



The UNIVERSITY of EDINBURGH

PROGRAMME SPECIFICATION FOR:
MSc (Taught) in Carbon Management

Foreword: This is a guide to the content of the MSc degree programme in Carbon Management. The staff who teach this programme are committed to offering students enthusiastic and authoritative teaching, and look to students to engage with dedication in the learning process. So, the learning outcomes *etc* specified here are what a student who engages in this way can typically expect to achieve. Of course, every student's route through this programme and actual achievements will be unique.

1. **Awarding Institution:** The University of Edinburgh
2. **Teaching Institution:** The University of Edinburgh (The School of GeoSciences and School of Management and Economics)
3. **Programme accredited by:** N/A
4. **Final award:** Master of Science (or Diploma)
5. **Programme title:** MSc (taught) in Carbon Management
6. **UCAS code:** N/A
7. **QA responsibility:** Dr Dave Reay
8. **Date of issue:** 01/11/07

9. Educational aims of programme:

The MSc in Carbon Management is a ground-breaking programme providing high-level interdisciplinary knowledge and skills in the business, economics and science of carbon management. The programme is designed for business, economics, and physical science graduates who want an advanced academic qualification as a launch pad for careers in climate change and carbon management by business, industry, government and NGOs. Specific aims are:

- Development of conceptual and analytical skills to enable critical evaluation of projected climate change impacts on businesses and consumers.
- Assessment of policies at international, national and local level devised to address climate change through adaptation and mitigation.
- Detailed examination of key carbon management techniques, incl. carbon accounting, auditing and footprinting, life-cycle and cost-benefit analyses.
- Integration of expertise in economics and business research with that in global carbon cycling, climate change impacts, adaptation and mitigation to provide graduates with an holistic understanding of carbon management.
- Creation of a ground-breaking, vital and in-demand course with around 50 students each year drawn from both EU and non-EU countries, with strong ties to industry and business, and excellent employment prospects for its graduates.

10. Programme Learning Outcomes:

The outcomes given are specifically what a student can learn from the core courses of the taught element of the programme, and the dissertation. Elective courses allow students to learn more in related areas: e.g. Management of Biological resources, Management of Sustainable Development, Change Management, and Global Strategy and Management.

(a) Core knowledge

- The global climate system, past, present and future. Climate sensitivity. Development and application of IPCC emissions, GHG concentration and temperature change scenarios. Model uncertainties and feedback mechanisms.
- Climate change impacts on global carbon (C) sinks. Feedback effects (positive and negative). Surface albedo. Vegetation C. Soil C decomposition, methane flux (wetlands, permafrost, hydrates), oceanic C sink. Interactions with land-use management and nitrogen deposition.
- Climate change impacts: IPCC 4th assessment report. Ecosystem goods and services, crop yields, water supply, migration and security, health, insurance and finance.
- Impacts of climate change at the national level. Emphasis on business sector: oil & gas, financial services, retail, utilities, telecoms, airlines, food and chemical industries.
- Local, regional and national adaptation to climate change.
- Global adaptation to climate change.
- The Stern Review. Global financial costs of climate change impacts. Economic consequences of global climate change impacts and adaptation.
- The politics of climate change mitigation. Rio, UNFCCC/Kyoto and post-Kyoto. Overview of mitigation scenarios: IPCC 4th assessment report. International carbon management. Annex 1 vs non-Annex 1 countries. Clean Development Mechanism. Joint Implementation.
- Carbon markets and trading. Price of carbon (Stern). National and international trading mechanisms and allowances. Future of trading – externalities and embodied emissions.
- Low and zero carbon technologies. Renewable energy, hydrogen, biofuels, nuclear, carbon capture and storage. Efficacy in UK and globally. CO₂ stabilisation wedges.
- Carbon sink protection and enhancement. Soil and vegetation C sinks. Carbon offsets.
- Regional and National regulatory strategies for carbon abatement. Taxes vs cap and trade. EU policies and emissions limits. UK policies incl. Kyoto obligations, Energy and Climate Change Bills, Climate Change Levy, Building standards, information instruments.
- Climate change as a business risk/opportunity. Economic transitions and disruptive technologies. Low-carbon products. Changing patterns of customer demand. Strategic implications for business.
- Corporate responsibility and climate change. Climate change as a reputational risk or a brand advantage. Managing stakeholder perceptions and expectations. NGOs business campaigning and climate change.
- Corporate carbon inventories, disclosure standards and reporting, and benchmarking. Associated issues – assurance, organisational boundaries; normalisation.
- Managing for lower carbon: understanding barriers (split incentives, materiality issues, managerial inertia) and solutions (governance, targets, management systems, incentives, change management). Surveying range of carbon management activities (energy efficiency, fuel switching, building management, behavioural changes, supply-chain carbon, low-carbon product design.)
- Investment and climate change. The role of investors. Current investor activity. Climate change as an investment risk/opportunity. Implications for financial analysis. Shareholder activism and climate change.
- Households as carbon sources. Indirect vs direct carbon emissions. Carbon footprinting.

