Faculty of Engineering & Design

MSc Programmes

UNIVERSITY OF BATH

The Bath EDGE:
Engineering & **D**esign **G**raduate **E**xperience

2013 entry edition

Further Information

The Bath EDGE:
The Bath Engineering and Design Graduate Experience

The Bath EDGE is the competitive advantage you will gain in your career from completing one of our graduate MSc programmes.

Our unique Engineering programmes, which develop your professional understanding in a research and design context, and highly specialised Architectural Engineering and Conservation programmes, produce graduates widely sought after by relevant industries. Our graduates are able to transfer their technical and business skills seamlessly from Bath to their chosen career, and all our Masters programmes reflect the world-changing research we carry out.

This brochure details how each programme delivers this unique combination of skills to enable you to become a future specialist and a technology leader.

The Bath EDGE is also the comprehensive service we are able to provide through our dedicated Faculty Graduate School.

The Graduate School team offer a dedicated support service to all postgraduate enquirers, applicants, students and staff, and help to create a close friendly community for all our postgraduate students. The team ensures an expert and dedicated point of contact before you arrive for any enquiries about your application and arrival in Bath. During your studies, the team offer support by organising academic, administrative, careers-related and social events.

> "Top 20 amongst the World's universities"
>
> Times Higher Education (THE) rankings of the world top 100 under 50 years old in 2012

Professor J Gary Hawley, Dean of the Faculty of Engineering & Design

"Welcome to the Faculty of Engineering & Design. The University of Bath is consistently ranked in the top 10 elite universities in the UK. This speaks volumes not only for the quality of our research and teaching but equally demonstrates our commitment to a high quality student learning experience. This brochure has been specifically designed to help you better understand not only our Masters provision we offer but also what you can expect in terms of support. I look forward to welcoming you to our university."

Professor Tim Ibell, Associate Dean for Graduate Studies

"The Bath EDGE has been specifically designed to develop your technical, professional and leadership skills. We play an internationally-leading role in research, and we embed this research within everything we teach. You will learn directly from experts who are making extraordinary breakthroughs.

Students achieving outstanding results on our MSc programmes are eligible for PhD scholarships should you wish to pursue a research focused career. Whether you wish to enter the profession of engineering on a fast-track leadership career or to begin the route onto one of the most highly-prized PhD degrees in engineering, the place to start is the University of Bath Engineering and Design Graduate School."

“University of the Year”

The Sunday Times league tables 2012

Campus view from the lake.

The University of Bath

The University of Bath is a small elite university with around 14,000 students, which is focused on maximising the employability of our students and maintaining our international reputation for excellence and innovation in research.

The Faculty of Engineering and Design ranks in the top 3 across all departments in The Sunday Times League Tables 2012. Our subject areas regularly rank in the top 10 in the UK, as does the University overall. The University is located just one mile from the city centre on one campus with all the amenities and facilities you will need to have a fulfilling student experience.

The benefits of our campus university

A campus university means everything you need as a student is in easy reach on one site. As well as the laboratories and lecture theatres, facilities for your lifestyle and social life are catered on campus. Benefits of the Bath campus are:

- The campus is self-contained. It has two grocery stores, two banks, dentist, medical centre, bookshop and around ten different places to eat and drink.
- It produces a friendly community, with all students working and studying on the same site.
- 24 hour security provides a safe environment for all.
- Everything is in walking distance, with travel time at a maximum of 10 minutes.
- Easy to meet people from other academic departments, due to everything being on the same site.

Campus facilities

The University of Bath has extensive facilities for its students for academic and social purposes. Here are just a few of them:

- The University Accommodation Centre helps you to find suitable accommodation, as well as offering social trips to the surrounding areas. Examples include the world famous countryside views of the Cotswolds, to trips to the Christmas Markets in Hyde Park, London.
- Library is open 24 hours, 365 days a year.
- Careers Advisory Centre offers help on anything from finding and applying for a job, to interview techniques. They also organise networking events and workshops on employability.
- Our Sports Training Village has an ethos of 'Sport for All,' offering training grounds for professional athletes and starter activities for those that want to try something new. They have facilities for all sorts of exercise from Rugby fields to a Judo Dojo room.
- The Institute of Contemporary Interdisciplinary Arts (ICIA) offers subsidised music, art and dance lessons to students, giving you the opportunity to learn something new at an affordable cost. With music practice rooms, there is a theatre and art gallery on campus. They also offer an extensive programme of live performances, exhibitions and concerts.

The Students' Union

The Students' Union (SU) is the social centre and support network of the University, dedicated to students' welfare. It is a democratically elected student body that represents students' concerns at the University. Here are just a few things that they do:

- Organise social events like the Summer Ball and Fresher's Week (the first week at university dedicated to socialising and orientation).
- Ensure students' voices are heard on important issues like tuition fees, and social space.
- Offers over 100 clubs and societies, presenting a great way to meet new people. Choose anything from break-dancing to bell ringing, curry appreciation to cheerleading.
- Creates volunteer opportunities, locally and internationally. Opportunities include volunteering in orphanages in Eastern Europe, multicultural schemes to introduce young people to new cultures and tutoring and mentoring schemes.

Top: Students outside University accommodation.
Bottom: Gliding club at Fresher's Week.

International students

The University of Bath has a vibrant international community, with over 2500 students from 100 different countries. Specific support and facilities are provided to help international students arrive here safely and feel at home on campus:

- A handbook before you leave for university, informing you of all essential information.
- Expert help and support on issues such as visas, from the International Student Advice Team and the International Office.
- Globe Café, an informal, social way to meet others from across the world.
- Fresh, the campus supermarket, including Fresh Oriental, an international foods section.
- The International Student Association, which offers weekly drop in sessions for any concerns you may have, but also creates campus wide activities that give you the opportunity to showcase cultural talents, such as at the Festival on the Hill.
- We have around 20 cultural societies at the University of Bath, which offer support as well as a great way to meet others from different countries. Examples are the Bath Thai Society, Chinese Student Society and the Japanese Society. See more at **www.bathstudent.com**

"The City of Bath is a wonderful environment to live and study."

MSc student, Eirini Passia

View of Bath Abbey from the ancient baths.

The City of Bath

Voted the best city in England (*Guardian & Observer Travel Awards*), Bath is one of the most interesting, cosmopolitan and vibrant cities in the UK. It is also the only city in the UK to be included in UNESCO's World Heritage list, named after its famous natural hot spring, popular with the ancient Romans and still enjoyed today. You can enjoy the same mineral rich waters in the modern Thermae Spa, Britain's original and only natural thermal spa, with its rooftop views and panoramic views of Bath's skyline.

You can enjoy many things in Bath for free as a student, and there's more to see than just the sites for tourists, with locals enjoying underground nightclubs and boutique shops. When living here, you can enjoy the frequent cultural events, with festivals going on every couple of months, ranging from the International Film Festival to the Coffee Festival.

Bath has everything from high end famous restaurants to cheaper student bars, as well as theatres and cinemas and a large variety of shops. There's a lot to do in Bath and there are many outdoor activities like boating along the River Avon and the famed Bath Half Marathon.

As well as being a very safe city (England's safest city – *Complete University Guide 2010*), and famous for the beauty of its Georgian and Roman architecture, the city is also surrounded by classic English rolling hills and picturesque countryside.

Above: A quiet shopping lane in the city. **Top right:** Rooftop pool at the Thermae Bath Spa. **Lower right:** Students at one of Bath's many pavement cafés.

Beyond the city

Bath is in a great location to get a full understanding of British life, seeing famous tourist attractions as well as experiencing some of the best of Britain. The University Accommodation Centre arranges tours throughout the year to the surrounding south-west areas.

Here are some of a few things you can do around Bath:

- London is only 90 minutes from Bath by train, with trains every 30 minutes.
- Bristol Airport provides fast access to an ever-increasing number of destinations and there is also a direct bus route from Bath to all major London airports, including Heathrow. www.nationalexpress.com
- The city of Bristol is just 15 minutes away, offering more shopping opportunities and live entertainment venues.
- The country Wales is nearby, with the capital city of Cardiff just one hour away by train with all the fun a capital city has to offer.
- The south-west countryside offers a wide variety of British landscapes – from the famous sites such as Stonehenge and the Cheddar Gorge to the rolling hills of the Mendips and the traditional villages of the Cotswolds.
- You can even experience classic British seaside with the coastal town of Weston-super-Mare, which has a typical old-style pier with arcade games and rides.

Related links:

Visitbath.co.uk
www.bath360.co.uk
www.somersetguide.co.uk/Bath
Facebook group: 'secret bath' http://tinyurl.com/64yhhh8

City facts
- 84,000 population
- 90 minutes from London
- UNESCO World Heritage City

"The University of Bath not only has a highly regarded Mechanical Engineering department, but also a very good overall reputation."

MSc student, Aditya Narang

Autoclave machine at Bath creates carbon fibre panels as used in current aircraft manufacture.

MSc Aerospace Engineering

12 months full-time. October start.

Why study the MSc Aerospace Engineering at Bath?

Aircraft manufacturers and airline operators continue to experience increasing environmental and economic pressures on their core activities. Responding to these pressures requires step-change improvements to the design of airframes and engines within the next ten years. The University of Bath MSc programme in Aerospace Engineering provides its graduates with the key specialist skills required to enter this challenging field.

What skills will I gain?

The MSc programme produces graduates with the technical expertise, research and development and project management skills that are highly sought after by the aerospace industry. You will develop technical understanding in aerospace engineering and learn how to harness that knowledge in a business environment. You will gain analytical and team working skills to enable you to deal with the open-ended tasks typical of current aerospace engineering practice.

In particular, you will learn to

- understand how aerodynamics, control systems, structural limits, thermodynamic efficiency and performance parameters affect the design of aircraft and aero engines
- develop conceptual designs which satisfy aircraft design specifications within the European Airworthiness Regulations
- gain an appreciation of the present state of research collaboration between the universities, government and the aerospace industry
- understand and apply the various management processes used in aerospace engineering
- evaluate the nature and role of technology strategy in creating value in the aerospace industry
- use a range of practical tools (scenario planning, real options, etc.) to develop practical technology strategies
- apply subject-specific knowledge in a range of complex situations, taking into account the implications for other areas of the business
- complete a substantial research project in a technical aspect of automotive engineering and prepare material for publication in the open literature.

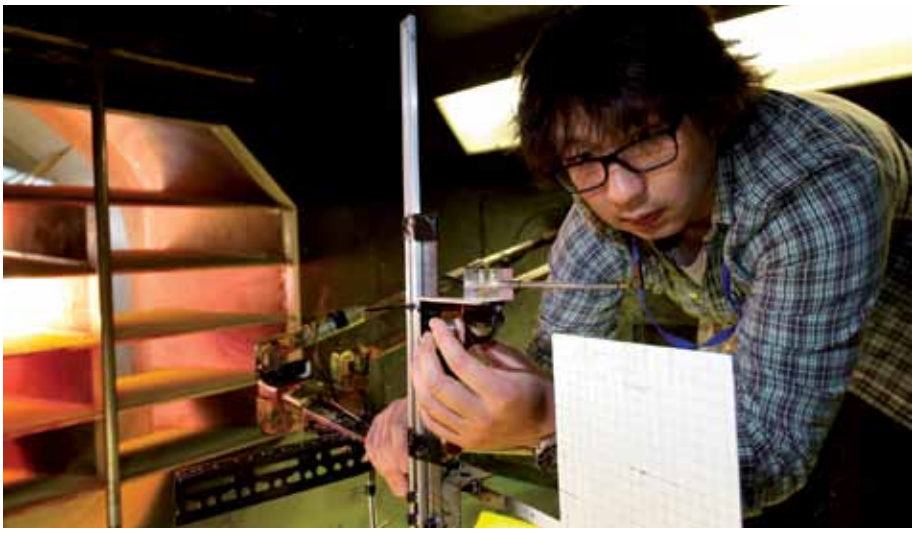
Programme timetable

The structure follows a unique pattern, in three parts, starting with advancing your technical skills and understanding, through to personal professional development and multidisciplinary group work, preparing you to finally undertake an individual project under expert supervision.

Semester 1 (October to January)
You will take five taught units, three compulsory and two options, to integrate your fundamental background of mathematics and engineering science into the area of aerospace engineering. Compulsory units cover the theoretical foundations of aerodynamics and propulsion and their implications for aircraft performance and design. Other units introduce you to experimental methods used in aerospace research and to the importance of the use of new lightweight composite materials in structural design. Our expert lecturers have wide experience of the aerospace industry and are involved in active collaborations and research with industrial partners across the sector. Assessment is by examinations and some coursework.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.

Summer period (June to September)
You will undertake an individual research project in a leading research centre. MSc Aerospace Engineering students carry out their research projects across the entire department – reflecting the multidisciplinary nature of this subject – but with a focus towards the Aerospace Engineering Research Centre and the Bath Composites Research Unit. Projects are carried out in areas such as experimental or computational fluid dynamics, gas turbine-related heat transfer, numerical simulation of structures and practical testing of new



Hot wire velocimetry measurements in the wind tunnel at Bath. Student George Hu undertaking aerodynamic research for micro air vehicles.

materials. Current areas of aerospace research at the University of Bath can be explored at **www.bath.ac.uk/mech-eng/aerc** and **www.bath.ac.uk/mech-eng/composites.**

Facilities to support the programme of study

Students have access to internationally-leading laboratory facilities for aerospace structures, experimental aerodynamics and heat transfer. Computational resources include the latest commercially-available software for finite element analysis and computational fluid dynamics, as well as a campus High Performance Computing facility which enables demanding computational modelling to be conducted. The Aerospace Engineering Research Centre also carries out joint research with other research centres across the department, giving the opportunity to carry out projects in areas such as aircraft fuel systems. Cross-departmental research collaboration also supports other projects that are strongly relevant to the aerospace industry, for example in manufacturing and metrology.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Mechanical Engineering, Physics or Maths.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Student checks and fixes the wing ribs to the wing spar for their human powered aircraft.

Career opportunities

Our MSc graduates work all over the world in areas such as civil aircraft flight planning and gas turbine manufacture. We actively encourage the best of our MSc students to continue their studies with us at PhD level.

Recent graduates have secured jobs as:

- Flight Operations Engineer, Monarch Airlines, UK
- Project Leader, Eaton Aerospace, India
- Carbon originator, Ecosecurities, Dubai
- Stress engineer, GKN Aerospace, UK
- Propulsion engineer, Aero Nimbus Airc, Royal Air Force, Malaysia
- Graduate engineer, Messier-Dowty, UK

What our students say

"I chose Bath after spending time exploring the campus and facilities, which impressed me immensely. It is also one of the top universities in the country for my chosen masters.

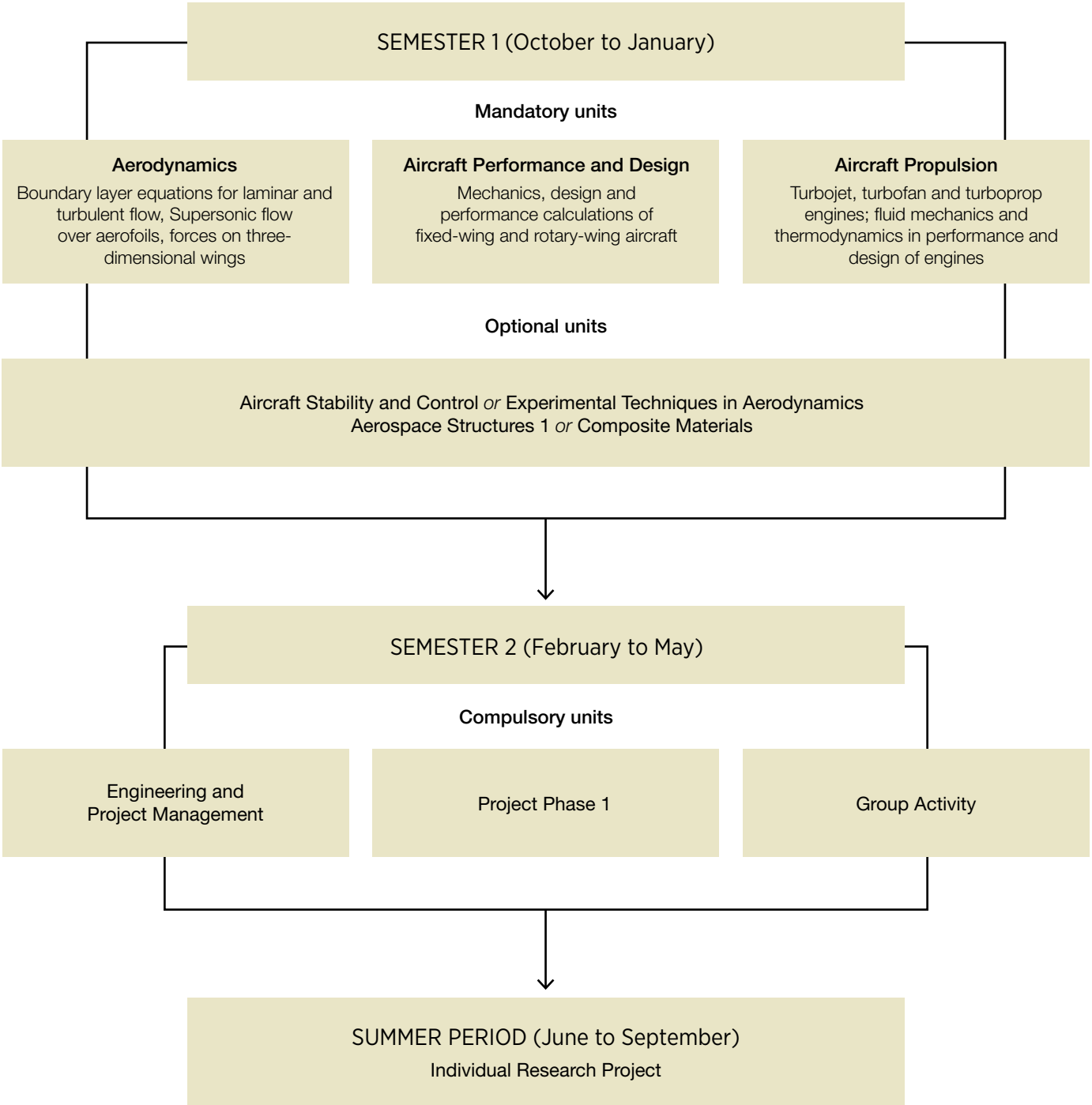
Coming to a new institution and undertaking a completely new discipline was, at first, daunting but has not detracted from the great experience I have had so far. The practical aspect of engineering has meant I have been able to use many of the skills I learnt as an undergraduate in an applied setting. This made the more technical modules I took in the first term very rewarding.

