MSc Design and Management of Sustainable Built Environments

Leadership in environmental design and energy management
Interdisciplinary approach to building design and management in a research-intensive environment.

Collaboration with other international leading schools, both within and beyond the University of Reading.

Closely aligned with the Innovative and Sustainable Technologies (IST) research group in the School of Construction Management and Engineering.

Underpinned by expertise from the Centre for Technologies for a Sustainable Built Environments (TSBE), which offers a range of engineering doctorates relating to sustainability in the built environment.

The School of Construction Management and Engineering is an internationally recognised centre of excellence in the area of sustainability.

The programme will equip students with globally sought after skills, thereby maximising employability.

Exposure to best practice, a series of site visits throughout the year, invited industry experts and a vast network of industry links will expose students to state-of-the-art practice.

Teaching is informed by the latest research of the School’s internationally leading academics, complemented by selected industry experts.

Academic excellence combined with a focus on real-world problems.

Continuing professional development: individual modules may also be taken as part of a personal continuing professional development (CPD) programme.
MSc in Design and Management of Sustainable Built Environments

Design and Management of Sustainable Built Environments is based on advanced understanding of the key subjects required for meeting carbon emission reduction targets in building sector. We deal with the analysis, synthesis, design and assessment of modern, energy efficient environmental systems (including urban systems, and passive and active building systems), using analytical and computer simulation techniques. We develop knowledge in environmental engineering and building design, design management, the application of digital technology, and urban and building sustainability.

Full-time or part-time routes
The modular structure provides the opportunity to study by combining intensive residential weeks at the University spread over two years or more for part-time students. (Full-time students undertake the same learning compressed into one year.)

Each module includes internet-based distance-learning support, accessible only to registered students. Modules are taught by academic and industry experts and include rigorous practice-related assignments. The MSc programme is completed by a research-based dissertation under close individual supervision, on a topic of the candidate’s choice.

Who should attend?
The programme provides an opportunity for new entrants to the professional practice of design and management of sustainable built environments:

- Building services engineer
- Design engineer
- Technical leader of sustainability
- Environmental architectural designer
- Energy assessor
- Energy consultant
- Green building assessor
- Facilities manager
- HVAC engineer
- Project analyst
- Simulation engineer

Programme themes
The aim of the programme is to provide a coherent framework for the discipline and practice of design and management. Each module includes sessions delivered by leading practitioners. The programme is continually informed not only by the latest developments in industry, but also by on-going international research.

A recurring theme throughout the programme concerns the dynamic nature of integrated design, operation and management of sustainable built environments. The themes cover urban sustainability, environmental design, intelligent operation and management.

Programme information
MSc Design and Management of Sustainable Built Environments
12 months full-time
MSc Design and Management of Sustainable Built Environments
24–63 months flexible part-time

Entry requirements
Candidates should hold a good honours degree in relevant area including engineering, physics, environmental science, design, planning and management, preferably with some relevant industrial experience. Candidates with relevant professional qualifications will also be considered.

International students
If your previous education was not taught in English, an IELTS 6.5 or TOEFL 570 is required. For more information see: www.reading.ac.uk/study/study-pg-academic-reqs.aspx

MSc in Design and Management of Sustainable Built Environments
Why choose Reading?

Join us in our journey of discovery and creative thinking, designed to question and challenge conventional wisdom about the built environment. Our aim is the co-creation of new knowledge and understanding about complex and challenging problems.

The School of Construction Management and Engineering is one of the world's leading university departments dealing with the built environment. The reputation of the School is based on the recruitment of successful students from diverse countries and on the authority of our academic staff, who have extensive experience as advisors, consultants and visiting lecturers to commercial organisations, governments and universities globally.

The School is truly multi-disciplinary in nature and contains over 30 members of full-time academic staff, including 10 professors. This wide range of expertise and international experience contributes directly to the quality of the School's degree programmes, providing ample opportunities for studying a wide range of topics related to the built environment.

Our MSc programmes are focused on ensuring an excellent student experience, dealing with new ideas, tools and techniques, and exposure to the latest research. We supplement this excellent teaching with twenty-first century technologies. Facilities include a dedicated computer lounge for use by our students equipped with the latest digital technology and software, including building information modelling (BIM), 3D laser scanning, building energy simulations and urban microclimate simulations. The School also possesses laboratory space and experimental equipment to support student research projects.

