exciting and workplace-relevant degree schemes are highly regarded by both students and employers. Our graduates have gone on to work for companies such as Google, MarkLogic, Roche, IBM, Mentor Graphics, Vodafone, Airbus, Microsoft, Bosch, Amadeus, Laura Ashley, BSquare, and DCA Design International among others. Some have gone on to set up their own companies.

Careers Service

Your time at university is a great chance to learn, develop and explore a whole range of experiences and options. As a Careers Service, we help you recognise who you are, what you are good at, and where you might like to go, and empower you to see what a world of opportunity awaits you.

The University's Careers Service has experienced and professionally qualified staff to help you:

- identify and source useful work experience options
- recognise the skills your university degree gives you that are valuable to employers
- plan your possible future career path(s)
- support you as you make applications to employers
- develop your entrepreneurial streak and set up your own business
- link up with employers, alumni and professional bodies to progress your career plans.

For PhD students there are a range of focused career development workshops on offer to help you network and raise your profile in the world of research. Aberystwyth University has also subscribed to the Vitae Research Development Planner to assist you with your professional development planning (PDP) process and prepare you for your next step after your degree, whether it be further academic study or employment.

Extra curricular activities

There are several societies and clubs for Computer Science students, including:

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 Students 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!

Supporting entrepreneurship
If you are thinking of starting a business or social enterprise or perhaps considering freelancing, our University Careers Service can offer you help and advice on all aspects of turning your good idea into a great enterprise. The AberPreneurs service offers:

Free start-up workshops and presentations
- Free start-up workshops and presentations
- Free one-to-one start-up mentoring from a professional business consultant
- InvEnterPrize - Aberystwyth University's annual £10,000 student ideas competition
- Business Start-Up Week - a whole week in June of workshops and presentations for budding entrepreneurs.

InvEnterPrize
If you have an idea for a new product or service which you could turn into a successful business venture, then InvEnterPrize - our 'Dragon's Den' style student entrepreneurship competition - is a fantastic opportunity to kick-start your new enterprise.

Individuals or teams with inventions, business start-up ideas or other ambitious plans can enter to win a generous prize package including support and investment worth up to a maximum of £20,000 to start the business. In addition, all shortlisted finalists will receive expert advice from a panel of successful entrepreneurial alumni.

Past winners include Car-go, a concept driverless delivery vehicle; Amigrow, which uses satellite technology and machine learning to assist farmers with decision making and is designed to help Colombian farmers improve crop productivity; and Papora.com, a language learning website.

✈ = International airport
🚆 = Train station
⛴ = Ferry port

Aberdeen 🚆✈

🚆✈ Glasgow   Edinburgh 🚆✈

Newcastle upon Tyne 🚆✈

⛴✈ Belfast

⛴✈ Dublin   ⛴🚆✈ Liverpool

Manchester 🚆✈

Birmingham 🚆✈

🚆 **Aberystwyth**

🚆✈ Cardiff

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