Coming from a mathematics background into an engineering discipline has, on occasion, proved challenging but being challenged and experiencing new situations are the main reasons I undertook a masters degree and I am relishing the opportunity to put what I have learnt so far into practise during my dissertation.

The modules in business related areas kept me thoroughly engaged and have forced me to look at things I had never considered before. I hope to undertake a PhD but now also have a notion to start my own company."

Jack Nicholas

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"Being a graduate from one of the leading universities in architecture and environmental design is useful for my career, not just in the UK, but in other countries as well."

MSc student, Erinia Passia

The award winning BaleHaus at Bath, made of prefabricated straw and hemp panels. Part of a major research project into how these building materials can be used for homes in the future.

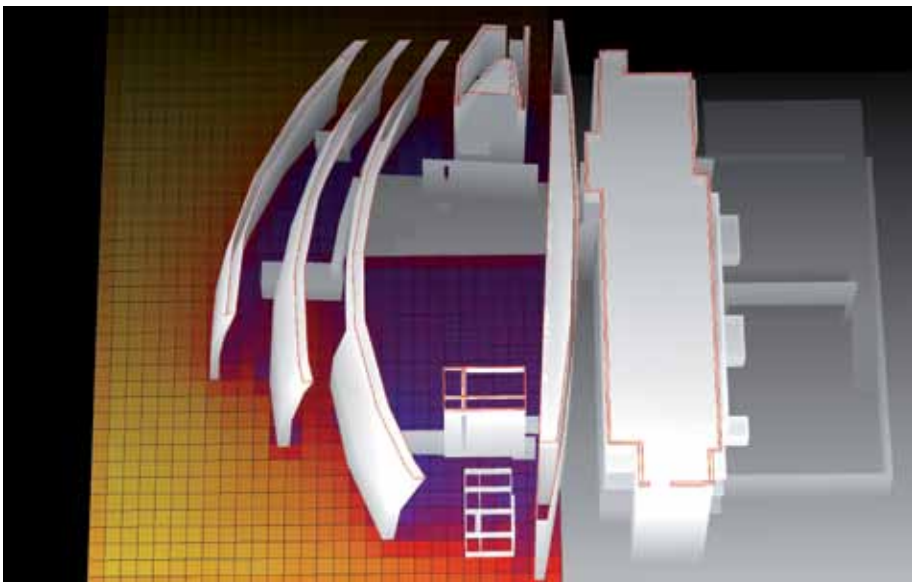
MSc Architectural Engineering: Environmental Design

12 months full-time, up to 48 months part-time, Diploma/CPD options available.

Why study the MSc in Environmental Design at Bath?

The environmental impact of buildings is significant, accounting for around 50% of carbon emissions in the UK. There is a need for construction professionals and building designers, who have the skills and knowledge base to create buildings with a low carbon footprint and reduced environmental impact.

The University of Bath MSc in Environmental Design will enable you to move your career forward in this rapidly expanding field. The University of Bath is an ideal institution for a specialist course in environmental design, with specialised centres, founded to embrace research into the effects on the built infrastructure of climate change and the need for sustainable development. Each centre has a particular focus, such as materials and products in the BRE Centre for Innovative Construction Materials (BRE CICM) or sustainable building design in the Research Unit for the Engineering and Design of Environments (EDEn).



Example of student project work. Simulation to model the daylight performance of Dives in Misericordia Church, Rome.

What skills will I gain?

This programme is designed to provide you with the skills and knowledge base to create buildings that have a low carbon footprint and reduced environmental impact, yet provide the comfort expected in modern buildings. It will lead you to re-appraise the design process and develop sustainability strategies for building projects. After graduation, you will be qualified to pursue careers as specialists in architectural and engineering practices. In particular it will help you to:

- deeply understand the holistic building design process
- understand the way in which individuals interact with buildings
- become fully aware of the drivers for sustainable building
- acquire in-depth knowledge of some of the technologies available to reduce the environmental impact of buildings
- develop strategies for achieving sustainable buildings
- work in multi-disciplinary design teams
- acquire in depth knowledge of how to design non-traditional buildings that are comfortable and functional
- research new concepts and technologies and report them clearly in the context of sustainable buildings.

Programme timetable

The programme is offered as a modular course – 7 core and 3 chosen from the optional units. The programme may be studied full-time over a period of twelve months for the MSc or nine months for the Diploma. A maximum period of 48 months is allowed for completion of the MSc or Diploma for part-time students. Units may be studied separately solely for the purpose of CPD.

Units are held on alternate weeks. Each unit comprises four consecutive days attendance (with a variety of lectures, seminars, tutorials, group projects), preparatory work beforehand, and/or work afterwards, amounting to 100 hours of study. Students are assessed during the unit or by work submitted immediately after each unit. Part-time students are encouraged to establish a regular pattern of attendance such as attending every second or third unit over a period of two or three years to establish and maintain the group dynamic of a cohort.

The course commences in October each year. Once the taught units have been successfully completed, students will undertake an individual research project as part of their dissertation.

The research dissertation may be based on work carried out in the University working under the supervision of research and academic staff, or where a suitable opportunity exists it may be based on work at the student's industrial work place. The work is undertaken during the summer for full-time students. Part-time students may take longer to complete the research dissertation.

The work may be computer based, laboratory based or a case study. The emphasis is on individual and original work. The work is defined in consultation with a member of staff and possibly the student's employer during semester 2.

Current areas of EDEn and BRE CICM research can be explored at:
www.bath.ac.uk/ace/ede
and
www.bath.ac.uk/bre

Facilities

The research facilities of the Department available to the group include:

- a range of environmental and meteorological sensors with dataloggers for environmental monitoring
- artificial sky with a range of light meters
- associated workshop facilities
- computing and software facilities for environmental modelling (IES and ECOTECT for thermal-lighting and respective energy consumption simulations in the built environment)

Admissions requirements

This programme is open to engineers, architects and suitably qualified candidates from other related disciplines. At the discretion of the Board of Studies students may be admitted solely on the basis of extensive professional experience in a relevant field.

IELTS 7.0 (with not less than 6.5 in each of the four components) or equivalent may also be required. Equivalents include 100 in TOEFL internet-based test, with not less than 24 in each of the components.

Career opportunities

The Bath MSc in Environmental Design will enhance your employability by providing you with valuable skills and knowledge that are directly applicable in the construction industry and the need for sustainable developments in the UK and abroad.

Top: University accommodation, Woodland Court, won an award for "Excellent" environmental design through the Buildings Research Establishment's Environmental Award Scheme (BREEAM), making the project one of only three in the country to achieve this status.
Left: Model of seated people in reverberation chamber to assess the acoustic performance of a room. (*Department of Architecture & Civil Engineering*)

What our students say

"The programme has been refreshing and challenging. I wanted to bring a greater understanding of low energy design to my architectural practice, to be able to advise clients and introduce design techniques into our projects. The course has enabled me to develop my interest in energy efficient design amongst similar minded students and staff. The module on renewable energy, where we had to analyse the energy performance of an existing building and propose improvements, this was an exercise that connected the theory with the real world situation. I have met some inspiring lecturers and guest tutors who are working in the field and making a difference with their buildings. I will miss my time at Bath when I finish in the summer."

David Minns

Programme structure

SEMESTERS 1 & 2 (October to May)

The taught units comprise the following topics:

Core units

- Building design for low carbon use
- Health, comfort and productivity in buildings
- Thermal performance of facades
- Daylight and shading
- Natural ventilation in buildings
- Acoustics
- Renewable energy sources and low carbon techniques

Optional units (three from):

- Sustainable construction materials
- Artificial lighting
- Building energy modelling
- Environmental impact studies

SUMMER PERIOD – RESEARCH DISSERTATION (June to September)

The research dissertation may be based on work carried out in the University working under the supervision of research and academic staff, or where a suitable opportunity exists it may be based on work at the student's industrial workplace. The work is undertaken during the summer for full-time students. Part-time students may take longer to complete the research dissertation.

Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"The MSc course in Façade Engineering is only available at Bath."

Paul Savidge, Group Operations Director, Wintech.

Automated windows forming part of a computer controlled building envelope. The Centre for Window and Cladding Technology at Bath has developed guidance on the design of automated facades, which facilitate the use of natural ventilation to reduce carbon emissions from buildings.
Photo courtesy of Velfac A/S

MSc Architectural Engineering: Façade Engineering

12 months full-time, up to 48 months part-time, Diploma/CPD options available.

Why study the MSc in Façade Engineering at Bath?

The programme at the University of Bath is the most established of its kind in the world. Unique until 2007, only 5 other similarly styled programmes exist across the EU.

The University of Bath is an ideal institution for a specialist course in façades because it is the home of the Centre for Window and Cladding Technology (CWCT). The Centre has become a national focus for research and standards in the field of Façade Engineering and plays an important part internationally in the dissemination of knowledge. For example, the CWCT recently hosted the International Conference 'Glass in Buildings' and was the co-ordinator of COST Action C13 'Glass and interactive façades'.

The University has a long history of successful interdisciplinary education for design professionals. We pioneered the use of design projects in postgraduate teaching by making use of both university-based researchers and practicing architects and engineers.

What skills will I gain?

The main aim of the programme is to provide students with a broad understanding and knowledge of façade engineering. This ensures they will have the skill, knowledge and understanding to design, manufacture and construct building facades and cladding. This programme provides the theoretical basis for a sound understanding over all the disciplines involved in the performance of façades and examines the complex inter-relationships between those different aspects through a consideration of existing constructions. Knowledge of materials, methods of manufacture and installation are considered as essential elements in the successful design of façades and are given a prominent place in the programme. The units broaden students' knowledge outside their original disciplines and give them a more holistic understanding of all aspects of the building envelope.

Curved point supported glass wall on the Thermae Bath Spa in Bath. The CWCT centre produced the national guidelines for risk assessment of safety of architectural glass.

Programme timetable

The MSc/Diploma programme comprises a total of 14 taught units, (8 core and 2 chosen from the remaining 6 optional units), followed by a research dissertation. Each unit is taught in 4-day blocks and may be taken in full-time or part-time mode. Each of the taught units may also be studied separately for the purpose of Continuing Professional Development. Assessment is a combination of preparatory exercises, continuous assessment, computer-based modelling exercises and real-time calculation tutorials. Group presentations are also included to improve peer-to-peer industrial knowledge transfer. All taught material is supported and uploaded to Moodle, the University's online learning environment.

Facilities to support the programme of study

The programme is taught in the Department of Architecture and Civil Engineering in a dedicated teaching facility. This is supported by the departments' structures and materials laboratory and the Centre for Cladding and Window Technology (CWCT) with its dedicated library and material/technology collection. In addition, students have access to Thermal Modelling software, (IES and THERM).

CWCT is comprised of members from internationally recognised industrial façade organisations, specialist contractors and façade engineering consultants. Their expertise and advice on the advisory board ensures timely and relevant industrial input on a regular basis. Industry façade experts are invited to give regular specialist lectures on this programme. CWCT currently have over 265 industry full members who are actively engaged in supporting the development of the programme.

Curtain wall panel being prepared for the aero-engine dynamic water test at Octatube, the Netherlands. The test procedures have been developed by the CWCT centre at Bath.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Civil Engineering. Applicants are required to have at least 3 years relevant industrial façade experience.

IELTS 7.0 (with not less than 6.5 in each of the four components) or equivalent may also be required. Equivalents include 100 in TOEFL internet-based test, with not less than 24 in each of the components.

Career opportunities

This programme began in 1996 and over 165 graduates are now employed in industry and research. Students come from many backgrounds, but all have a common interest in façade engineering and share their experience while learning. Students are recruited from, and return to, careers in architecture, engineering, and specialist façade contracting across the world.

Typical jobs our graduates progress to include Technical Director, Group Operations Director, façade design management, product development, product testing, application development, façade analysis and modelling.

Our alumni show a rich variety of career opportunities worldwide, such as:

- Façade and Cladding consultants, Wintech Ltd, UK
- Head of Façade Engineering, Trow Consulting Engineers, Canada
- Managing Director, Façade Engineering Ltd, Ireland
- Executive Architect, Ong & Ong Architects, Singapore
- Technical Director, Wintech, UK
- Designer, TRO Jung/Brannen, USA
- Façade Engineer, LG Hausys, South Korea

What our students say

"The technical content of the course, together with the good employment possibilities, high university ranking and also its scenic location only reinforced my interest in studying at Bath. The CWCT (Centre for Cladding and Window Technology) is a great asset: injecting a wealth of experience and technical knowledge into the course."

Clyde Abela

"Overall the course has been very rewarding and enjoyable. The programme has enabled me broaden network of both social and industry contacts. I plan to continue to progress my career with Sandberg LLP, and firmly believe that this qualification will help with my progression."

Lawrence Gray

"The façade of a building is the element that makes the internal space habitable, it acts as a filter allowing in beneficial elements of the external climate whilst providing a barrier to those less desirable elements. It is often considered to be the highest risk of any project and the MSc course in Façade Engineering at Bath is essential to properly understand and mitigate this risk."

Paul Savidge, alumni, now Group Operations Director, Wintech.

Programme structure

SEMESTERS 1 & 2 (October to May)

Students will study taught units delivered by national experts in the field of façade engineering and building physics. The units studied comprise the following topics:

Core units

- Introduction to façade engineering
- Façade materials and components
- Glass and glazing
- Weathertightness
- Thermal performance of facades
- Structural integrity
- Façade construction
- Façade procurement

Optional units (two from):

- Daylight and shading
- Natural ventilation in buildings
- Contract management
- Thermal analysis of façades
- Structural analysis of façades
- Acoustics & Fire

SUMMER PERIOD – DISSERTATION (June to September)

You will undertake an individual research project in either one of three leading departmental research centres or with the Centre for Window and Cladding Technology (CWCT). The topics will fundamentally relate to façade engineering but may encompass materials, structures, glazing technologies, building physics, daylight and natural ventilation, fire or acoustics.

Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"Everything is just perfect! People here are friendly, lecturers are nice and knowledgeable."

MSc student, Nic Zhang, Frank Wallace scholarship holder

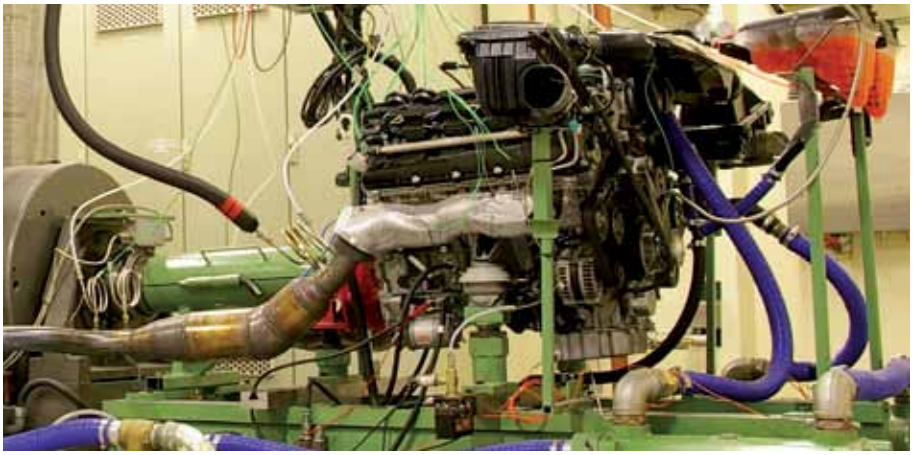
University of Bath climatic chassis dynamometer for powertrain evaluation with full emissions measurement capability.

MSc Automotive Engineering

12 months full-time. October start.

Why study the MSc in Automotive Engineering at Bath?

This is an exciting era to be starting a career in automotive engineering. We are living in a global environment where change is being driven by an accelerating demand that we must move to low-carbon vehicles and fuels. The engine forms the heart of any low-carbon vehicle. This MSc programme is firmly rooted in our international research standing, in the applications and performance evaluations of high-efficiency diesel engines, bio and other alternative fuels as well as the design and operation of next-generation transmission systems. The University of Bath's MSc programme in Automotive Engineering will provide you with the key skills and specialist experience needed for you to contribute effectively to the development of low-carbon vehicles.



Jaguar 5 litre V8 Engine at University of Bath dynamic test facility, as part of the ultra boost extreme downsizing project. In collaboration with partners including Jaguar Land Rover, Lotus Engineering and Shell.

What skills will I gain?

This programme is aimed at engineering graduates who wish to work in the automotive industry, with particular focus on the design, performance and operation of automotive power trains and vehicle systems. As an Automotive Engineering MSc student, you will develop technical expertise in automotive engineering and also learn how to harness that knowledge in a business environment. You will gain team-working and analytical skills to enable you to deal with the open-ended problems typical across the today's engineering industry.

In particular, this programme of study will help you to:

- understand the vehicle design process and the operation and performance of important sub-systems
- analyse current and projected future environmental legislation and the impact this has on the design, operation and performance of automotive power train systems
- analyse in detail the operation and performance indicators of transmission systems, internal combustion engines and after-treatment devices
- understand and apply the various management processes used in automotive engineering
- understand the nature and role of technology strategy in creating value in the automotive industry
- use a range of tools (scenario planning, real options, etc.) to develop practical technology strategies
- apply subject-specific knowledge in a range of complex situations, taking into account the implications for other areas of a business
- develop a detailed understanding of project planning and through-life project costing
- operate effectively – both independently and within teams – assuming leadership roles where opportunities arise
- complete a substantial research project in a technical aspect of automotive engineering and prepare material for publication in the open literature.

Programme timetable

The structure follows a unique pattern, in three parts, starting with advancing your technical skills and understanding, through to personal professional development and multidisciplinary group work, preparing you to finally undertake an individual project under expert supervision.

