Masters programme in
Sustainability and Environmental Studies

Private and public sector organizations need an appropriately trained, highly skilled and environmentally aware workforce to respond to the challenge of sustainable development and climate change. This one-year MSc in Sustainability and Environmental Studies has been successfully addressing this need since 1991.

This course welcomes applicants from all subject backgrounds: arts, social sciences, humanities, engineering, agriculture, law, science and business.

The MSc in Sustainability and Environmental Studies is accredited as meeting the requirements for Further Learning for a Chartered Engineer (CEng) for candidates who have already acquired an Accredited CEng (Partial) BEng (Hons) undergraduate first degree. See [www.jbm.org.uk](http://www.jbm.org.uk) for further information.

**Key Delivery Team**

The delivery team comprises leading academics from the Department of Civil and Environmental Engineering, Faculty of Engineering, Strathclyde Business School and the Law School. A brief profile of the key academic team is provided below:

**Dr Girma Zawdie** (Civil & Environmental Engineering) is the Course Leader of the MSc Sustainability and Environmental Studies. He has expertise in technology choice and transfer; clean technologies and industrialisation in developing countries; triple helix (University, Industry and Government Links) and innovation systems; link between economic, environmental & technological aspects of production functions; and world poverty and sustainable development. He is co-founder & co-editor of the International Journal Technology Management & Sustainable Development. He has undertaken research & consultancy work for UN agencies, ILO, DFID, British Council and different NGOs. He has research links with Ethiopia, Malawi, Thailand, Malaysia, South Korea, Pakistan, and countries of the Maghreb region.

**Dr Elsa João** (Civil & Environmental Engineering) has expertise in the areas of Strategic Environmental Assessment (SEA), Environmental Impact Assessment (EIA), environmental analysis, Geographical Information Systems (GIS), scale effects, spatial data quality and enhancement of positive impacts. She is one of the academics leading SEA in the UK. Since 2002 she has trained more than 400 practitioners on SEA from more than 60 different organisations. Her current research focuses on how enhancement can improve project design & strategic planning. She is part of the Scottish Government-sponsored Centre of Expertise for Climate Change.

**Dr Tara Beattie** (Civil & Environmental Engineering) has expertise in the field of public health and the management of water and solid waste. Her research interests include free-living protozoa and their potential to cause human disease. More recently her studies have focused on the endosymbiotic interaction between human bacterial pathogens and free-living protozoa, and their potential risk to public health.

**Roger Perman** (Economics) has expertise in applied econometrics, environmental economics, environmental modeling, pollution control policy and international environmental policy. He teaches business economics and econometrics in France, and has undertaken economic consultancy work in Albania, Iraq, Russia, and Ukraine. Research includes structural convergence of European economies and applied co-integration analysis. He has jointly written texts in Business Economics, Environmental Economics and the Economics of Strategy.
STRUCTURE OF THE MSc IN SUSTAINABILITY AND ENVIRONMENTAL STUDIES

The MSc involves a curriculum of three core classes (totalling 40 credits) and a very wide range of optional classes (80 credits). Each module is taught two to three hours per week over 8 to 12 weeks. In addition, students also undertake a dissertation (60 credits). Progress to the dissertation is dependent on performance in the instructional modules.

Compulsory Core Classes

- International Environmental Policy
- Qualitative and Quantitative Research Methods
- Sustainability & Strategic Environmental Assessment

Optional Classes (choice of 8)

- Air Pollution, Climate Change and Human Health (*)
- Contaminated Land Management
- Energy Economics
- Energy Resources and Policy (*)
- Environmental Impact Assessment
- EU and UK Environmental Law
- Environmental Pollution Management
- Geographical Information Systems
- Global Water Policy
- Independent Study in Collaboration with Industry (*)
- Pollution and Rehabilitation of Degraded Ecosystems
- Principles of Economic Appraisal
- Principles of Environmental Microbiology
- Science, Technology and Innovation Policy
- Waste Management and Landfill Design
- Water and Environment Management

(*) Students interested in climate change should take these classes.