Academic excellence and practical relevance

The Reading MSc in Design and Management of Sustainable Built Environments was launched in 2013 as a unique and innovative route for entry to a professional career in the building and engineering industry and profession, for graduates from a wide range of disciplines. It very quickly attracted a reputation as the programme in sustainability for the architecture, building services, energy management and construction industry and profession. The programme attracts high quality graduates from all disciplines and prepares them for a career with

Career possibilities

All subjects at Reading offer access to our Careers Advisory Service. It is designed to open doors, launch our students' careers and ensure they are well equipped to make the most of their potential and the job opportunities ahead. Common careers include:

- Urban planner
- Sustainability manager
- Technical director
- Sustainability consultant
- Environmental architectural designer
- Building services engineer
- Design engineer
- Technical leader of sustainability
- Energy assessor
- Energy consultant
- Green building assessor
- Facilities manager
- HVAC engineer
- Project analyst
- Simulation engineer

For more information on our Careers Advisory Service, visit www.reading.ac.uk/careers
The MSc Design and Management of Sustainable Built Environments covers knowledge across urban studies and building. I have benefited from gaining skills in computer simulation and technical analysis. I have a co-supervisor from industry for my dissertation and this helps me with transferring knowledge learned from the programme to practice. This programme is very helpful and useful for the people who want to study sustainable built environments.

Yuefeng Ling
Current student

‘The programme has really helped me to gain a deeper understanding of the environmental implications of construction for urban environments. This has lead me to realise and understand the necessity for sustainable construction methods and the way they can influence the environment for the better.’

Simbarashe Matapo
Current student

The teaching is through lectures, seminars, workshops and site-visits. The teaching is supported with guided study through traditional private study and web-supported learning. We arrange field trips, e.g. the BRE Innovation Park and the IBM Innovation Centre Smarter Planet and Emerging Technology Lab. We have work placement arrangement with our industry partners including BRE, Arup, Hoare Lea, Carillion, Balfour Beattie, BDP, and ESA. Dissertation topics are linked with industry practice. Our programme is supported by CIBSE and CIOB.

One distinctive feature of the programme is the large integrating module, Design and Management Principles and Practice. This involves applying principles from core modules in analytical and simulation studies.

Employability
Graduates will typically find employment in environmental urban planning, architectural design, environmental engineering, facilities management, energy assessment, green building assessment, energy policy.

Funding
There are several possibilities for accessing funding to participate in our programmes.

International students seeking funding should contact their local British Council office. See: www.britishcouncil.org/learning-funding-your-studies.htm

The University of Reading offers a limited number of scholarships and bursaries to UK and EU students. Please note that there is considerable competition for all these sources of funds. Please see: www.reading.ac.uk/cme-pgr-funding.aspx

‘This programme provided a wide range of theoretical and practical applications for understanding the concepts. I learned number of software packages such as IES and other BIM-related packages throughout the programme. It was a very enjoyable experience for me and I absolutely enjoyed it!’

Manthan Harsad | Current student

Career possibilities

Energy officer
Sustainability consultant
Sustainable energy consultant
Renewables engineer
Renewables consultant
Technical director
Project analyst
Researcher
Sales and marketing specialist
Design engineer

Previous dissertation titles include:

Sustainable urban design and eco-city assessment
Urban microclimates and urban heat island
Passive building design
Green building assessment
Indoor environment and thermal comfort
Indoor air quality
Natural ventilation design
Daylighting design
Building performance and post occupants evaluation
Sensor technology and building energy management
Design for adapting climate change
End-use behaviour and energy demand in buildings
Building information modelling
Renewable energy in buildings
Post-occupancy evaluation
Core modules

Engineering research and dissertation
We deal with the basic skills for carrying out research, including the ability to develop a clear research question and subsequent research proposal; critically assessing relevant literature; identifying appropriate methods to address the chosen question; and robust analysis of results. We discuss these elements of research in lectures, before students embark on their projects.

Sustainable design and management principles and practice
We develop a holistic approach to the delivery of sustainable buildings. The integrated process of design, operation and management is at the core of this module. We include hands-on training in computer simulation skills and experimental skills. The module is based around a series of issues:

• Assessing passive and active systems in terms of their environmental performance and impact.
• The role of building site impact, building façade design, building services engineering systems, construction materials, facilities management and system controls in moderating the internal building environment and an understanding of the energy implications for each.
• Building users’ needs.
• Heat transfer, building simulations and hands-on skills of simulation using software packages such as, the integrated energy design tool LT, lighting design tool DIAL, integrated environmental solutions (IES) and energy assessment procedures.
• Direct experience of experimental practice.

Urban sustainability
We place sustainable development (SD) within a city-level context and highlight the importance of integrating SD across building, neighbourhood and city levels to ensure sustainable outcomes. We explore the different ways in which new cities (e.g. eco-cities and smart cities) and existing cities may be viewed through a range of conceptual frameworks which include ‘metabolic systems’ and ‘complex adaptive’ systems. The overall role of urban planning is also explored in shaping and producing sustainable outcomes in a variety of cities with a key emphasis on sustainable transport. Consideration is also given to the challenges of retrofitting and re-engineering cities to 2050 and the ways in which futures studies can help not only shape city visions, but also help cities plan and monitor energy, water and waste targets. We also study the concept of ‘sustainable cities’, the ways in which the sustainability of cities may be measured and how key technologies at city level are deployed (for example urban water drainage and urban waste management).