Semester 1 (October to January)
You will integrate your fundamental background of mathematics and engineering science into the arena of automotive engineering. You will take five taught units, three compulsory and two options, delivered by our expert lecturers. Assessment is by examinations and some coursework.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.

Summer period (June to September)
You will undertake an individual research project in one of our leading research centres. MSc Automotive Engineering students carry out their research projects across the entire department – reflecting the multidisciplinary nature of this subject – but with a focus towards the Powertrain, Vehicle Research Centre (PVRC) and also the Centre for Power Transmission and

Motion Control (PTMC). Typical project areas include experimental and analytical investigations of new turbocharger concepts, after treatment operation, alternative fuel performance as well as the control and calibration of advanced vehicle and powertrain systems.

Current PVRC research areas can be explored at: **www.bath.ac.uk/mech-eng/auto** and **www.bath.ac.uk/ptmc**

Facilities to support the programme of study

- a state-of-the-art chassis dynamometer (which forms the hub of vehicle research activities)
- three dynamic engine research platforms
- advanced transmission research facility
- emissions measurement facility
- control, simulation and rapid prototyping.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Mechanical Engineering.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Shock absorber and vehicle suspension design for a Formula SAE racing car.

Career opportunities

Our MSc graduates now work all over the world in various industries. A number of them pursue their Doctorates in universities worldwide.

Recent jobs secured in the UK and overseas by our graduates:

- Calibration Engineer, Ford Motor Company Ltd
- Product Engineer, Renault
- Engineering Consultant, D'Appolonia

Other companies which have hired our recent graduates include:

- British Aerospace
- Airbus UK
- Intel
- Ricardo
- Cambustion
- Panama Canal Authority
- Moog Controls Ltd

What our students say

"Among many outstanding universities in the UK, the University of Bath stood out and attracted me immediately. Having worked for a car manufacturer for over two years, I was looking for postgraduate study to improve my knowledge and experience of the automotive industry.

The University of Bath is famous for Mechanical Engineering. Firstly, the Powertrain & Vehicle Research Centre works with many top companies and organizations to provide several state-of-art testing facilities for engine and transmission, as well as the chassis dynamometers for whole vehicles.

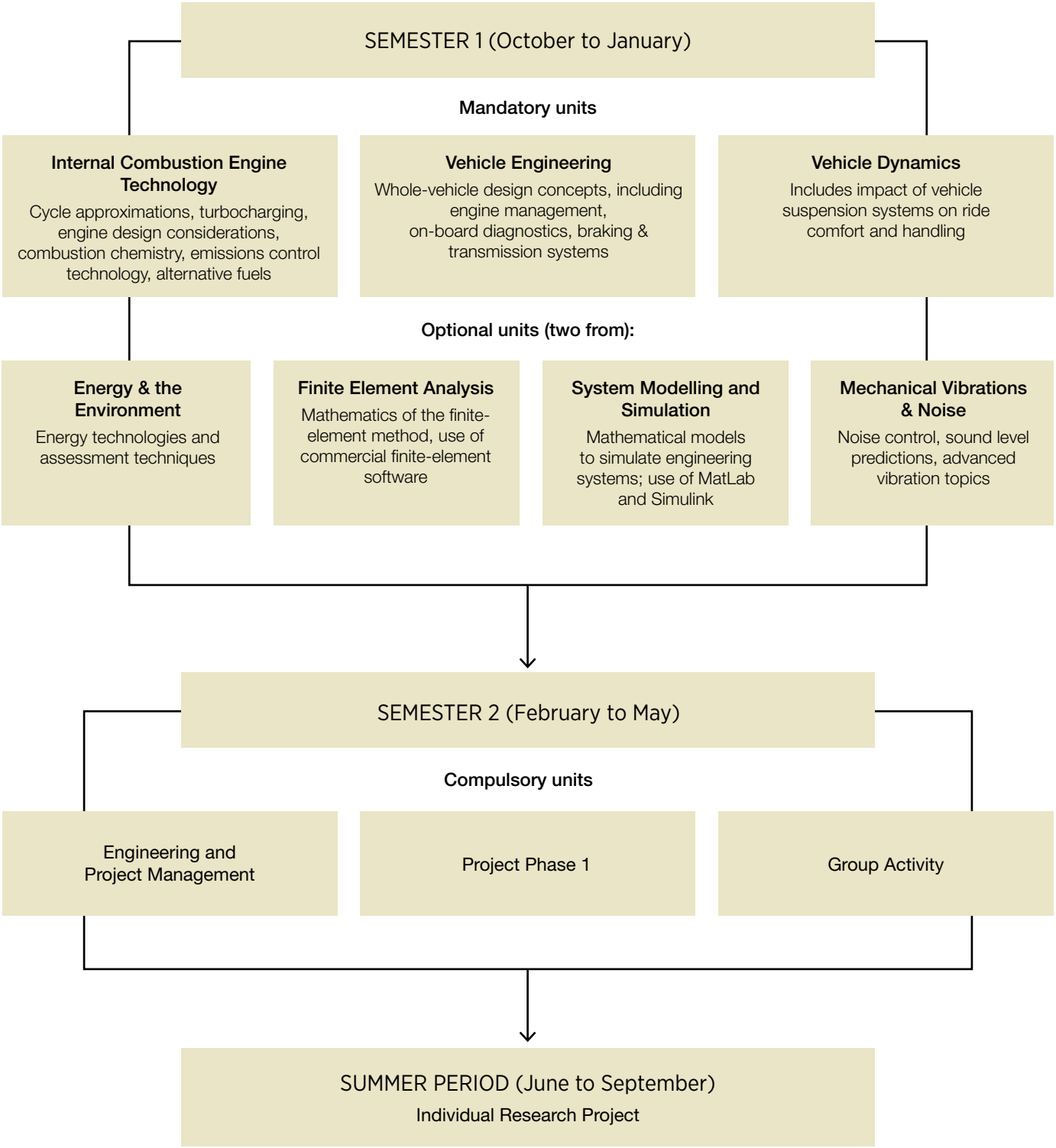
Secondly, I have had some fantastic opportunities, such as a visit to a Formula 1 factory, a presentation for a two-stroke variable-compression-ratio HCCI engine, an introduction to a pure electric vehicle at the research centre, debates with several top managers in the automotive industry and an engine tribology conference.

As for student life in Bath, there are many friendly people and societies in the University. I got involved in music, playing in a band and even go karting! I really enjoy just lying on the grass by the lake reading books and talking with my friends on campus too.

There are opportunities to pursue a PhD with a scholarship here too. A lot of research that is carried out here is at the cutting edge of the automotive industry. You can specify your career choice in the industry and make yourself more attractive to companies in the future."

Huayin Tang

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"A beautiful city with a large student population, Bath provides the flexibility of being lively and serene at the same time."

MSc student, Relin David Abraham

Natalie Quinn and Will Bazeley set up a racking test on a scaled timber frame.

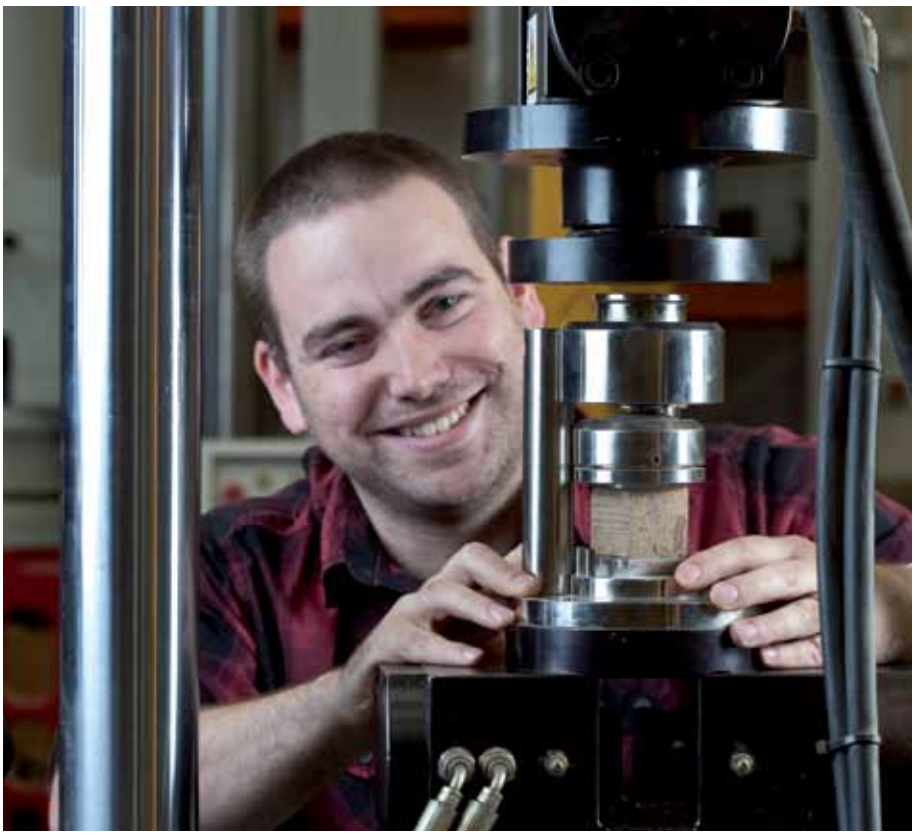
MSc in Civil Engineering: Innovative Structural Materials

12 months full-time. October start.

Why study the MSc in Civil Engineering: Innovative Structural Materials at Bath?

The use of construction materials is key to infrastructural development globally. New approaches are now needed for innovative renewable and low carbon structural engineering materials.

This MSc in Innovative Structural Materials is a unique UK postgraduate programme that draws upon the research strengths of the BRE Centre for Innovative Construction Materials (BRE CICM), based at the University of Bath. It offers an advanced qualification useful to engineering and science graduates wishing to develop an in-depth and practical understanding of the use of innovative structural materials in the provision of sustainable and holistic construction solutions for the built environment.



Neil Price tests the compressive strength of a timber sample.

What skills will I gain?

You will develop practical knowledge and tools to support you in the use of innovative structural engineering materials in the context of sustainable and holistic construction. You will also learn how to harness that knowledge in a business environment. You will gain analytical and team working skills to enable you to deal with the open-ended problems typical of structural engineering practice.

In particular, you will gain;

- intellectual understanding of the nature and behaviour of structural materials in terms of strength, deformation characteristics, durability and environmental considerations
- knowledge of materials and structures research methods to enable you to undertake independent research in construction materials and structures' problems
- the ability to appropriately apply knowledge on structural materials in the provision and delivery of sustainable and holistic construction
- the capability of contributing to the technical and business operation of a project team
- comprehensive knowledge and appreciation of significant contemporary issues in structural materials and structural engineering research
- research training, including personal project management and innovative thinking, enabling you to continue on to doctoral level research, should you choose
- the ability to act autonomously in planning and implementing the use of structural materials in design situations

Programme timetable

Semester 1 (October-January)
The first semester consists of five taught compulsory units, providing a foundation in the most significant issues relating to the sustainable use of innovative structural engineering materials in design and construction.

Typically each unit consists of 22 hours of lectures and 11 hours of tutorials, and may additionally involve a number of hours of laboratory activity and field trips with approximately 65-70 hours of private study (background reading, report writing, laboratory results processing and revision for examinations).

Semester 2 (February-May)
Semester 2 offers a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes. You will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply

to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.

Summer/Dissertation Period
(June-September)
You will undertake an individual project leading to an MSc dissertation. Depending on your chosen area of interest, the individual project may involve theoretical and/or experimental activities; the individual projects are carried out under the supervision of a member of academic staff. There may be an opportunity to carry out your project with the Building Research Establishment (BRE).

Facilities to support the programme of study

The Department of Architecture and Civil Engineering offers dedicated computer suites and well-equipped and newly refurbished laboratories for experimental work to support your studies. There may also be project related research opportunities at the BRE laboratories in Garston, UK.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in an engineering or science subject.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Victoria Stephenson sets up a durability test for an infill masonry wall.

Career opportunities

The construction industry needs experts in innovative renewable and low carbon structural engineering materials and as a graduate of this programme, you will be well placed to fulfil this role. The holistic project-based learning environment in semester 2 will develop key skills actively sought by top employers.

Career prospects for graduates will be enhanced by:

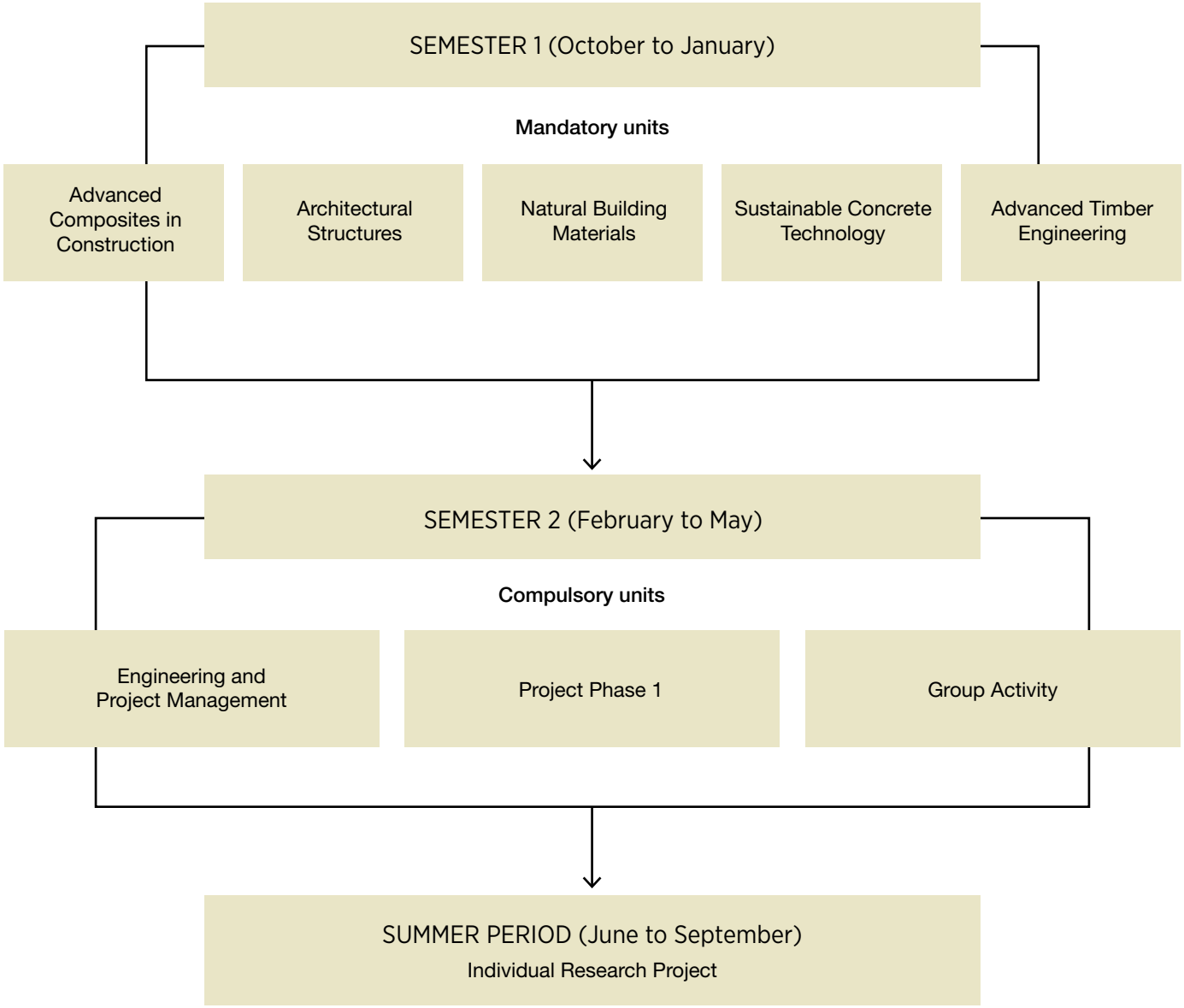
- The reputation of the undergraduate civil engineering programmes (ranked 2nd in the UK for 2013 by the Guardian Newspaper, with the 3rd highest employment rate).
- Excellent links with local, national and international employers.
- Links with the Building Research Establishment (BRE) through the BRE Centre for Innovative Construction Materials (CICM) based at the University of Bath.

The BRE CICM has approximately 50 PhD and other research students conducting research into innovative construction materials, mainly funded through grants from external sources. It is anticipated that the top MSc students will have the opportunity to further their studies through the PhD programme at Bath should they wish to.

This programme is new for 2012/13 and we are currently seeking accreditation to enable graduates with a suitable first degree to achieve Chartered Engineer status in the UK, after suitable industrial experience.

Up to date information is available on our website, **go.bath.ac.uk/ism**

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"The more I travel around the UK, the more I confirm how lucky I am to be a student in Bath."

MSc student, Manuel Darmanin

Students at Windsor Castle.

MSc Conservation of Historic Buildings

12 months full-time. 2-4 years part-time, Diploma/CPD options available.

Why study the MSc in Conservation of Historic Buildings at Bath?

The UNESCO World Heritage city of Bath is an ideal location for a specialist course in the conservation of historic buildings, both for the available study material and as an environment in which to live. The programme provides training in structural and architectural conservation, within an academic framework of architectural history and theory, including the philosophy of conservation. The course is taught by leading architects, structural engineers and related professionals, directed by Dr Michael Forsyth.

The Department of Architecture and Civil Engineering has a well-established tradition of education and training based on interdisciplinary co-operation between architects and engineers, as well as experience in related areas and techniques, including urban management and computer modelling.

Students travel from across the UK to attend the programme and it attracts overseas students from many countries (recently from China, Thailand, Malaysia, India, Taiwan, Japan, Mexico, Argentina, USA, Canada, Serbia, Northern Cyprus).

Accreditation

The curriculum accords with the conservation guidelines of ICOMOS (International Council on Monuments and Sites) and is accredited by the Institute of Historic Building Conservation (IHBC) and the Royal Institution of Chartered Surveyors (RICS). After completing the MSc, graduates are exempt from the RICS internal examinations and eligible for entry to the RICS Assessment of Professional Competence (APC).