SUMMARY CLASS (MODULE) DESCRIPTIONS

Compulsory Core Classes

International Environmental Policy (Roger Perman, Economics, Strathclyde Business School) - The main objective of this class is to provide a grounding in the economics of the environment. It demonstrates what economic analysis can contribute to discussions about the use of our natural capital (or environmental resource) base, and to discussions about policy responses to environmental problems. A key element of the economic approach to environmental policy is ‘value for money’ - designing policy interventions that give the greatest environmental improvement for any particular budget outlay. But economic analysis also deals with questions about sustainability (and so impacts on future generations) and equity between different individuals, groups, and countries. This class pays particular attention to international environmental problems. Such problems have been high on the agenda for environmental policy interventions since the Rio Summit of 1992, yet are ones that seem to be the most difficult to make progress with. We examine why this has been the case, making use of the growing literature on international environmental agreements. The class adopts a practical, applied orientation throughout. Applications include transport policy, water quality and availability, global climate change, and loss of biological diversity.

Qualitative and Quantitative Research Methods (Dr Elsa João, Civil & Environmental Engineering, Faculty of Engineering) - Students will acquire familiarity with, and practice of, contemporary research techniques, and examine different ways of, and gain experience in, presenting research results. An examination of the methodologies used in environmental research and an evaluation of their application to different kinds of research problems will be undertaken. The class discusses the key principles, and practical exercises, on both quantitative and qualitative research methods, including survey methods, interviewing techniques, use of census data, statistical methods and policy analysis. The class also includes a discussion on ethical issues. Finally, there is dissertation-related teaching on choosing a research question and a research method, and writing a research proposal.
Sustainability & Strategic Environmental Assessment (Dr Elsa João, Civil & Environmental Engineering, Faculty of Engineering) - This class allows students to develop theoretical and applied understanding of key principles of sustainability and Strategic Environmental Assessment (SEA). SEA is a significant appraisal and decision-aiding tool that evaluates the environmental impacts of policies, plans and programmes, such as a transportation policy or a local development plan.

Optional Classes (in alphabetical order)

Air Pollution, Climate Change & Human Health (Dr Iain Beverland, Civil & Environmental Engineering/Environmental Health) – The class provides students with knowledge & skills applicable to atmospheric pollution impacts, ranging from local to global scales. This includes a focus on the assessment & management of impacts on human health through effective interface between the public health sciences of environmental epidemiology and environmental toxicology; and environmental engineering approaches to manage environmental risks.

Contaminated Land Management (Dr Christine Switzer, Civil & Environmental Engineering) – Within the background of land redevelopment (residential, industrial/commercial and gardens/parks), this module aims to provide insights into the remediation of contaminated land, including the regulatory framework and risk assessment, sampling & analysis, and various remedial techniques for contaminated land.

Energy Economics (Prof. Peter McGregor, Economics, Strathclyde Business School) - Energy resources (such as crude oil, natural gas, coal, biomass, wind and sunlight) can be harvested and converted into useful forms to produce energy commodities (such as petroleum and diesel fuel, natural gas, and electricity) that can be used to provide energy services for human activities. The class begins by studying the forces that generate both demand for and supply of energy resources and energy commodities. It considers what factors determine the way those commodities are transported to users, and how residuals are disposed of. It investigates the roles of alternative market and regulatory structures on these activities, the impacts of such activities and their environmental consequences. The class identifies criteria required for the efficient provision and use of energy commodities and resources and reasons why efficiency is rarely achieved. The class adopts a practical, applied orientation throughout. Applications include the evaluation of renewable energy projects and the economic analysis of nuclear power.

Energy Resources and Policy (Professor Joe A Clarke, Mechanical & Aerospace Eng, Faculty of Engineering) - Against the background of international commitments on atmospheric emissions, diminishing fossil fuel resources and the liberalisation of energy markets, this class examines sustainable options for energy production, supply and consumption. The aim is to give students an understanding of current trends, and to enable a critical evaluation of emerging ideas, technologies and policies.

Environmental Impact Assessment (Dr Elsa João, Civil & Environmental Engineering, Faculty of Engineering) - This class provides an introduction to the methods used to predict environmental impacts, and evaluates how these may be used to integrate environmental factors into decisions. The class draws principally on the UK planning context of environmental impact assessment of individual projects (project EIA), but also takes account of EIA experience in other countries and international organisations.