Energy in buildings
Measures for improving energy efficiency in buildings include environmental architectural design, environmental systems operation and renewable energy technologies. Through these, we develop a comprehensive understanding of energy usage in buildings and methods for improving energy efficiency. The material includes developing an understanding of a range of issues: the impact of the built environment on the global energy scene, environmental architectural design, assessment of energy efficiency of buildings, sustainable energy systems, energy demand and load profiles in buildings, policies and socio-technical issues relating to building energy efficiency and the integration of renewable energy into buildings.
Urban microclimates
We consider the impact of built form and texture on urban climate and building performance. We introduce the fundamental physics behind urban microclimates and explore urban climate simulation tools to assist urban climate planning. We develop in-depth understandings of how: urban microclimates are formed and operate, climate change impacts, urban heat island phenomena, urban texture and form, sustainable urban design, urban ventilation and the interaction between urban form and buildings.

Building information modelling
Our aim is to develop the basic knowledge and skills needed to use building information modelling (BIM) in professional work. We consider the value of open shareable asset information to clients; its impact on their ability to manage their assets and on project delivery. Specific BIM standards are covered, such as IFC, Uniclass, COBIE, BS1192, and the rationale for their use. We use structured processes for sharing model, document and spreadsheet information in a collaborative project team. Software packages that are appropriate to professional work within a collaborative project team using BIM are covered (e.g. model servers, data capture, storage and manipulation tools). The implementation of BIM is considered on a case study project.

ICT and energy management
The substantial gap between design and in-use performances affects a wide range of newbuild and retrofit projects, as well individual energy technologies. Against this background, energy monitoring and management offers major energy saving potential. Based on ICT and sensor technologies, energy monitoring and management integrates the optimisation of building energy systems with the engagement of users and FM in the process. We address these technology and user issues in a systematic way focusing on people-centred energy efficiency in the operation phase of the building life cycle using ICT-based approaches for monitoring and managing energy consumption in buildings. We address information and building energy technologies and their application to inform, engage and empower users to achieve substantial energy savings at modest costs.

Green building assessment
The evaluation of performance of a real building is carried out using green building assessment tools. The aim is to provide a comprehensive knowledge of the green building concept and existing assessment tools. We deal with a range of issues: the concept of green buildings, carbon emission reduction targets, measuring sustainability of buildings, green building assessment methods/rating tools, international standards, resource conservation in construction. The module offers BREEAM Accredited Graduate scheme.

Environmental quality and well-being
The built environment is designed to regulate the immediate surroundings of people to aid daily activities. This is relevant from city scale through to individual buildings and indoor space. In the context of the built environment, environmental quality provides a measure for determining the impact of the environment on human health. An understanding of environmental quality is developed by introducing principles of environmental systems, measurement of environmental quality, health and well-being and the influence of urban development on the surrounding environment. Our aim is to understand the impact of urban development on human health and well-being. We develop an understanding of the different scales (from city to building) associated with environmental quality and control.

Optional modules
In addition to the core modules, options are available to help you customise the programme to meet your needs. These include:

- Carbon management
- Renewable energy in power systems
- Engineering project management
- Advanced visualisation
- New technology, management and change
- Thermodynamics of energy systems
The programme is led by internationally renowned and research active academic staff. Specialist expertise is provided by a number of visiting experts who contribute to the programme as external lecturers, advisers and research collaborators.

**Professor Running Yao**  
Director of MSc Design and Management of Sustainable Built Environments

**Professor Derek Clements-Croome**  
Professor of Architectural Engineering

**Professor John Connaughton**  
Professor in Sustainable Construction

**Dr Geoff Cook**  
Associate Professor in Inclusive Environmental Engineering

**Dr Phil Coker**  
Lecturer in Renewable Energy

**Professor Tim Dixon**  
Chair in Sustainable Futures of the Built Environment

**Dr Abbas Elmualim**  
Associate Professor in Sustainable Built Environments

**Dr Emmanuel Essah**  
Lecturer in Sustainable Technologies

**Dr Katherine Hyde**  
Lecturer in Environmental Sustainability

**Professor Li Shao**  
Chair in Sustainable Technologies in the Built Environment

**Dr Zhiwen (Vincent) Luo**  
Lecturer in Building Services Engineering

**Dr Dragana Nikolic**  
Lecturer in Digital Architecture

**Dr Michael Peters**  
Lecturer in Energy Policy

**Dr Stefan Smith**  
Lecturer in Energy Systems

**Dr Jacopo Torriti**  
Associate Professor in Energy Economic and Policy

**Dr Maria Vahdati**  
Lecturer in Renewable Energy

**Professor Jennifer Whyte**  
Professor of Innovation and Design

Further details of all staff can be found at [www.reading.ac.uk/cme-staff.aspx](http://www.reading.ac.uk/cme-staff.aspx)