How is the programme structured?

The programme is structured into four distinct units, which are taught on separate days. Full-time students attend the programme on Wednesdays and Fridays for lectures, seminars, discussions and visits. Part-time day-release students attend either on Wednesday or Friday and, for their benefit, the units flip over yearly so that the day remains constant for two years. Teaching takes place over eleven weeks in semester one and eleven weeks in semester two, plus three and four weeks respectively to complete coursework.

What skills will I gain?

By the end of the programme students will be expected to be able to demonstrate:

- a knowledge of the structural and constructional techniques used in the conservation of historic buildings
- a knowledge of architectural history and theory, in particular the philosophies and approaches to conservation of the built environment
- an ability to research the history of a building and to assess and understand its significance
- knowledge of the law relating to historic buildings and the ability to make a case for or against a listed building proposal.
- visual awareness of the characteristics of classical architecture.

Admissions criteria

A first or upper second class UK honours degree or internationally-recognised equivalent in engineering, architecture, surveying, planning, geography, archaeology, history or management.

IELTS 7.0 (with not less than 6.5 in each of the four components) or equivalent may also be required. Equivalents include 100 in TOEFL internet-based test, with not less than 24 in each of the components.

Top: Hands-on learning about lime products
Above: Structural conservation at Woodchester Mansion.

Students on the scaffolding with the Director of Properties, Royal Windsor household.

Career opportunities

The degree has a proven track record of employability. We aim to draw students from a range of backgrounds, mostly architects, engineers, surveyors and suitably qualified candidates from other fields including planners and building industry managers. We also accept (and encourage) students who have either taken a non-vocational degree (usually historians or art historians, but also geographers, archaeologists and others). Examples of career opportunities for previously non-vocational graduates on the basis of our MSc degree are English Heritage, the National Trust, local authorities and private practices.

Examples of jobs obtained by graduates from a non-vocational background on the basis of our MSc degree include:

- English Heritage (historic research department, inspectors, managers)
- Conservation officer, UNESCO, Paris
- Conservation architects with many well-known practices working on every type of historic building from Salisbury cathedral to medieval timber-framed barns
- Architects' practices working on conservation and building new country houses in a classical style
- Development Officer with Turquoise Mountain repairing a mosque in Kabul
- Inspector with the Victorian Society
- National Trust Manager of Uppark House
- Member of the Information Team, The Science Museum, South Kensington.

What our students say

"The course has been very enjoyable with the subjects studied combining academic theory with practical application. The work has been challenging, of course, but fascinating and I have enjoyed researching for each module - luckily for me there was only one exam.

The majority of lectures are given by practitioners, which means that the information disseminated is up to date. Many site visits have been organised, which bring the lectures to life and enable a greater comprehension of theoretical issues.

The diverse student body comes from all backgrounds and disciplines. Despite our different ages, experience and backgrounds the group shares a common and passionate bond to conserve historic buildings. As I get further into my academic career I realise how much there is to know and how little I know. Now I hope to continue next year with a PhD!"

Tina Lloyd

Programme structure

SEMESTER 1

Structural Conservation
History of structures; survey techniques and report writing; assessment and diagnosis of structural failure; repair techniques; philosophy and technology; fire prevention in historical buildings; case studies of structural problems in selected building types; environmental control and monitoring

History and theory
The theory of classical architecture; philosophy and history of the conservation of historic buildings; garden conservation and archaeology - an introduction

Case studies

SEMESTER 2

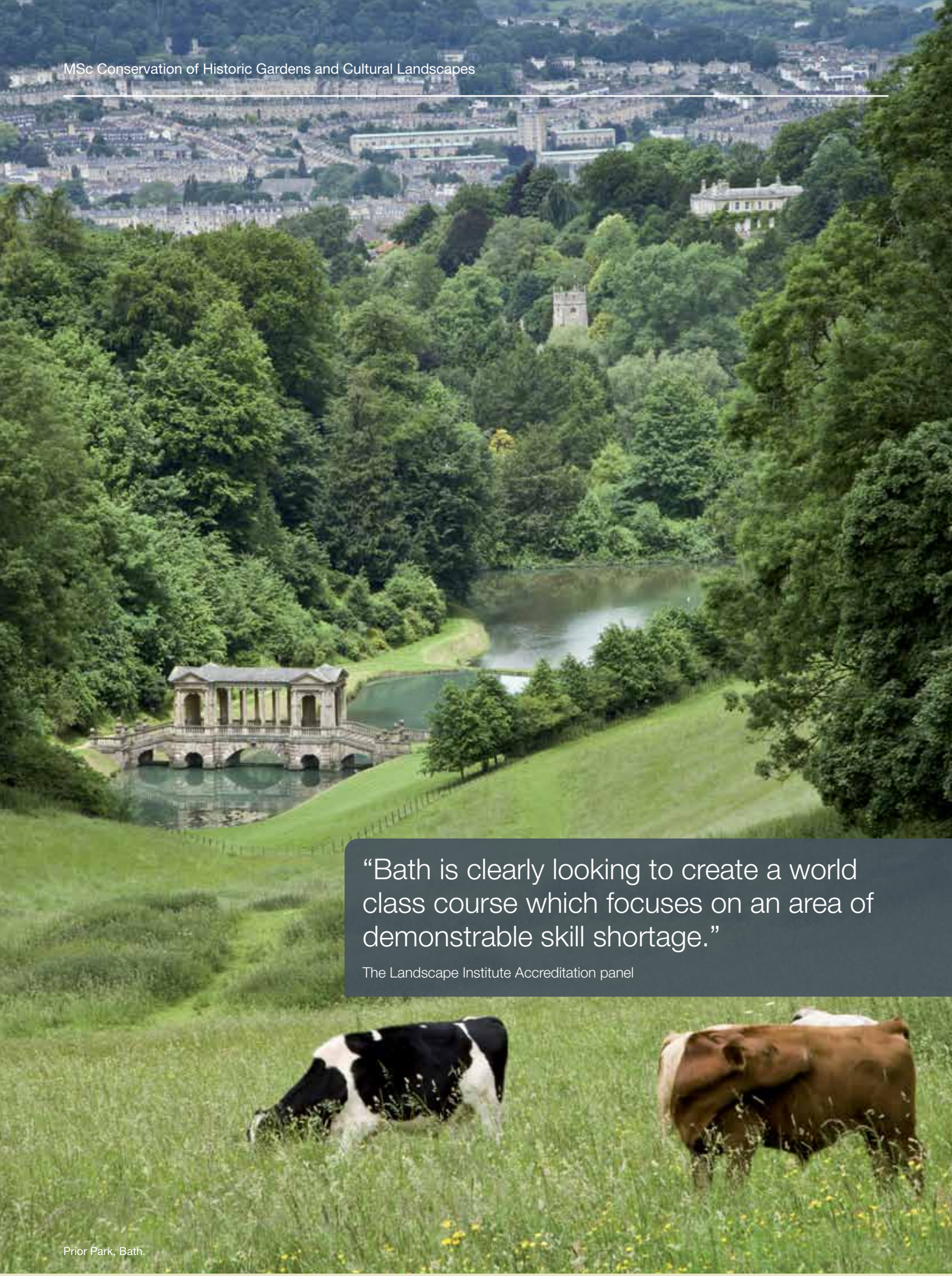
The Legislative Framework
The law and listed buildings; listed building consent and appeals; ancient monuments legislation; The National Amenity Societies and the role of pressure groups; conservation and development: urban planning from the 1947 Town and Country Planning Act to the present day; contracts in conservation work; value added tax and listed buildings; maintenance programmes

Materials, construction and skills
wall materials, roof coverings: timber, metals, finishes

Case studies

DISSERTATION
This is a specialist study on an agreed selected subject relating to areas such as the history and theory of architecture and conservation, structures and structural engineering, materials technology and conservation, the law relating to listed buildings and urban management and the planning process.

Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change



"Bath is clearly looking to create a world class course which focuses on an area of demonstrable skill shortage."

The Landscape Institute Accreditation panel

Prior Park, Bath.

MSc Conservation of Historic Gardens and Cultural Landscapes

12 months full-time, 2-4 years part-time, Diploma/CPD options available.

Why study the MSc in Conservation of Historic Gardens and Cultural Landscapes at Bath?

The UNESCO World Heritage City of Bath is an ideal location for a specialist programme in the Conservation of Historic Gardens and Cultural Landscapes, with numerous important gardens and landscapes in the region or within travelling distance.

This Masters programme is the only one of its kind in the UK. It will equip you with key analytical and practical skills and grounding in the theory and practice of designed and cultural landscape conservation and management. It offers an interdisciplinary and cross-functional perspective, integrating conservation and management studies within a broader understanding of history and theory, survey and assessment, as well as the legislative framework.

This distinct degree enables you to analyse the synergies between different approaches and philosophies, whilst learning to look at how these interrelate and impact on one another through thought-provoking debate. It also provides you with the opportunity to develop an individual viewpoint.

The Bath MSc has a distinctive profile that attracts highly qualified applicants. This is due to its coherent and integrated approach to conservation, as well as its innovative combination of rigorous academic study, practical skills, and vocationally orientated units. The varied and challenging programme is designed to provide maximum flexibility to cater for the wide-ranging experiences, interests, and career aims of each individual student. The programme is taught by leading professionals, expert practitioners and academics, coordinated by a dedicated Director of Studies, Marion Harney.

Accreditation

The curriculum accords with the conservation guidelines of the International Council on Monuments and Sites (ICOMOS). All students may become licentiate members of the Landscape Institute. After completing the MSc these graduates are eligible to progress to Chartered status by completing the Landscape Institute's Pathway to Chartership programme.

What skills will I gain?

- the ability to research, record, analyse, interpret and understand the significance of buildings and sites
- the aptitude to understand and interpret our landscape heritage and assess its significance
- the capacity to complete a comprehensive survey and assessment of a site, produce reports and make recommendations for its conservation
- the skill to assess appropriate management and conservation approaches and to write a coherent conservation and management plan
- to document and communicate ideas effectively in writing and orally in a way appropriate and accessible to both professional and lay audiences
- a sound knowledge of the current system of heritage protection
- the ability to make a case for or against an intervention in an important landscape
- develop an awareness of the key issues and organisations involved with the historic environment

How is the programme structured?

Flexible study options

The degree programme commences in October and is offered as one year full-time, two years part-time, four years extended part-time. Alternatively, single units can be taken for Continuing Professional Development purposes (the CPD route is not assessed).

Attendance is either one day or two days per week over two semesters (Wednesday and/or Friday). Each semester contains eleven weeks of teaching, so the commitment for attending lectures, seminars and visits by the part-time route is just 22 days over the year or 44 days full-time. The dissertation period runs from June until September and on successful completion of the MSc you will graduate in December.

Stowe House, Buckinghamshire.

Our teaching and your learning

Our diverse study environment means you will be exposed to a wide range of leading academics, practitioners and conservation bodies, as lecturers, workshop tutors and site visit leaders. You will benefit from a stimulating learning environment and a diverse range of teaching and learning techniques, from standard lectures to seminars, practical workshops and a range of site visits that provide an application-specific context, consistent with the needs of professional practice. The case studies provide you with the opportunity to see integrative examples of conservation practice.

Assessment

Assessment is continuous by coursework, essays, report writing and case studies.

For the Legislative Framework, a written examination is taken at the end of the unit.

Coursework is central to the programme, forming an integral component of each unit. The work is structured to give you academic and practical experience through written and oral presentations and by the development of field skills and practical techniques.

Admissions criteria

The programme is open to graduates from most disciplines or equivalent professional qualification or relevant experience. Graduates of other fields such as history of art who wish to gain a vocational degree are also eligible to apply.

At the discretion of the Board of Studies students without a first degree may be admitted on the basis of substantial professional experience in a relevant field.

IELTS 7.0 (with not less than 6.5 in each of the four components) or equivalent may also be required. Equivalents include 100 in TOEFL internet-based test, with not less than 24 in each of the components.

Career opportunities

The programme has a proven track record of good employability. Our students come from a range of backgrounds including professionals already working in practice and suitably qualified candidates from other fields. We also encourage and accept students with non-vocational degrees. Potential employers for graduates include the landscape and heritage industries, in UK and overseas, including English Heritage, The National Trust, Natural England and other Government agencies, local authorities, planners and conservation architects, garden historians, National Parks managers, Trusts and private architectural and landscape practices.

Recent examples of Graduate employments as a direct result of obtaining the MSc include:

- 1 South West Region Landscape Specialist
- The newly-created, three-year post of Historic Landscape Project Officer – South East Region (HLPO) with the Association of Gardens Trusts (AGT)
- Landscape consultant, who has recently secured a project including the restoration of historic gardens for the owners of a prominent William Playfair private residence in Edinburgh
- Chartered Landscape architect gained employment with Historic Landscape Consultants Debois Landscape Survey Group
- Townscape Consultant based in London
- Teaching landscape ecology in the Shires of Devon and Somerset
- Ranger for the dual designated nature/culture World Heritage Site of St. Kilda
- Consultant of 'Designer Landscapes', has just completed a prestigious show garden for the Royal Horticultural Society's Chelsea flower show
- Consultants securing historic landscape design commissions
- Garden design commissions
- In addition 4 graduates from the programme have registered to complete PhD's at the University of Bath, 1 securing a Faculty Scholarship to do so.

What do our graduates say?

"As an architect from Hong Kong, it is nice to have students from all different backgrounds within the field, e.g. building surveyors, landscape architects, gardeners, infrastructure planners, etc. One thing I must mention is, to learn all this in the world heritage city of Bath is just a perfect match. I learnt a lot from the practical side, from the legislation and actual management of the places. Yet the balance between the theories and the practical issues of the course is just right."

Shun Leung

"After working for six years as a conservation architect in Malta I felt the need to further my education abroad. This unique programme enabled me to learn about the history, survey techniques, legislation and conservation management as practiced in the United Kingdom as well as overseas. Learning in the company of fellow students coming from different backgrounds and careers, also enabled us to exchange ideas and discuss different opinions with one another."

Edward Said

"I can recommend the part-time route for busy people with on-going commitments. I work full-time as Landscape Director in an architectural firm and as a visiting tutor on Urban Design. The assignments are a challenge after a break from education of 30 years, but the discipline is having benefits back in the office. The modules are delivered through a variety of visiting lecturers and there is something to learn on each and every site trip. The course is keeping me up to date with conservation thinking, particularly at this time of massive change with the new National Planning Policy Framework, Localism Bill and funding cuts."

Wendy Tippett

Programme structure

The programme takes place on Wednesday and Friday with lectures, seminars, workshops, discussion and site visits. Linked to each of the taught units are case study units that provide opportunities to integrate theory and knowledge in applied situations.

SEMESTER 1

Two taught units, each accompanied by a related unit of Case Studies which integrate and exemplify the teaching in the main unit

History and Theory
Provides you with knowledge and understanding of garden and landscape history and theory relating to the historic environment of both urban and rural environments and of conservation philosophy in the historic environment.

Case studies

Survey and Assessment
Covers the techniques of survey and assessment, conservation planning, archaeology, interpretation, mapping, recording, and the skills required for reading landscape and architectural plans, understanding topography and documentary research methods.

Case studies

SEMESTER 2

Two taught units, each accompanied by a related unit of Case Studies which integrate and exemplify the teaching in the main unit

Conservation and Management
Emphasizes the skills, management techniques and strategies required for the management of designed and natural gardens and cultural landscapes.

Case studies

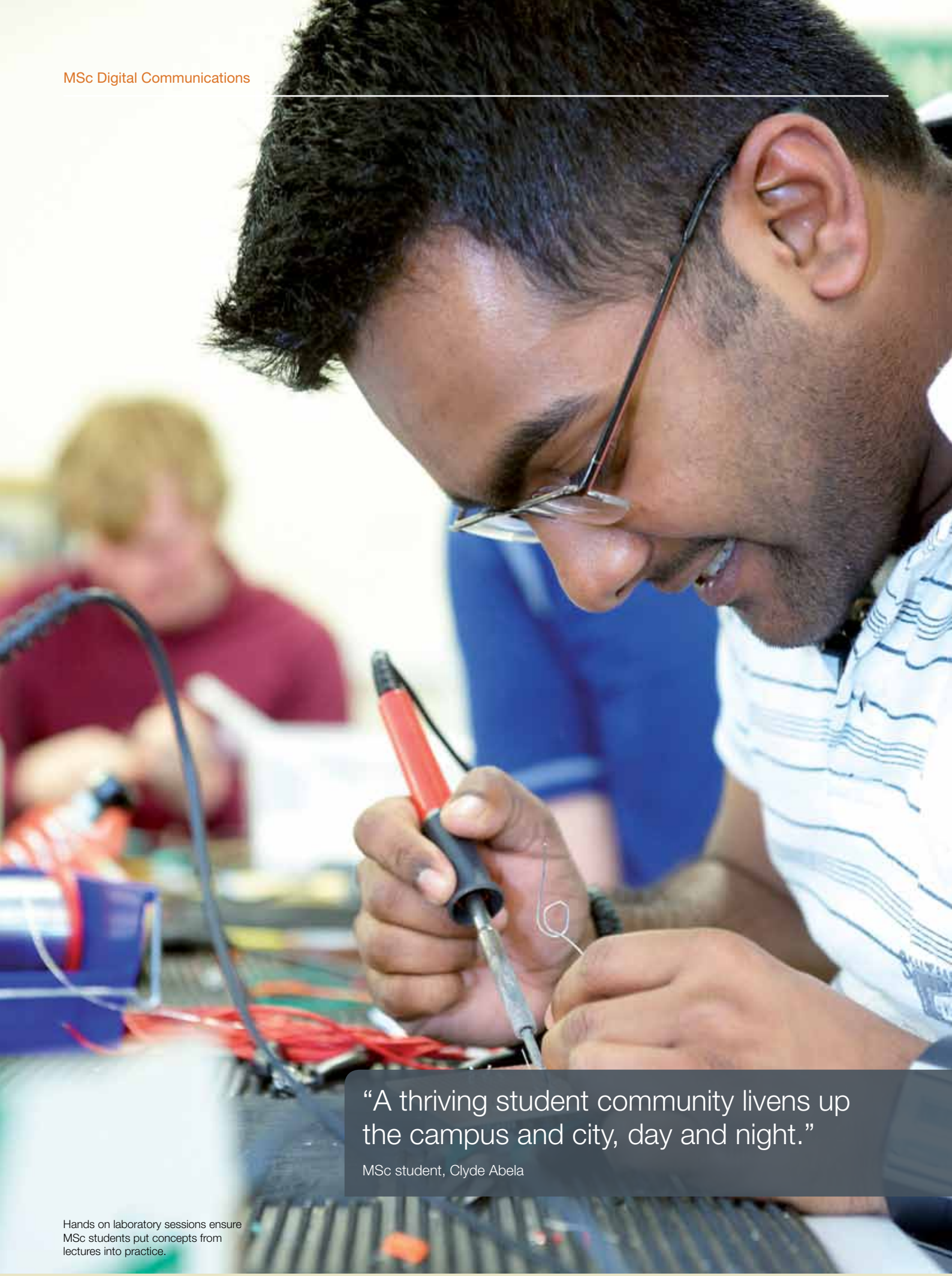
The Legislative Framework
Teaches the legislation at a national level as it relates to conservation, legislation and International Charters and Standards; and to the function of national and international bodies such as UNESCO's International Council of Monuments and Sites (ICOMOS).