EU and UK Environmental Law (Professor Mark Poustie, School of Law, Faculty of Humanities and Social Sciences) - This class introduces students to the sources, principles and main features of the substantive laws of the UK and the EU relating to the environment, as well as key international law. It also introduces the various UK and EU regulatory agencies, their respective functions and powers, and methods of administrative regulation and enforcement.

Environmental Pollution Management (Dr Iain Beverland, Civil & Environmental Engineering/Environmental Health) - The class develops in-depth knowledge & skills regarding the science, engineering & management of environmental pollution control approaches to protect public health. The class achieves these aims through research-led teaching at the interface between public health and environmental engineering, with a particular focus on methodologies based on risk-centred approaches. Lecture sessions are complemented by industrial & government case studies in contemporary air quality management practice.

Geographical Information Systems (GIS) (Dr João, Civil & Environmental Engineering, Faculty of Engineering) - This practical-based class provides a thorough introduction to the rapidly growing field of Geographical Information Science. The class covers the key theoretical principles but also provides many computer-based exercises using current state-of-the-art Geographical Information Systems (GIS) – namely IDRISI and ArcGIS. The class evaluates how GIS can be used for spatial query and analysis, while at the same time assessing the quality and the effectiveness of the resultant products in terms of their use.

Global Water Policy (Professor Bob Kalin, Civil & Environmental Engineering) - This class explores the issues relating to overall global water policy and its interaction with other global issues; the impact of Climate Change and economic development on water resources and availability; the different implementation issues based on regional case studies; and the role of stakeholders on the acceptance and achievement of policy objectives.
Independent Study in Collaboration with Industry (Dr Richard Lord, Knowledge-Exchange Director, Department of Civil and Environmental Engineering) - Graduates increasingly need highly developed transferable professional skills to prepare for and to gain future employment. This module will allow students carrying out placements and projects with industry to develop and refine professional skills while gaining credits in the process. One of such projects will be the small or medium sized enterprise (SME) Carbon Audit that students carry out with training from Carbon Trust. A placement type project activity is another possibility, by individual agreement. Approval of students being able to take this module would be done on case-by-case basis by MSc course leaders as an individualised learning contract. Students will be selected by competitive application and CV. [Students doing the SMS Carbon Audit will be asked to pay between £100-£250 (exact figure, which depends on subsidy and number of students taking part) to be determined later.]

Pollution and Rehabilitation of Degraded Ecosystems (Dr Charles Knapp, Civil & Environmental Engineering, Faculty of Engineering) - This class introduces key principles of ecology and it then explores the ecosystems problems caused by pollutants, both atmospheric and aquatic, with regard to toxicity, bioaccumulation and ultimate disruption. Approaches to remedial clean-up are described in relation to current legislation.

Principles of Economic Appraisal (Roger Perman, Economics, Strathclyde Business School) - Appraisal and value of capital investment projects is a key element of strategic decision making by managers in both public and private sectors. But economic appraisal has a much wider scope than conventional capital appraisal, as it can encompass the wider external or social implications of capital projects, and it can be used to appraise programmes and policies, not just standalone projects. This class provides participants with the foundation knowledge and skills to undertake economic appraisal in its various forms and contexts – both from the point of view of a single project and when making choices among a multiple set of options. The class deals with a variety of forms of economic appraisal: cost-benefit analysis (CBA), cost-effectiveness analysis (CEA); and multi-criteria analysis (MCA). The class also deals with special issues that arise in public or social appraisal. Applications include the appraisal of a traffic project, a cost-benefit analysis of a renewable energy project, and value-for-money choices in health care provision.

Principles of Environmental Microbiology (Dr Charles Knapp, Civil & Environmental Engineering, Faculty of Engineering) - This module aims to introduce microbiology in a manner that is of practical importance in environmental engineering and science. Emphasis is placed on the microbial ecology and microbiology of dilute nutrient solutions such as lakes, subsurface environmental and biological treatment processes. Microbial physiology and biochemistry will be discussed in detail as it pertains to environmental systems. Both biodegradation and public health aspects of microbiology are included. The course combines theoretical and fundamental concepts in biology, and laboratory analytical skills to provide a basic background in microbiology grounded in practical applications.