Personal carbon allowances. Climate change mitigation. The role of business in encouraging/enabling household mitigation. Economic costs and benefits, payback times.

(b) Intellectual skills

- Economic implications of climate change impacts and integrated view of mitigation and adaptation by business and industry.
- Critical analysis of carbon reduction policies and technologies.
- Efficacy of climate change mitigation instruments (e.g. carbon trading and offsetting).
- Scientific, economic and political arguments for reducing carbon emissions
- Management skills, techniques and strategies for climate change mitigation, adaptation and risk management.
- Advanced knowledge of, and skills in, the economics of climate change and carbon management, and the management of associated business risks and opportunities.

(c) Subject-specific skills

- Assessment of energy and carbon inventories for businesses and households.
- Determination of greenhouse gas abatement curves in relation to national and international targets.
- Use of life-cycle analyses and importance of embodied emissions of goods and services.
- Calculation of ecosystem carbon budgets.
- Use of climate change reporting standards and protocols to report on carbon emissions.
- Understanding of national and international carbon trading mechanisms, their aims and limitations.

(d) Transferable skills

- Quantitative methods.
- Critical evaluation of governmental and corporate environmental policies.
- Economic and market analyses.
- Evaluation of institutions, ecosystems, goods and services in terms of resource flow.
- Interpersonal skills, independent learning and self-development.
- Research and science communication skills (incl. peers, public, media and government).

The programme provides a suitable qualification for students seeking careers in industry, research, consultancy or policy-making. The choice of dissertation project can be used to tailor the degree towards a chosen career path. The programme is able to draw on its collaboration with leading carbon management consultancies to provide excellent post-graduation employment opportunities. In addition, the programme provides an excellent pathway for subsequent PhD study at the University.

11. Programme structure and features

Entry Requirements Minimum of a 2.1 Honours degree or equivalent in business, economics, or a physical science. Applicants with a degree in a social science or the humanities may be accepted, subject to appraisal by the programme director and the completion of recommended pre-session reading.

Target Intake 25 students in the first year (2008/09), rising to 50 students per year in subsequent years.

Fees Standard taught MSc in Management fees for School of Management and Economics (£6,500 EU, £11,700 non-EU [2007/2008]). No additional course costs.

Degree Criteria MSc is full-time (12 months) or part-time (24 months), pass requires 120 credits from

taught courses and 60 credits from the research dissertation. Diploma is full time for 9 months, 120 credits from taught courses.

Taught Component

The taught component consists of six courses of lectures: three courses in the first semester and three in the second semester. All students attend and complete the four compulsory core courses, three in semester 1 and one in semester 2. Students must achieve at least a pass (50%) in their 4 core courses and a minimum overall mark for the taught component of 50% to progress to the research dissertation stage. Students who do not achieve a pass will have the option of graduating with a Postgraduate Diploma in Carbon Management (these students must achieve a 40-49% average for their course component) at the discretion of the Board of Examiners.

Core Courses (80 credits)

- Climate Change Impacts and Adaptation (Geosciences). Semester 1 (20 credits).
- Business and Climate Change (Management and Economics). Semester 1 (20 credits).
- Carbon Economics (Management and Economics). Semester 1 (20 credits).
- Climate Change Management (Geosciences). Semester 2 (20 credits).