Case studies

DISSERTATION

The dissertation provides students with an opportunity to pursue, in depth, specialist study within the field of historic garden and cultural landscape conservation and provides students the opportunity to design and complete a research project undertaken under the supervision of an appointed supervisor.

Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change



"A thriving student community livens up the campus and city, day and night."

MSc student, Clyde Abela

Hands on laboratory sessions ensure MSc students put concepts from lectures into practice.

MSc Digital Communications

12 months full-time. October start.

Why study the MSc in Digital Communications at Bath?

Communication is fundamental to the modern "connected world". Digital communication systems enable that communication, whether work emails, a chat with a friend on a mobile phone or a streaming video broadcast to a global customer-base. The importance and growth of the technology that feeds this market area make Digital Communications a strategic choice for specialisation at MSc level.

The programme follows a unique structure, flowing from technical teaching through to business management techniques to individual and group based design projects. This combination of design, business and project management ensure that our graduates acquire academic and personal qualities, as well as business acumen, to make an immediate contribution to industry or to undertake future research.

The programme is accredited by the Institution of Engineering and Technology (IET), required for eligibility towards full Chartered Engineer (CEng) status.

What skills will I gain?

You will gain a solid foundation in the fundamental concepts of digital communications, including signal and information theory. This foundation will enable you to understand and evaluate the operating principles and trade-offs on which modern digital communications systems are based.

In particular, this programme of study will help you to:

- understand the fundamental concepts of signal theory and information theory, and appreciate the relationship between them
- explore the range of currently important digital communications systems
- understand the signal-processing techniques employed in communications transceivers and the reason these techniques are employed
- explain the important technologies and techniques used by the range of systems studied
- understand the nature and role of technology strategy in creating value in the digital communications industry
- apply subject-specific knowledge in a range of complex situations, taking into account the implications for other areas of the business
- operate effectively – both independently as well as within teams – assuming leadership roles where opportunities arise
- complete a substantial research project in a technical aspect of digital communications engineering.

Programme timetable

The structure follows a unique pattern, in three parts, starting with advancing your technological skills and understanding, through to personal professional development and multidisciplinary group work, preparing you to finally undertake an individual project under expert supervision.

Semester 1 (October to January)
You will integrate your fundamental background of mathematics and engineering science into the arena of digital communications. You will take five taught units, three compulsory and two options, delivered by our expert lecturers. Assessment is by examinations and some coursework.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.

Summer period (June to September)
You will undertake an individual research project in one of our leading research centres. MSc Digital Communications

High performance digital design equipment in the student laboratories at Bath provides the opportunity to investigate the full range of protocols used in current communication systems.

students carry out their research projects across the entire department.

Typical project areas include:

- investigation into the effects of the natural environment on the propagation of electromagnetic and acoustic waves
- satellite navigation systems
- radio communication systems
- seabed and marine acoustics
- microelectronics, optoelectronics and novel materials
- radio frequency transmitters for human implantable transcutaneous sensors.

Facilities to support the programme of study

The Department of Electronic and Electrical Engineering provides extensive laboratory facilities to all its postgraduate students. In addition, digital communications postgraduates have access to a wide range of digital signaling equipment and real-world data sources owned by the University and located all over the globe.

Admissions criteria

A first or upper second class UK honours degree or equivalent internationally recognised equivalent in Electronic Engineering.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Multi-use telecommunications towers are a cost effective way of providing UHF and VHF broadcast, GSM mobile phone connectivity and point to point microwave links. A key aspect of this provision is the correct frequency allocation and interference suppression circuitry studied in the MSc in Wireless Systems.

Career opportunities

Recent graduates have secured jobs as:

- Senior Engineer, Mobily, Saudi Arabia
- Field Test Engineer, Amazon, India
- Graduate Signalling Engineer, Thales, UK
- Incident and Problem Manager, Trapeze ITS, UK
- Sales Engineer, Beijing Raisecom Science & Technology Co, Ltd, PR China
- Project Manager, Motorola, PR China
- Power System Control Engineer, Tanesco Ltd, Tanzania

We also actively encourage the best of our MSc students to continue their studies with us to PhD level for which scholarships are available.

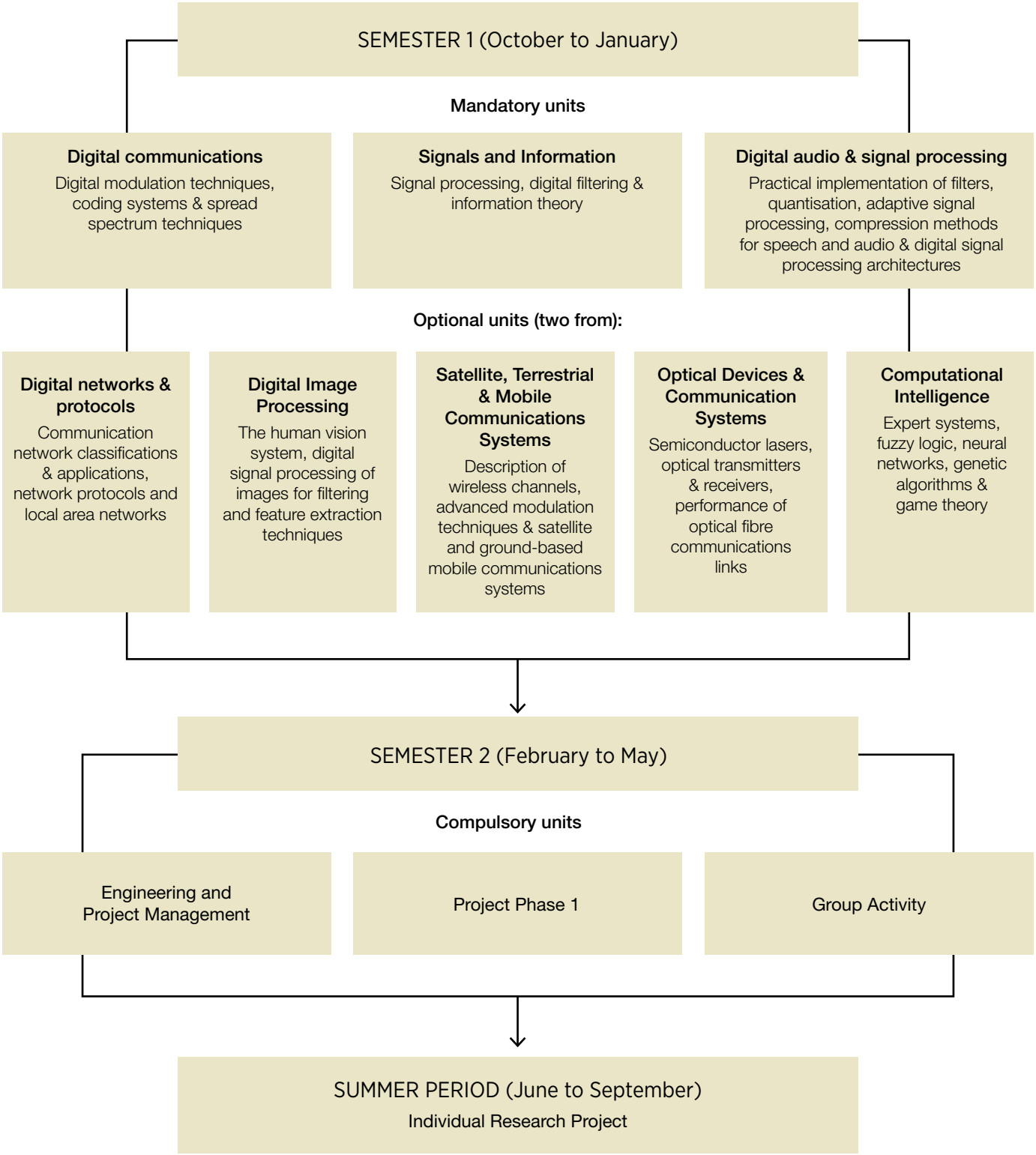
What our students say

"The academic reputation of Bath and the convenience of completing my masters in just one year was my reason for studying here.

The best thing about the programme has been the combination of communications and management studies. As a telecommunications graduate, the management modules in the second semester have been the most important to me to improve my career prospects. Telecommunications is a growing industry in Greece and I believe I will have a lot more options in my professional career after studying here. I like living in Bath as people are very friendly and hospitable and there are many places to visit and things to do. Bath is a graphic city of great beauty."

Ioannis Dimitriou

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

“The University of Bath has a great reputation for its research and teaching capabilities.”

MSc student, Liu Zhao

Current research focuses on how to effectively locate points of failure in power transmission line networks, which can run for hundreds of kilometres.

MSc Electrical Power Systems

12 months full-time. October start.

Why study the MSc in Electrical Power Systems at Bath?

The University of Bath MSc programme in Electrical Power Systems will give you the skills and specialist experience required for your career in the Electrical Power Industry, including the transmission and distribution companies, manufacturers and academia world-wide.

This MSc programme is taught within the Department of Electronic and Electrical Engineering and builds on a long-term involvement with the power industry, the education of electrical power engineers and extensive research work. The programme provides engineers with a firm grasp of the field, enabling them to understand the subject in depth and contribute to the wealth and health of the industry worldwide.

The programme follows a unique structure, flowing from technical teaching through to business management techniques to individual and group based design projects. This combination of design, business and project management elements ensure that graduates acquire the academic and personal qualities, as well as business acumen to make an immediate contribution to industry or to undertake research.

What skills will I gain?

The aim of the MSc programme in Electrical Power Systems is to equip you with the ability to make an immediate engineering contribution to electrical power systems analysis, planning, operation and management. You will be able to perform in-depth engineering work on defined tasks requiring technology, research, personal project management and innovative thinking. The University of Bath MSc programme in Electrical Power Systems provides its graduates with the underpinning knowledge of business operation and project team-working that leads to maximised impact within an industrial setting.

In particular, this programme of study will help you to:

- understand the fundamental concepts of electrical energy systems and analysis
- detail the principal subsystems of a modern power systems network
- recognise and explain the functional purpose of each subsystem
- understand and apply the various management processes used in electrical power systems engineering
- analyse the nature and role of technology strategy in creating value in the electrical power systems industry
- use a range of practical tools (scenario planning, real options, etc.) to develop practical technology strategies
- apply subject-specific knowledge in a range of complex situations, taking into account the implications for application of electric power in general
- develop a detailed understanding of project planning and through-life project costing
- operate effectively – both independently as well as within teams – assuming leadership roles where opportunities arise
- complete a substantial research project in a technical aspect of electrical power systems engineering, and prepare material for publication in the open literature.

Programme timetable

The structure follows a unique pattern, in three parts, starting with advancing your technological skills and understanding, through to personal professional development and multidisciplinary group work, preparing you to finally undertake an individual project under expert supervision.

Semester 1 (October to January)
You will integrate your fundamental background of mathematics and engineering science into the arena of Electrical Power Systems. You will take five taught units, three compulsory and two options, delivered by our expert lecturers. Assessment is by examinations and some coursework.

Student uses motor test rig to investigate instability of induction motor drives under high load conditions.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.

Summer period (June to September)
As a student of MSc Electrical Power Systems, you will undertake an individual research project in the Centre for Sustainable Power Distribution, which is widely recognised as a centre of research

excellence within the area of electrical power and energy systems. It carries out research in all aspects of power generation, transmission and distribution and has internationally recognised expertise in:

- power system planning
- operation and management
- security and stability analysis of large systems
- control of power systems
- protection of power systems
- distributed generation
- power systems economics and market operation
- condition monitoring and protection of power plant.

Facilities to support the programme of study

The Department of Electronic and Electrical Engineering provides extensive laboratory facilities to all its postgraduate students. In addition, electrical power systems postgraduates have access to:

- a real-time digital transient simulator
- a multi-machine power system simulator
- chemical and kinetic energy storage equipment
- a full range of industry-standard software such as ATP, EMTDC, ERACS, and ANSYS
- electrical power market simulator.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Electrical Engineering. Applicants must demonstrate a suitable academic background in electrical power systems.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Career opportunities

Recent worldwide employment examples from MSc Electrical Power Systems graduates include:

- London Engineering Manager, EDF Energy, UK
- Special Project Engineer, Guam Power Authority, USA
- Transmission and Control Engineer, Scottish and Southern Energy, UK
- Senior Strategic Projects and Research Analyst, Central Electricity Board, Mauritius
- Distribution Manager, Barbados Light & Power Co. Ltd, Barbados
- Head of Mechanical Engineering, First Hydro, UK
- Power Systems Design Engineer, National Grid, UK
- Electrical Engineer, British Power International, UK
- Senior Electrical Engineer, Torishima Pump mFng. Co. Ltd, United Arab Emirates

We also actively encourage the best of our MSc students to continue their studies with us to PhD level, for which scholarships are available.

What our students say

"Among the few specialised MSc programmes in this field in the UK, I found Bath's was the most fulfilling. This programme introduces you to the world of electrical engineering, but also it informs you how important it is to have a business management perspective of the field.

I found the second semester modules the most enjoyable, due to the individual and team projects and oral presentations we did. I also found them demanding, but in a good way as they really helped me develop my time management skills.

Studying in one of the prettiest cities in the UK, and at one of the best Universities in the country, will be a memorable experience. Lecturers and university personnel are friendly, easy to talk to and most importantly, helpful. At no point during my MSc did I feel alone or helpless. I would definitely recommend the University of Bath to anyone who has high career goals."

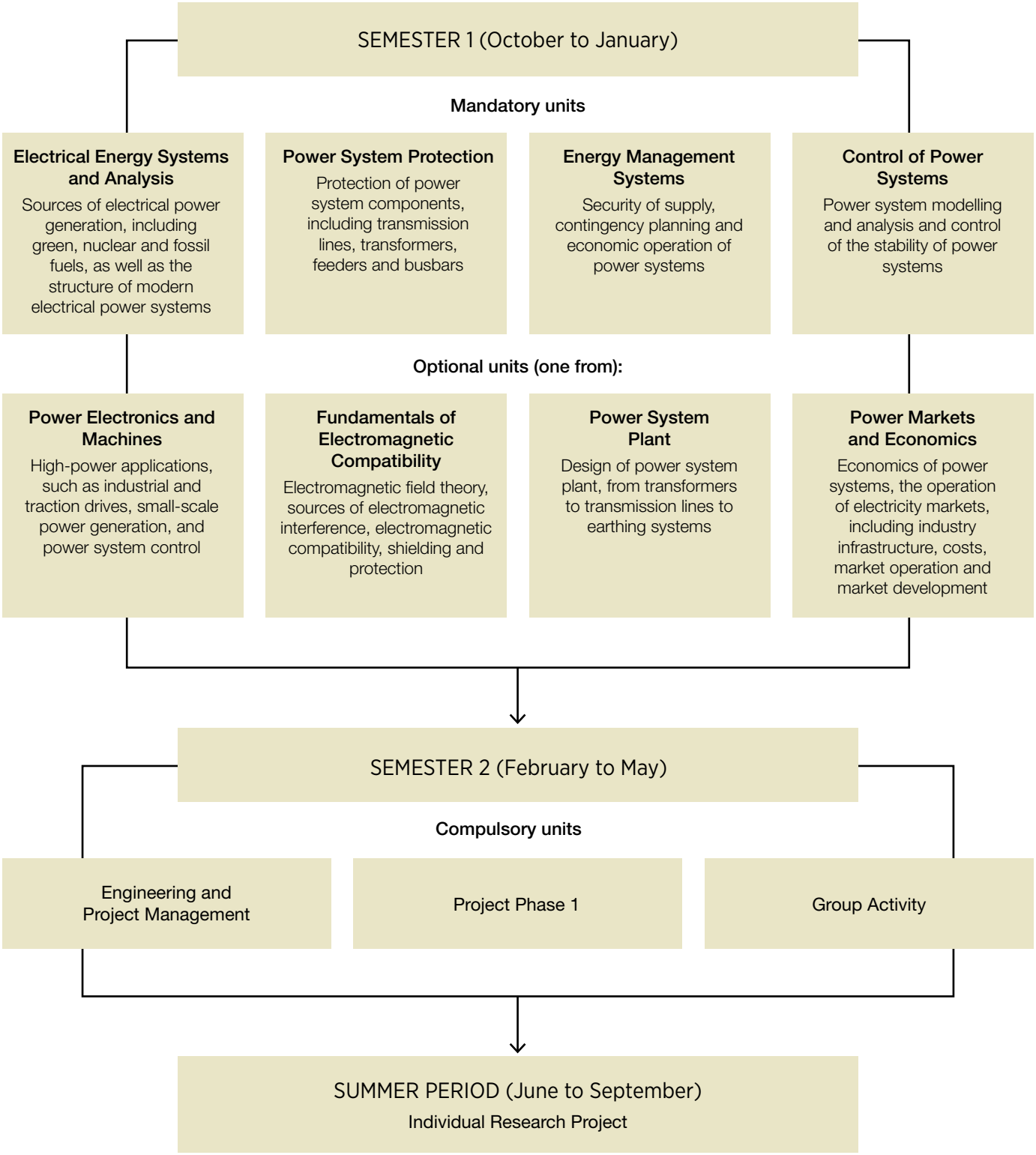
Paris Hadjiodysseos

"The power sector is considered as one of the most promising industries in fast developing countries, like China. Taking the Electrical Power Systems programme at the University of Bath gives me advantages in job-hunting back in China. I've already been offered a job in the State Grid Corporation of China.