Science, Technology and Innovation Policy (Dr Girma Zawdie, Civil & Environmental Engineering, Faculty of Engineering) - This class introduces the conceptual and practical issues underlying policy-making processes, with a particular focus on science and technology policy and innovation management. The class addresses elements of policy analysis as an interdisciplinary exercise. Within this context, it explores questions as to how innovations occur and how they can be managed to enhance prospects for socio-economic development and environmental protection through sustainable use of resources.

Waste Management and Landfill Design (Dr Tara Beattie, Civil & Environmental Engineering/Environmental Health, Faculty of Engineering) - This class covers organizational and regulatory aspects of waste management practice in the UK: legislation, composition of domestic and industrial wastes, storage, collection, reception, and disposal of solid wastes, clinical wastes, sewage sludge disposal, recycling and recovery.

Water Environment Management (Dr Tara Beattie, Civil & Environmental Engineering/Environmental Health, Faculty of Engineering) - To develop an understanding of the physical, chemical and biological parameters within surface water and how these relate to water quality, water quality objectives and pollution control strategy. To provide knowledge on the design and process involved with the control of water and wastewater treatment.

The above list includes the classes considered to be most suitable for the MSc in Sustainability and Environmental Studies. However, a wider list of optional classes is available from the Department of Civil & Environmental Engineering, including, for example, the following:

- Environmental Chemistry
- Fundamentals of Environmental Forensics
- Site Investigation and Risk Assessment
- Hydrogeology
- Introduction to Health & Safety
- Transport, Development and Sustainability


READING

Each class (or module) will provide reading and you do not need to read before the course starts. However, if you are interested, relevant textbooks for the MSc as a whole are:


CAREER PROSPECTS FOR MSC SUSTAINABILITY & ENVIRONMENTAL STUDIES

This one-year MSc offers an innovative cross-disciplinary approach to the study of environmental management, policy, and sustainable development. It aims to develop an understanding of the broad theoretical perspectives associated with the decision tools used to apply sustainable development policy and management. Participants will gain an in-depth knowledge of the major environmental issues currently being investigated, monitored and controlled at global, national and local levels and an understanding of the methods and procedures with which environmental considerations and climate change are incorporated into development and planning decisions.

It is widely recognized in private and public sector organizations that there is a need for an appropriately trained, highly skilled and environmentally aware workforce to respond to the challenge of sustainable development and climate change. Meeting this need requires an interdisciplinary education. This MSc, with its flexible structures and wide range of options from across the University, is set up to allow students from a variety of disciplinary and work backgrounds to widen and deepen their knowledge and understanding of the contribution that many disciplines can make to the solution of environmental problems.

There is a strong demand for graduates with environmental management and policymaking skills and the Department has successfully seen its graduates capitalize upon a wide range of employment within the private, public and voluntary sectors. This MSc provides the opportunity to develop applied professional skills and knowledge and graduates are employed in a range of positions in private consultancies, government agencies, local authorities, environmental regulators, businesses and industries.

MORE INFORMATION ON MSC SUSTAINABILITY & ENVIRONMENTAL STUDIES

Detailed class descriptions can be provided upon request.

For more information please visit [www.strath.ac.uk/civeng/pg/](http://www.strath.ac.uk/civeng/pg/)

Or contact us by e-mail: civeng-pgt@strath.ac.uk

The Department of Civil and Environmental Engineering is highly interdisciplinary. Academic and research staff, from 13 different countries, originate from a range of different fields including civil engineering, environmental engineering, geology, microbiology, chemistry, mechanical engineering, geography, economics and maths. We have 36 members of academic (26) and research (10) staff, of whom 14 are women (39%).

Celebrating over 125 years of Civil Engineering at Strathclyde

The Department of Civil and Environmental Engineering is marking the 125 year birthday of the department in 2014. This coincides with the department move to brand new offices and facilities, including a £6M investment in state of the art integrated environmental and civil engineering labs.

[http://www.strath.ac.uk/civeng/](http://www.strath.ac.uk/civeng/)