Further details of these courses can be found in the accompanying documents. Details of the expert lecturing staff now confirmed for provision of these courses are also provided.

Elective Courses (40 credits)

The optional courses are selected from a wide range offered within related MSc programmes in the School of Geosciences and School of Management and Economics. Other optional modules provided by the School of Social and Political Studies, the Scottish Agricultural College and the Institute for Energy Systems will be offered subject to timetable and quota constraints. The following courses are recommended:

School of Geosciences

- Human Resource Management
- Forest and Environment
- Management of Sustainable Development
- Management of Biological Resources
- Participation in Policy Planning
- Values and the Environment
- Rural Development
- Culture, Ethics and Environment

School of Management and Economics

- Change Management
- Global Strategy and Management
- Corporate Strategy
- Management Across Cultures
- Global Financial Markets and Emerging Economies
- The Changing Business Environment in China
- Financial Analysis
- Marketing Management
- Corporate Finance in Emerging Markets
- Advertising Management

- Japan as a Model for Emerging Markets
- Cases in Finance and Investment
- Providing and Managing Public Services
- Case studies - Business Management in China and India

School of Social and Political Studies

- Sociology of the Environment and Risk

Scottish Agricultural College

- Applications in Environmental Economics
- Environmental Impact Assessment
- Waste Reduction and Recycling

Institute for Energy Systems

- Power System Engineering and Economics
- Renewable Energy Engineering

Research Dissertation (60 credits) Each student conducts an individual research project on a subject chosen in consultation with and supervised by the Programme Director and/or lecturing staff. MSc candidates write up their work as a dissertation (12,000 words), which is submitted by the end of August.

Research costs (£500 per student) are charged as part of the overall programme fees.

A mark of 50% or more for the research dissertation is required for awarding of the MSc. Students achieving a dissertation mark of 40-49% may be awarded a Diploma at the discretion of the Board of Examiners.

In addition to in-house expertise, the programme boasts numerous collaborative links to carbon management consultancies and academic institutions. These will provide additional supervision capacity for those students wishing to undertake more applied research projects, in particular those focussed on carbon and energy auditing, waste management and life cycle analyses. Confirmed collaborators include:

- The Edinburgh Centre for Carbon Management
- CarbonPlanet.com
- National Industrial Symbiosis Programme
- Royal Botanic Gardens, Edinburgh

The wide-ranging expertise in all aspects of carbon management provided by the lecturing staff and industry partners allows students to conduct a research dissertation project tailored to their specific interests and aspirations for post-graduation employment. Potential research areas include:

- Carbon trading and taxation
- Carbon benchmarking
- Ecosystem carbon cycling and management
- Climate change adaptation by businesses
- Waste management and climate change
- Low carbon technologies
- Governmental and international carbon reduction

12. Further comments:

The programme draws together existing expertise in carbon management from across the University, as

well as input from nationally and internationally renowned experts in specialist areas such as Personal Carbon Allowances, Carbon Offsetting, Food-related emissions, and Emissions Scenarios.

As such, the programme is unrivalled in terms of its provision of comprehensive high-level training in carbon management. Following establishment of the programme in 2008-9, the rolling out of targeted CPD courses in key areas of business carbon management are planned.

APPENDIX 2

GEOSCIENCES: NEW MSC BUSINESS PLAN FORM

This form must be submitted in conjunction with a Draft Programme Specification and the associated financial spreadsheet to GO for agreement to take a proposal for a new MSc programme to School Board of Studies.

(The details requested on this form are also required by College after BoS approval.)

1. SUMMARY INFORMATION

- please insert the requested information into the boxes below

Programme Title	MSc in Carbon Management
Name of proposer(s)	Dr Dave Reay
Name of intended Programme Director	Dr Dave Reay
Duration of study (tick as applicable, and give months for FT)	Full time x 12 months Part time x 24 months
Mode of study / delivery (tick as many as applicable)	Resident at Edinburgh University x Resident at another HE institution <input type="checkbox"/> Collaborative <input type="checkbox"/> Distance learning <input type="checkbox"/> Flexible training package <input type="checkbox"/>
Date of intended first intake	September 2008

2. MARKET INFORMATION

(i) Explain how you have assessed the potential demand for this programme.