You don't find the technology and innovation classes with a business focus at other universities. This programme has been really rewarding due to the hands on projects. Working with real power equipment has reinforced what I learnt in the classroom and put things into a real perspective for me."

Liu Zhao

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"The friendly, positive atmosphere and excellent support for students are added advantages that mark the success of the postgraduate programmes."

MSc student, Talini Pinto Jayawardena

The course covers the tools, technologies, knowledge and skills necessary to successfully undertake large complex engineering design projects in today's global and highly competitive business environment.

MSc Engineering Design

12 months full-time. October start.

Why study the MSc in Engineering Design at Bath?

The MSc produces graduates with the creative, technical, managerial skills and expertise, highly sought after, in the field of engineering design. The programme covers an extensive range of innovative design techniques and approaches, reflecting how design impacts across all sectors of industry, whilst broadening your career opportunities as much as possible.

Design influences all industrial activity whether from the perspective of a process, a support system or a technology. In a rapidly developing global marketplace, the emerging critical differentiating issue is one of design, in terms of appeal, innovation, speed and cost-effectiveness. It is vitally important that engineering designers understand the needs of increasingly demanding customers of all types. This programme is also underpinned by the areas of research that fall within the remit of the University's Innovative Design and Manufacturing Research Centre (IdMRC). Current research areas are detailed on the IdMRC website, **www.bath.ac.uk/idmrc**.

What skills will I gain?

The aim of this MSc programme of study is to provide a high-level experience for graduates who wish to specialise in engineering design or to undertake engineering design research in a holistic manner.

You will develop technical expertise in engineering design and also learn how to harness that knowledge in a business environment. You will gain analytical and team-working skills to enable you to deal with the open-ended problems, typical of engineering practice.

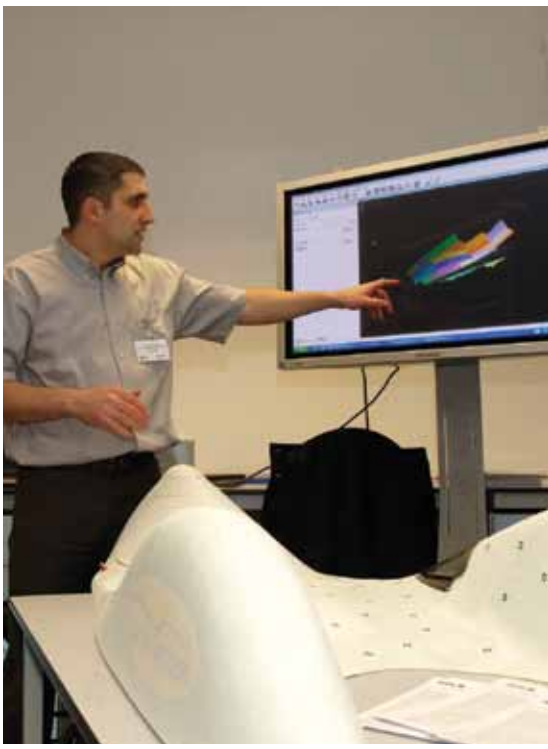
In particular, you will learn:

- to understand the issues associated with creativity and innovation
- detailed knowledge and experience of the issues of global working
- a number of techniques to enable the management of engineering design projects and teams
- a number of knowledge management strategies associated with design rationale – information for innovation, design reuse, manufacturing knowledge, and knowledge-based engineering
- to understand the nature and role of technology strategy in creating value in the engineering design industry
- to use a range of practical tools (scenario planning, real options, etc.) to develop practical technology strategies
- to apply subject-specific knowledge in a range of complex situations, taking into account the implications for other areas of the business.

Programme timetable

Semester 1 (October to January)
In the first semester, you will take five units: three compulsory, two optional (see the programme structure diagram overleaf). Compulsory units introduce the fundamental principles of new product design and development, advanced design and innovation techniques, and computer aided packages for design. Further units offer a wide choice of related topics including business processes, materials selection and system modelling and simulation, with a focus on understanding sustainable approaches and the global commercial environment. Assessment is by coursework and examinations.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.



MSc student using advanced CADCAM, rapid prototyping and metrology to optimise the performance of new designs.

Summer period (June to September)
You will undertake an individual research project in one of our leading research centres. MSc Engineering Design students carry out their research projects across the entire department – reflecting the multidisciplinary nature of this subject – but with a focus towards the Innovative Design and Manufacturing Research Centre (IdMRC). Projects are carried out in areas such as design information and knowledge, creativity and IT systems. The projects are often related to other ongoing research. The design projects originate from a variety of sources in the Department or local industry and from students' own interests.

An integrated approach to using state-of-the-art virtual prototyping and engineering analysis tools to design complex engineering systems.

Facilities to support the programme of study

You will make extensive use of the advanced facilities, which are regularly upgraded and updated according to industry and research needs. These include a global design facility with remote working and video conferencing systems and advanced CADCAM capabilities that include Rapid Prototyping software. The department also has Solid Edge and a full Unigraphics suite. A recent development is a bespoke model shop facility for “design and make” and “prototyping” activities.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Mechanical Engineering.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Career opportunities

Previous graduates of the MSc in Engineering Design have progressed to begin careers in the UK and abroad in areas such as environmental design and design consultancies.

Recent graduates have secured jobs at:

- Garrad Hassan
- ABB Research
- Dyson

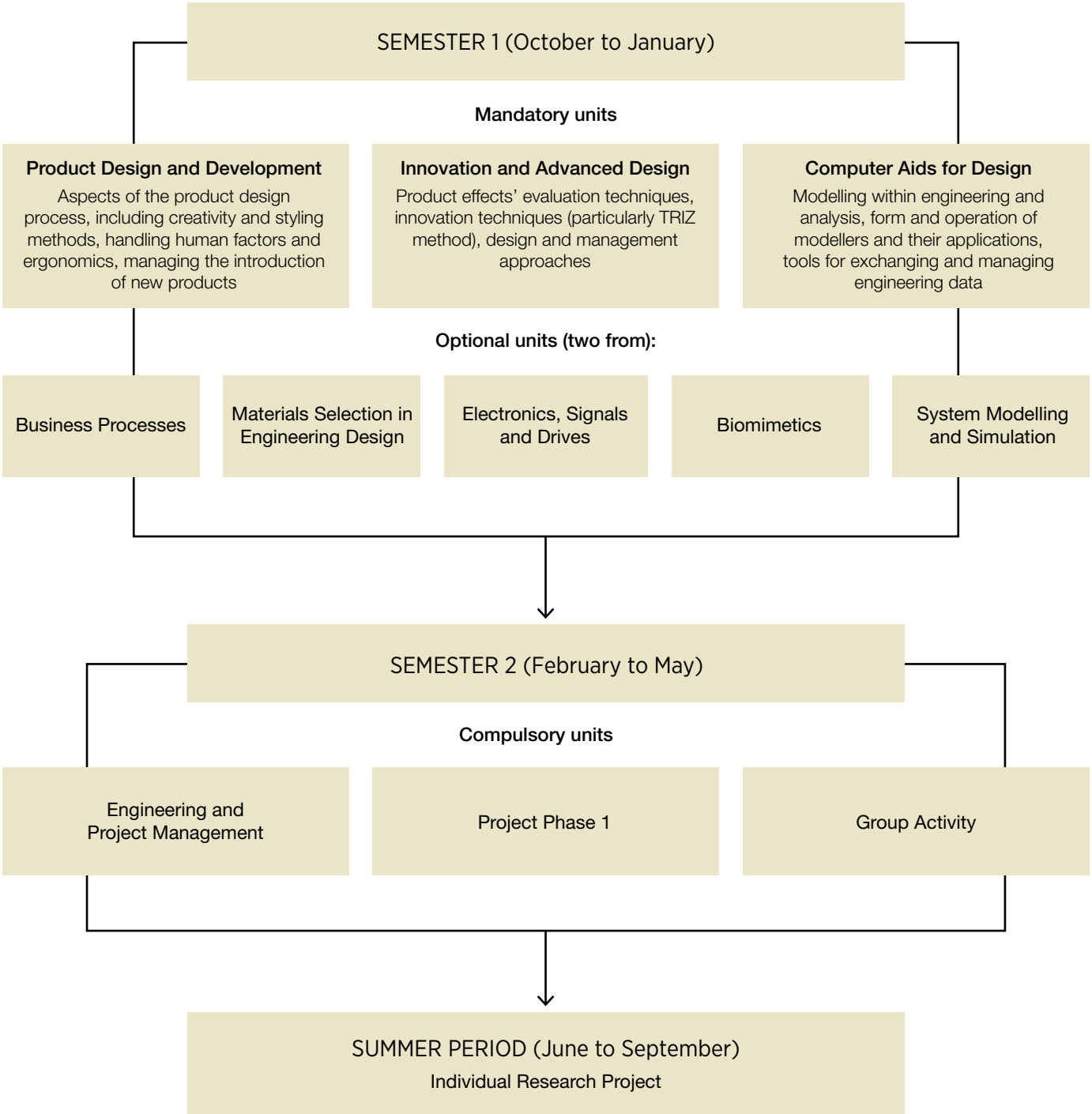
We actively encourage the best of our MSc students to continue their studies with us to PhD level.

What our students say

“I really appreciated the commitment and high levels of interest from personal tutors. I particularly enjoyed the introductory lectures and the high standard of teaching throughout the programme. I found the management of the final project most challenging as I was working to a brief set by an outside company. The project was to design a better alternative for woodchip storage and delivery for a biomass boiler. It was very interesting to learn more about the technology and the way it is used, and also to be given a chance to improve it. As for life in Bath, I got involved in a few student societies and really enjoyed student life. It was a great opportunity to learn to love a new city, which is why I now live and work in the area.”

Paul Fryer, alumni, now Design Engineer, Polamco (Bath) UK

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

"The biggest concern is with the ability of graduates to apply their knowledge to real industrial problems… practical application, theoretical understanding and creativity and innovation are seen as the top priorities."

Royal Academy of Engineering

Students learn to plan innovation and technology management strategies for current engineering businesses.

MSc in Innovation and Technology Management

12 months full-time. October start.

Why study the MSc in Innovation and Technology Management at Bath?

The business world is changing. 21st century leaders need to be equipped with both technological and managerial skills. It is no longer enough to be an engineer with sound technological skills if you are unable to manage a supply chain and lead a diverse workforce. At the same time, you need experience of creativity, design and manufacturing methods in order to understand the technological processes that operate within your company. The MSc in Innovation & Technology Management is designed with this in mind. It teaches engineering and science graduates key management and leadership skills whilst simultaneously training management graduates about the technological operations within business. Whilst most of our Engineering MScs focus on a specific technical area, the MSc in Innovation and Technology Management takes a broader, more strategic view. As the name suggests, this programme is designed for graduates with an aspiration to manage the creation, development and introduction of complex and innovative technology.

The MSc in Innovation and Technology Management is the flagship programme of a unique collaboration between the School of Management and the Department of Mechanical Engineering, both ranked in the top 3 for subject areas in the *Sunday Times University Guide 2012.*

The Department of Mechanical Engineering has a proud record of achievement, consistently rated as producing world leading and internationally excellent research. Close links with industry ensure that all reaching and research remains topical and cutting edge. The School of Management has over 40 years experience in providing high quality and innovative management programmes. Our world class research combined with a unique emphasis on real-world learning makes Bath an outstanding place to study.

What skills will I gain?

This programme is designed for engineering, science and management graduates who are looking to develop an in-depth understanding of innovation and technology management concepts and methods, and the skills to apply these in real life. By combining the development of your innovation, management and technological/engineering skills you will gain the expertise to excel as leaders in complex business environments. On the programme you will:

- build a systematic and thorough understanding of innovation and technology management theory and principles
- gain hands-on experience of creativity tools, decision analysis and product design
- acquire project management, marketing and strategic skills
- learn about management and innovation in complex, global inter-organisation networks
- plan innovation and technology management strategies
- develop your leadership capabilities, enabling you make an impact on strategic decisions
- apply your skills to real-life problems.

From lectures to seminars, group project work to practitioner presentations, you will be exposed to a diverse range of teaching and learning techniques. You will be assessed via a variety of individual and group methods including exams, projects, reports and presentations as well as the final dissertation. The teaching schedule is supplemented by invited talks from external practitioners, active case studies and trips to innovative engineering companies.

Programme timetable

The programme is offered on a full-time basis, lasting 12 months, divided into two 11 week semesters and the dissertation period. The teaching programme consists of 10 units (5 per semester), each focusing on a different aspect of innovation and technology management. The first unit, Management of innovation, introduces the key themes of the programme, while other units provide in depth treatments of key management and engineering principles, processes and techniques.

During the final three months of the degree you will produce a dissertation. This is your opportunity to explore in far greater depth a particular topic that has been covered during the programme.

Students work in groups to produce innovative communications plans and strategies.

Given the combined management and engineering nature of the programme, you may choose to produce a dissertation that spans both management and engineering perspectives and methodologies, or choose to apply either a management or an engineering focus. You will be expected to base your dissertation on real world innovation management practice.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in engineering, management or science. Other disciplines with some numerical content will be considered, on an individual basis.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Career opportunities

Since the programme began in 2008, a very international student profile has developed, and our graduates' opportunities are proving to be very varied and worldwide, from project management roles through to government policy and innovation research. Students have recently joined us from Brazil, Chile, Colombia, Greece, Iran, Kazakhstan, Nigeria, Sri Lanka, Thailand and the UK.

Recent graduates have secured jobs as:

- Analyst, Accenture
- IT auditor, Ernst & Young, Kuwait
- Project Management Officer, Airbus
- Graduate Risk Analyst, AXA
- Design Engineer, Joy Mining Machinery
- Graduate Engineer, Messier-Dowty
- Deputy Director Innovation and Entrepreneurship, Pontifical Universidad Catolica, Chile
- PhD student at the University of Bath

What our students say

"I was very interested in Bath due to its excellent curriculum; there are very few programmes that combine Engineering and Management. I think it is not only important to know how things work but also why they work and what makes them work the way they do and this course has done exactly that for me. Something I love about the program is that each course is a different challenge and involves teamwork and presentations, which have helped me develop both my team building and presentation skills. My intentions are to work in the oil and gas industry to develop new sustainable technology or facilitate the development of such technologies with the knowledge I have gained."

Olgalilia Herrera Monterrubio

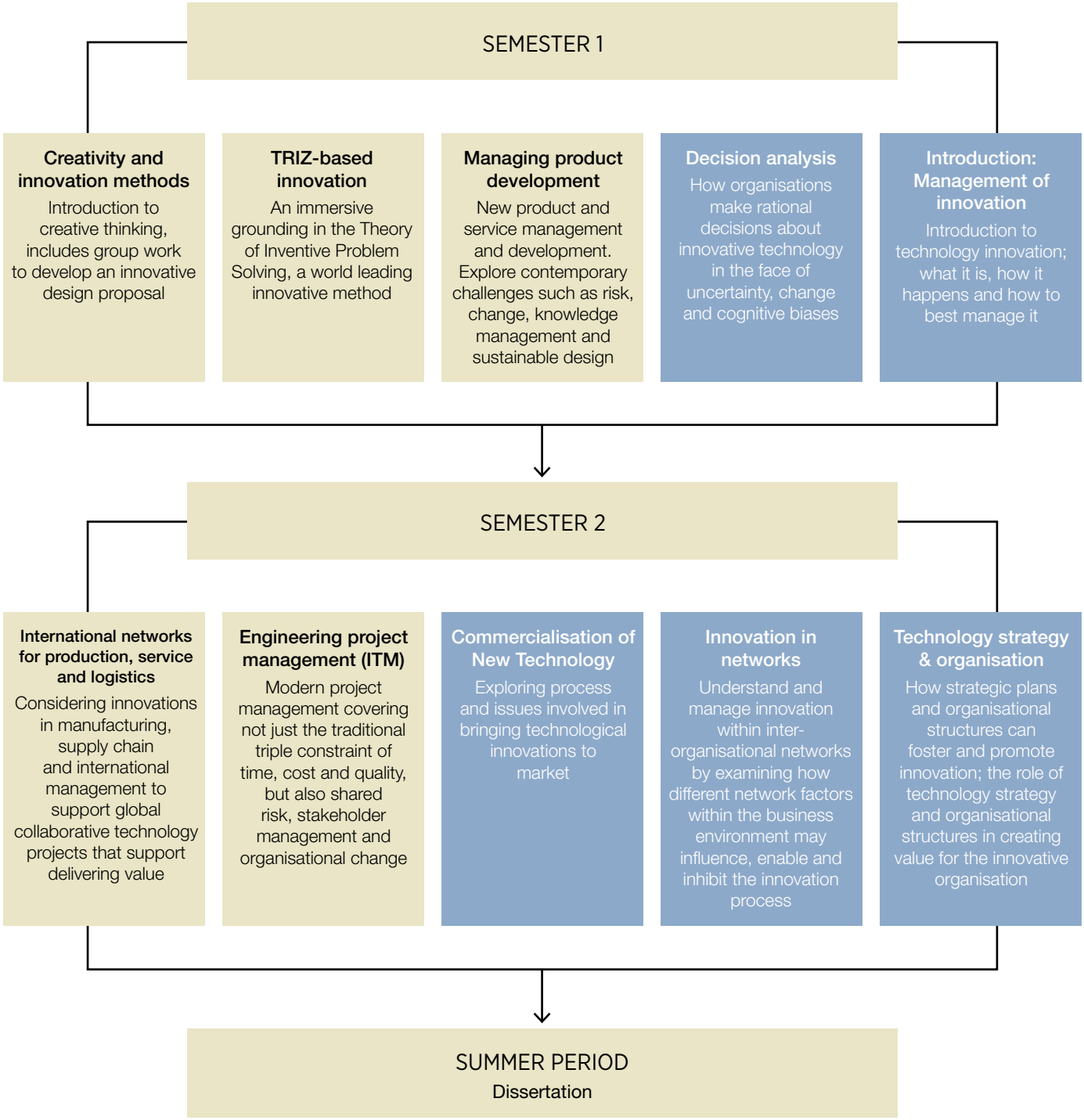
"Bath has a very good reputation for science and technology, and also has a leading business school with strong industry links. I have enjoyed stepping outside the boundaries of business and economics to learn about technology design and development. I feel this has added an additional layer to my understanding of business and companies. There is also a strong emphasis in the course on thinking of innovation in terms of systems, which I feel has given me many tools to help untangle and understand complex situations. You get plenty of chances to try out new ways of thinking through group-work. I believe there will be strong long-term demand for innovation management experts due to combination of increasing globalisation, interdependence and complexity of business environments coupled with rapidly developing technology."

Tom Swales

"This programme is broad enough to allow a wide array of careers from a self employed inventor to a member of an innovation team in a production team. I want to go into business consulting and this course has taught me so many tools and models that can be applied in a variety of ways to solve a lot of business problems in the world today. I have also made new friends and learnt about many different cultures to prepare me for my future in business negotiating and consultation so I can behave properly in different countries."

Elinam Horgli

Programme structure



Delivered by the Department of Mechanical Engineering

Delivered by the School of Management

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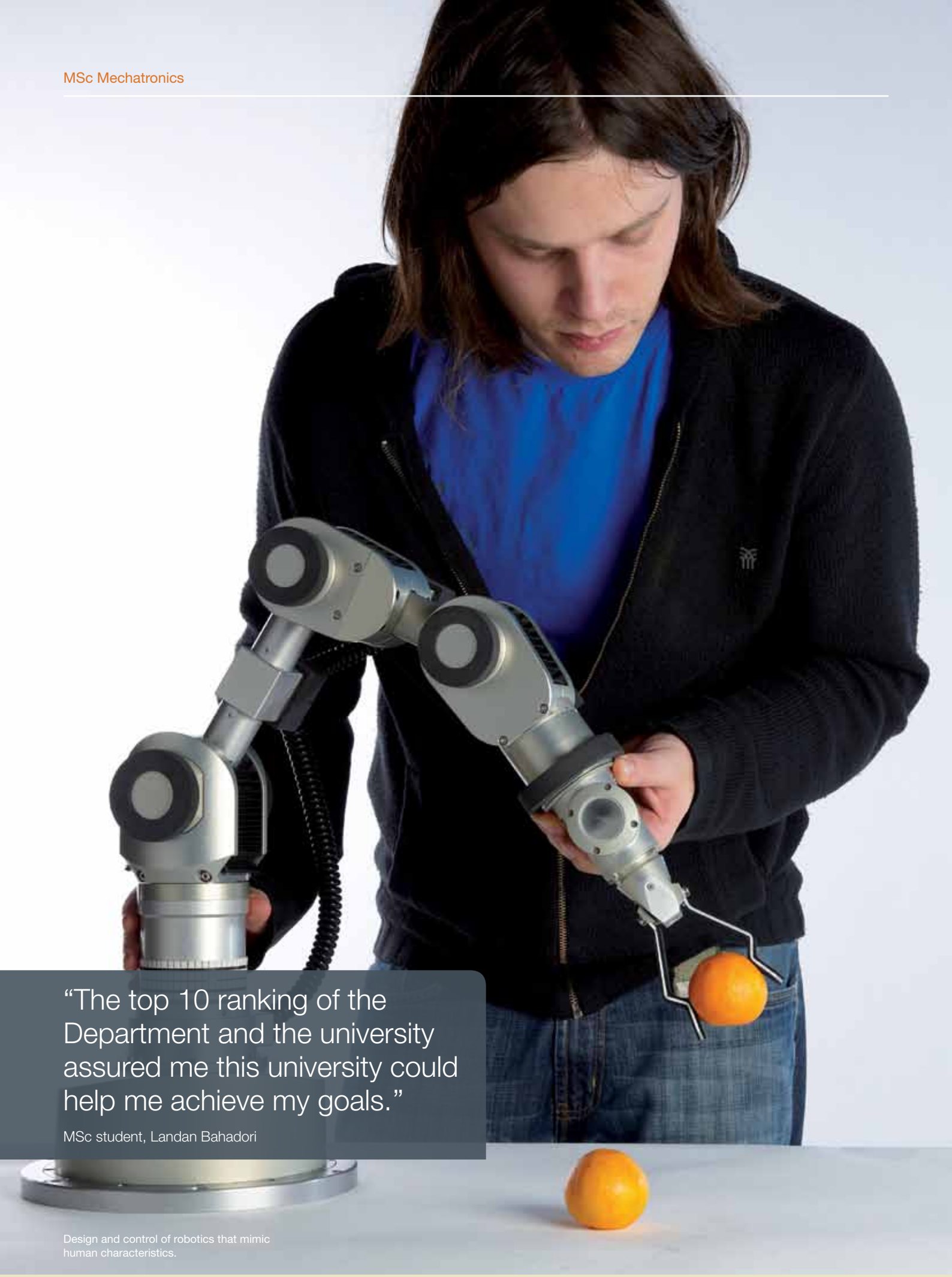


“The top 10 ranking of the Department and the university assured me this university could help me achieve my goals.”

MSc student, Landan Bahadori

Design and control of robotics that mimic human characteristics.

MSc Mechatronics

12 months full-time. October start.

Why study the MSc in Mechatronics at Bath?

This MSc programme produces graduates with technical, managerial skills and expertise across both electrical and mechanical engineering. This makes them in high demand across the aerospace, automotive and manufacturing sectors. The programme has been specifically designed to fulfill the needs of modern industry requiring knowledge in both fields and incorporates a significant input from industry to complement its academic foundations. The programme specialises in enabling students to produce mechatronic components, which increase performance and energy efficiency, as sought after by industries worldwide.

The programme is supported by both the Department of Electronic and Electrical Engineering and the Department of Mechanical Engineering, both of which are among the top performers in the UK, with international excellence in both teaching and research. There are also strong links with firms such as Rolls-Royce and BAE Systems in the electrical power and energy-related industries.

What skills will I gain?

Graduates of this programme have an in-depth knowledge of how electrical engineering can be integrated with mechanical engineering to affect state of the art technologies. You will be qualified to significantly improve the performance of equipment and devices by using, for example, artificial intelligence and modern control and computer engineering. You will be able to approach a problem from a systems engineering point of view, having developed the ability to apply the concepts and principles of mechatronics design to complex multi-physics engineering situations.

In particular, you will learn to:

- explain, develop and produce designs of mechatronic systems and subsystems
- implement mechatronics designs within complex multi-physics engineering systems
- apply artificial intelligence and modern control and computer engineering techniques to improve the performance of modern equipment and devices
- understand the nature and role of technology strategy in creating value in the mechatronics industry
- apply subject-specific knowledge in a range of complex situations, taking into account the implications for other areas of the business
- develop a detailed understanding of project planning and through-life project costing
- operate effectively, both independently as well as within teams, assuming leadership roles where the opportunity arises
- complete a substantial research project in a technical aspect of mechatronics engineering and prepare material for publication in open literature.

Programme timetable

The structure follows a unique pattern, in three parts, starting with advancing your technical skills and understanding, through to personal professional development and multidisciplinary group work, preparing you to finally undertake an individual project under expert supervision.

Semester 1 (October to January)
You will study five units in the first semester, three compulsory, two optional (see the programme structure diagram overleaf). You will integrate your fundamental background of mathematics and engineering science into the arena of mechatronics. The first semester covers the fundamental principles of computational artificial intelligence, integrated engineering control techniques, mechatronic systems modelling and simulation. Further advanced options will give you an in-depth knowledge of how electrical and mechanical engineering can be integrated to effect state of the art technologies. Assessment is by examinations and a small amount of coursework.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team

Student Benjamin Williamson with the Bath entry to the Student Autonomous Underwater Challenge.

would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project. Assessment is by coursework and some examinations.

Summer period (June to September) You will complete your MSc through an individual research project in one of our leading research centres. This project work involves the integration of electrical engineering and mechanical engineering. Each student is assigned two supervisors, one from each of the two departments.

Examples of appropriate projects include:

- design and control of autonomous robots
- undersea tidal wave power generators
- design and control of high speed mechanisms.

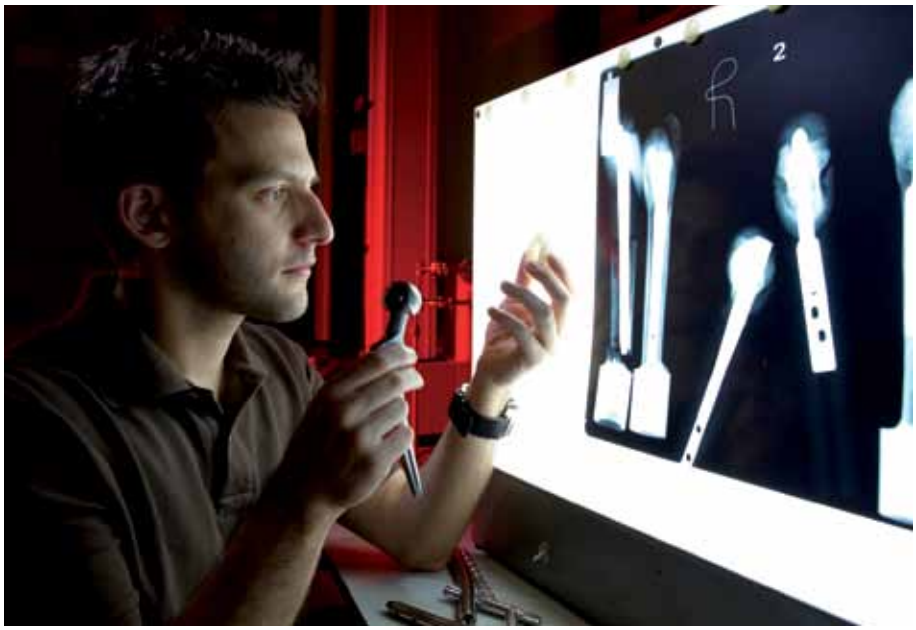
Facilities to support the programme of study

There is a dedicated Autonomous Systems and Robotics laboratory that serves the programme. Facilities in both Departments (Electronic and Electrical Engineering and Mechanical Engineering) are also open to Mechatronics MSc students for their group and individual projects. The Electronic and Electrical Engineering Department has a state of the art, real-time digital simulation facility and a microgrid laboratory. The Department of Mechanical Engineering has numerous high-tech experimental facilities organised under 12 research centres and covering a wide range of research activities in areas including aerospace, automotive, manufacturing, energy and environment, power transmission and motion control.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Mechanical Engineering or Electrical and Electronic Engineering.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.



Student researching the mechanics of sliding hip screws.

Career opportunities

Graduates with knowledge and training in both electrical and mechanical engineering are very much in demand in aerospace, automotive and manufacturing industries. More and more of the hydraulic and mechanical aspects of these industries are being replaced by mechatronics components to reduce weight and increase performance and energy efficiency. The career opportunities in the UK and worldwide industry are very significant.

We also actively encourage the best of our MSc students to continue their studies with us to PhD level.

Jobs our recent graduates have secured include:

- Product Research Development Engineer, KTP Associate, University of Bath, UK
- Project Manager, Guandong Best Control Technology, PR China
- Software Engineer, DIAGNOS, UK
- Engineer, MAN Diesel & Turbo, USA.

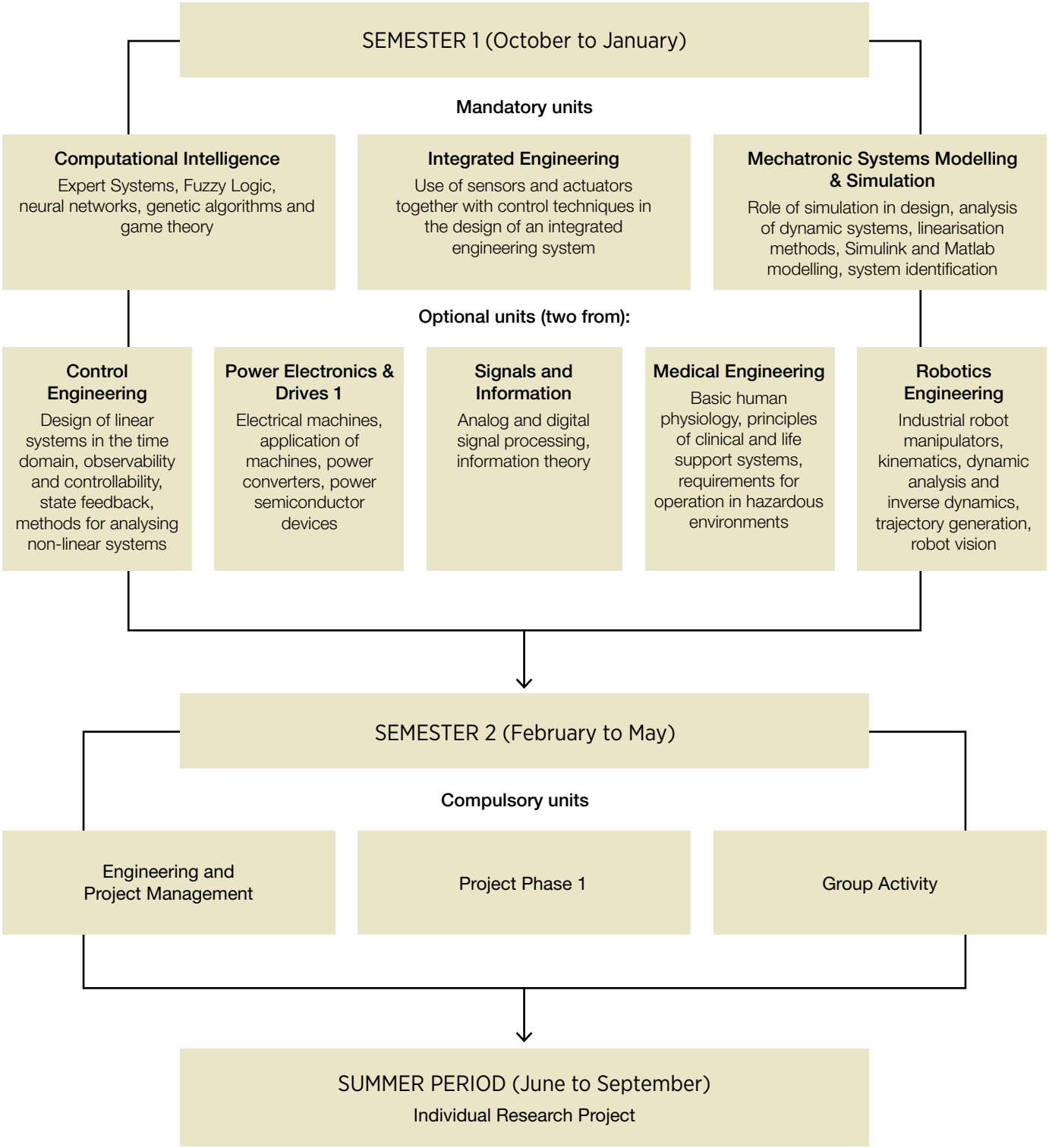
What our students say

"As industry becomes more sophisticated, there is a need to integrate disciplines so I chose Mechatronics which I find most interesting. I chose Bath because it has a great rank as a top 10 university, but also because of the lecturers' profile and facilities.

I particularly like how well structured the programme is: the combination of laboratory work, factory visiting, group design work and lectures. I have improved my analytical power and social capabilities at the same time. I would love to do my PhD here to repeat my wonderful education experience at the University of Bath."

Ladan Bahadori

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
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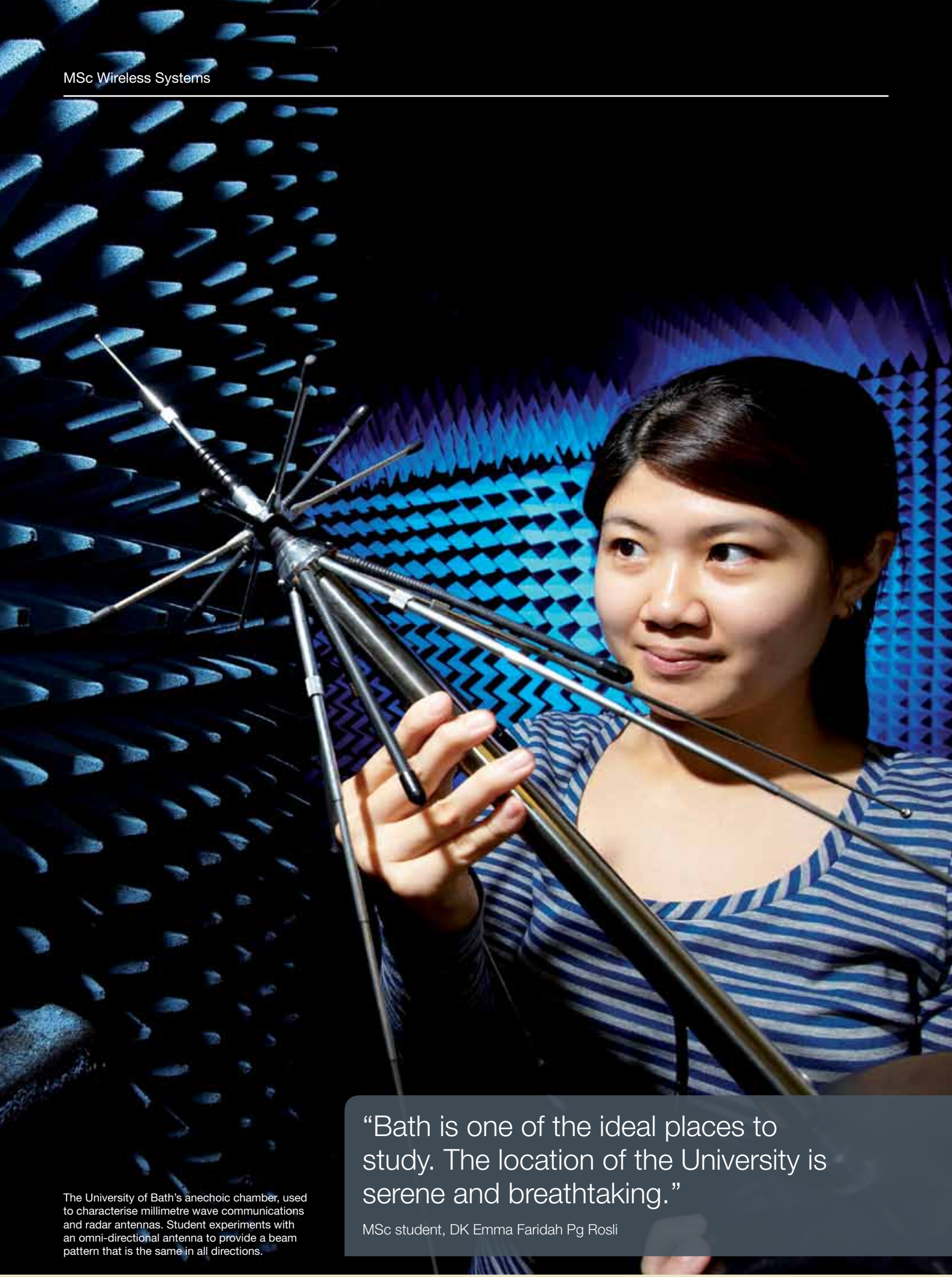


"Bath is one of the ideal places to study. The location of the University is serene and breathtaking."

MSc student, DK Emma Faridah Pg Rosli

The University of Bath's anechoic chamber, used to characterise millimetre wave communications and radar antennas. Student experiments with an omni-directional antenna to provide a beam pattern that is the same in all directions.

MSc Wireless Systems

12 months full-time. October start.

Why study the MSc in Wireless Systems at Bath?

The University of Bath MSc programme in Wireless Systems will enable you to move your career forward in the rapidly expanding wireless systems industry, by providing the solid foundation of knowledge combined with business skills and awareness of emerging technologies.

This programme will provide you with a solid foundation in fundamental concepts of wireless systems, including signal and information theory. These will enable you to understand and assess the operating principles and trade-offs in which modern wireless systems are based. You will also study units representing advanced application areas of Wireless Systems, in which the Department enjoys an internationally leading reputation for research.

The programme follows a unique structure, flowing from technical teaching through to business management techniques, to individual and group based design projects. This combination of design, business and project management elements ensure that our graduates acquire the academic and personal qualities as well as business acumen to make an immediate contribution to industry or to undertake future research.

The programme is accredited by the Institution of Engineering and Technology (IET), required for eligibility towards full Chartered Engineer (CEng) status.

What skills will I gain?

The aim of the MSc in Wireless Systems is to equip you with the ability to make an immediate engineering contribution to industry in this field. You will become able to perform in-depth engineering work on a defined task requiring research, personal project management and innovative thinking. We will give you an underpinning knowledge of business operation and project team working to allow you to maximise your impact within a conventional industrial setting.

In particular, this programme of study will help you to:

- solve appropriate numerical problems in signal and information theory
- analyse and optimise the performance of the principal subsystems in an existing wireless system
- design a basic wireless system to achieve a specified performance
- understand and apply the various management processes used in wireless systems engineering
- understand the nature and role of technology strategy in creating value in the wireless systems industry
- use a range of practical tools (scenario planning, real options, etc.) to develop practical technology strategies
- apply subject-specific knowledge in a range of complex situations, taking into account the implications for other areas of the business
- operate effectively – both independently as well as within teams – assuming leadership roles where opportunities arise
- complete a substantial research project in a technical aspect of wireless systems engineering.

Programme timetable

The structure follows a unique pattern, in three parts, starting with advancing your technological skills and understanding, through to personal professional development and multidisciplinary group work, preparing you to finally undertake an individual project under expert supervision.

Semester 1 (October to January)
You will integrate your fundamental background of mathematics and engineering science into the arena of wireless systems. You will take five taught units, three compulsory and two options, delivered by our expert lecturers. Assessment is by examinations and some coursework.

Semester 2 (February to May)
This is a distinctive project-based learning environment with compulsory units common to our suite of MSc programmes, through which you will develop your professional understanding of engineering in a research and design context. In the group activity, you will work in a multi-disciplinary team to apply engineering and project management techniques to solve a conceptual design problem, just as an industrial design team would operate. The project phase unit introduces you to research methods and project planning, which you then apply to detailed background research in your discipline area in preparation for your individual summer dissertation project.

Positioning satellites make use of phased array techniques to modify the beam pattern of their antenna systems. Current research at the University of Bath examines the impact of atmospheric effects on GPS precision and availability.

Assessment is by coursework and some examinations.

Summer period (June to September) You will undertake an individual research project in one of our leading research centres. MSc Wireless students carry out their research projects in the following research centres:

Centre for Space Atmospheric & Oceanic Science (CSAOS)

Research projects of particular interest to students taking the MSc in Wireless Systems include an investigation of the effects of the natural environment on the propagation of both electromagnetic and acoustic waves. Other research includes satellite navigation systems, radio communication systems and seabed and marine acoustics.

Centre for Advanced Sensor Technology (CAST)

Research in this centre brings together expertise in microelectronics, optoelectronics and novel materials. Projects of relevance to wireless systems students include radio frequency transmitters for human implantable transcutaneous links. The research centre has a clean room for device fabrication and an internationally recognized theoretical modelling capability.

Facilities to support the programme of study

The Department of Electronic and Electrical Engineering provides extensive laboratory facilities to all its postgraduate students. In addition, MSc Wireless Systems postgraduate students have access to a wide range of radar and experimental GPS equipment, as well as real-world data sources owned by the University and located worldwide.

Admissions criteria

A first or upper second class UK honours degree or internationally recognised equivalent in Electronics or Computer Science. In addition, you will need to show evidence of a suitable undergraduate level knowledge including high frequency electromagnetics and propagation.

IELTS 6.5 (with not less than 6.0 in each of the four components) or equivalent may also be required. Equivalents include 92 in TOEFL internet based test, with not less than 21 in writing and listening, 23 in speaking, 22 in reading.

Career opportunities

Recent employment examples from MSc Wireless Systems graduates include:

- Director of Radiocommunications Section, Telecoms Section, Seychelles
- Engineering Consultant, AIRCOM International, UK
- Electronic Communication Specialist, Cybron Technology (M) Sdn Bhd, Malaysia
- Software Engineer, Intercom, UK
- Graduate Trainee Engineer, Ministry of Defence, UK
- Program Manager, Motorola Ltd, PR China
- Project Manager, Reliance Industries Ltd, India

We also actively encourage the best of our MSc students to continue their studies with us to PhD level for which scholarships are available.

What our students say

"I chose the Wireless Systems programme because the programme structure offered the right mix of very advanced subjects to build my knowledge and maximise my employability in the industry. The University of Bath being a top 10 university confirmed my choice. Coming from a university in India, starting the degree was not easy, but the support from the tutors and great university facilities made me capable of facing the challenges in my program.

Individual course work, especially the Digital Image processing, really helped me to improve my research and problem solving skills. The managerial subjects in the second semester helped to get an overview about the current market atmosphere and latest trends in the marketplace. Overall, this program was helpful not only to improve my knowledge in the subject area but helped to develop confidence about tackling unfamiliar problems and ability to plan my works."

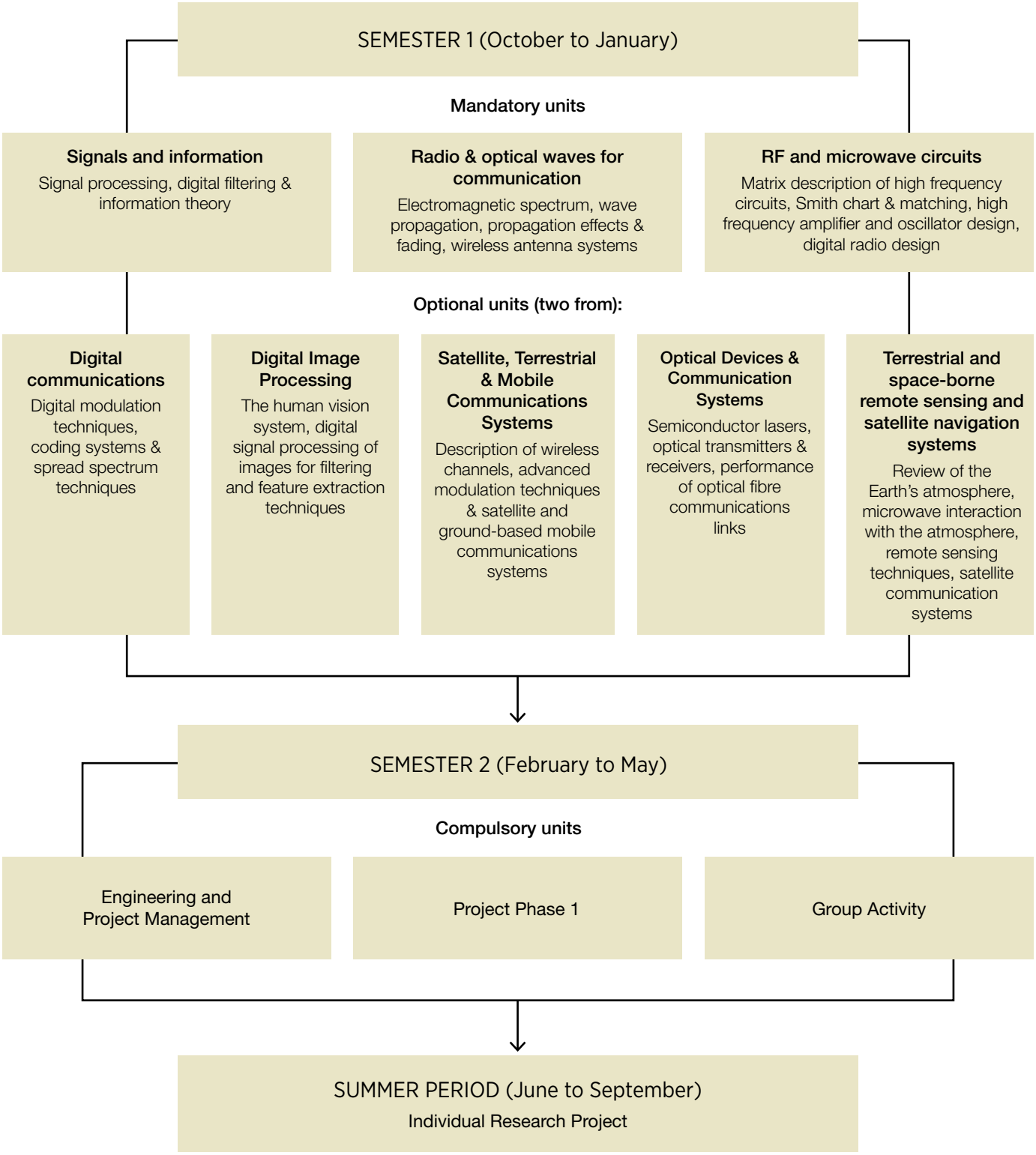
Vineeth Karumathy Chakkapan

After working for Racal Acoustics and DX Telecom in the UK following graduation in 2007, Alkesh Mehta now works for Amazon in India, mainly on field testing their Kindle digital e-book reader which has WiFi and 3G networking capability. This work has taken him all over Europe and Asia. Alkesh said:

"What I love about my work at Amazon is getting the opportunity to work on different projects and most importantly testing the Kindle. The MSc in Wireless Systems from Bath provided me an opportunity to develop technical and non-technical skills as well as an edge over others in this competitive industry. Knowledge of RF communications and GSM/UMTS technologies has greatly helped me in my current role."

Alkesh Mehta, alumni, Field Test Engineer, Amazon, India

Programme structure



Descriptions of the content of each unit can be found at **www.bath.ac.uk/catalogues**
Availability of units listed may change

How to apply

To apply for one of our MSc programmes in the Faculty of Engineering and Design you need to register for the online application system. Using your unique login, you can complete the application form and upload supporting documents such as references and exam results. You will be able to track the progress of your application and access correspondence regarding your offer.

Step 1 Apply online

Once you have decided to apply, you will need to submit your application to us online. You will need the following documents (they can be uploaded or scanned):

- One reference (usually academic)
- A scan/copy of your degree certificate
- A scan/copy of your degree transcript
- A scan/copy of your English Language result, if applicable.

Select the programme you wish to apply for at **www.bath.ac.uk/study/pg/applications.pl** and follow the instructions.

Step 2 Keep track of your application

You can track the progress of your application at **www.bath.ac.uk/applicant**. Most students receive news of the decision on their application within 6-8 weeks. If you receive an offer it will either be:

Conditional - the university will offer you a place if you meet certain conditions, usually based on exam results. You will need to check the conditions of your offer.

Unconditional - you have met all the academic requirements for the course and the university is happy to accept you.

All our offer holders receive online information, which details the next steps you need to take.

Step 3 Accepting an offer

You can accept your offer whether it is conditional or unconditional. Once you have met the conditions of your offer, you will receive confirmation of your place at Bath.

Next steps

After you have accepted your offer you can start preparing for your arrival at Bath. At this stage, you can apply for scholarships and book your accommodation.

ATAS certificate

If you require a student visa for your MSc, you may also need to apply for a taught masters Academic Technology Approval Scheme (ATAS) certificate. Please consult the website before applying for a visa. **www.fco.gov.uk/atas**

Fees and finance

Tuition fees

Fees for full-time MSc programmes vary between disciplines, so consult our website for up to date information. Some programmes offer alternative study options such as distance learning, short professional courses and part-time, with alternative fee structures. Please note that visa restrictions exclude international fee payers from the part-time study option. **www.bath.ac.uk/study/pg/fees**

Scholarships

The Faculty of Engineering and Design offer scholarships to our best MSc applicants. There are also scholarships offered by the International Office and eligible applicants can be considered for more than one award up to a value of £5,000. To be eligible for a scholarship you need to have accepted an offer to study one of our MSc programmes. For up to date information, refer to the taught scholarships section of the Faculty Grad office website. **www.bath.ac.uk/engineering/graduate-school/funding**

Finding part-time work

You may want a part-time job during your studies to help towards your living costs, or just for the experience and to meet new people. The University offers numerous jobs on campus through Joblink in the Students' Union. The benefit of having a job on campus is the potential for flexible working hours depending on your study schedule and deadlines. The university recommends no more than 16 to 20 hours a week during term time. Students with visas need to check their working hour restrictions.

There are a number of resources available to help you find a job on campus or in Bath including:

- Search Joblink: **bathstudent.com/joblink**
- Bath Chronicle newspaper is out every Thursday and has a range of jobs advertised: **www.thisisbath.co.uk/jobs**
- The shopping complex in Bath offers many jobs too: **southgatebath.com/job-opportunities.aspx**

Living in Bath: student accommodation and living costs

Accommodation

Postgraduates can pick from university halls accommodation or private rental accommodation. Postgraduate university rooms are based in the city centre, near all the shops and a few minutes bus ride from the campus. There is a broad range of room types to suit all budgets, and over 40% of the rooms have ensuite facilities. There are lots of rental choices in the city centre, and if you prefer to rent a private room, the accommodation centre can help you with their online search facility for private accommodation.
www.bath.ac.uk/study/pg/accommodation

Living costs

As a guideline, living costs for the 2012/13 academic year estimate at £13,676 for students in halls accommodation, or £12,844 if you choose private accommodation, based on a single person sharing an apartment or house.

Student services provide this useful estimated breakdown example:

Expenditure (based on 52 weeks unless otherwise stated)	**Per Week**
Rent (Ranges from £88 - £210 per week according to choice and availability). Average costs - £130 per wk x 52 weeks. Inclusive of utility bills including internet and core insurance.	£130.00
Food	£35.00
Toiletries, laundry etc	£9.00
Clothes	£7.00
Travel, local & outside of Bath (public transport)	£10.00
Leisure/social/sport	£40.00
TV licence 12 months (rate from 1st April 2012. Refunds are available on any unused part of the annual fee. See www.tvlicensing.co.uk for more information).	£3.00
Mobile phone	£10.00
Health costs (e.g. contact lenses, dentist, prescriptions etc).	£4.00
Programme costs (these can vary depending on course requirements, so check the costs with your Department).	£15.00
Your own allowance for emergencies	
Other	
Total weekly cost	**£263.00**
Total cost for year	**£13,676.00**

Your overall living costs will clearly depend on your choice of accommodation and lifestyle. Student services provide some useful budgeting guides to help you plan your likely costs for living in Bath for 12 months.
www.bath.ac.uk/studentservices/money-service/budgets

Cleveland Buildings postgraduate accommodation.

Students outside the Library on campus.

Other useful resources

Publications

- The Grants Register: *The Complete Guide to Postgraduate Funding Worldwide* - Published by Palgrave Macmillan (also on CD)

Websites

- **www.direct.gov.uk/studentfinance** - For links and information regarding postgraduate funding
- **www.rcuk.ac.uk** - Research Councils in the UK for Postgraduate students.
- **www.prospects.ac.uk** - A careers website for postgraduate students with sections on further study and funding.

Information for international students

- **www.bath.ac.uk/international** - Country specific guidance on applying to Bath
- **www.ukcisa.org.uk** - UK Council for international student affairs. Information and advice on immigration, financial support, work and study.
- **www.educationuk.org** - The British Council site for general information on studying in UK and scholarship searches for international students.
- **www.fco.gov.uk/atas** - Academic Technology Approval Scheme (ATAS). Information on requirements for non UK, EEA or Swiss Nationals.
- **www.ukba.homeoffice.gov.uk/visas-immigration** UK border agency website for information on obtaining a student visa

Contact us

MSc admissions, Engineering and Design Graduate School

Email: **fac-eng-gs-admissions@bath.ac.uk**
Tel: +44 (0)1225 383868

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UK

www.bath.ac.uk/engineering/graduate-school

"All first time overseas postgraduates studying a full-time course will be guaranteed accommodation as long as they apply by the deadline, usually the end of July."

University of Bath: Aerial view.

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