(including where appropriate information from the Recruitment and Admissions Liaison Service; International Office; Careers Service; employers; professional bodies; students etc)

We have liaised with Lorna Halliday, Head of College Recruitment, to ensure the marketability of the programme and to put in place a coherent marketing strategy via the International Office and elsewhere. We have spoken to several employers about the programme, all of which have been very enthusiastic, offering collaboration with student dissertations and the opportunity for post-graduation employment:

"In order to satisfy our growing customer base we require the services of skilled carbon auditors, brokers and originators. Carbon Planet is excited to be collaborating with the University of Edinburgh in providing both practical study opportunities and, at graduation, employment prospects for a significant number of qualifying students." Dave Sag, CEO, Carbon Planet

Interest and feedback from prospective students has been excellent, with over a dozen enquiries to Geosciences already and at least 2 applications, despite our having made clear that applications cannot be considered until the

programme is granted approval. Feedback from undergraduate and post-graduate students already at Edinburgh has been similarly positive, with several indicating their intent to apply.

Since the creation of the programme web page at www.geos.ed.ac.uk/carbon and publication of a press release on the programme by the University it has featured in *Nature*, the *Daily Record* and on *BBC Radio Scotland*. Additional interviews have also been requested by *BBC Newsnight* and *BBC Radio Scotland* should the programme gain approval. Our contacts within the British Council have been used to alert them to the proposed programme and we have subsequently been approached to tender for a new Chevening Fellowship Programme on 'Finance and Investment in a Low Carbon Economy' which, if successful, would provide even more weight and vitality to the proposed programme.

Quantitative information on demand for such a programme has been difficult to find. Anecdotal evidence supporting our view that there is a great demand for courses such as that proposed here have come from recent articles in the *Times Higher Education Supplement*, *The Guardian* and *Nature*. Specifically:

"Global warming and the need to become a sustainable society are driving a new industrial economic revolution. Any time you have an industrial economic revolution, you create thousands of new jobs in disciplines that didn't exist before, and I think we're at the early stages of that." Tom Kimmerer, executive director, Association for the Advancement of Sustainability in Higher Education.

"There is great demand for graduates who have grappled with the complexity and uncertainty of issues such as environmental sustainability, development, economics and climate change" Charles Redman, director of the new School of Sustainability at Arizona State University in Tempe.

Further Marketing of the Programme

- Stuart Simmons, Business Development Executive in the School of Geosciences, has committed £3,000 from the Knowledge Transfer Fund for the advertising of the programme. This funding will be used to provide half page adverts in *New Scientist* magazine for two weeks during February 2008.
- Programme marketing via the International Office, School of Geosciences and School of Management and Economics has been instigated, with the rolling out of marketing should approval be granted.
- An official programme launch early in 2008 at the Scottish Parliament is planned, subject to programme approval. Key media, political and academic contacts will be invited.
- Promotion of the programme via collaborating networks and companies, including the British Council, Edinburgh Centre for Carbon Management, CarbonPlanet.com, National Industries Symbiosis Programme (NISP), Food Processing Knowledge Transfer Network (FPKTN) and the Industry CO2 Consortium.
- Additional advertising for the programme has been secured on the www.researchiscool.com, www.ghgonline.org and School of Geosciences websites.
- Further high-profile marketing of the programme will be achieved through the various media contacts of the programme directors (incl. TV, radio, print and online, see www.geos.ed.ac.uk/homes/dreay/media.html).

(ii) Summarize comparable provision and student numbers at competitor institutions.

To our knowledge, the proposed programme is the first of its kind to bring together economists, management experts and geoscientists to provide such high-level MSc training in carbon management. Its integration of expertise in the School of Geosciences with that in the School of Management and Economics means that it is able to recruit from student pools not normally available to Masters courses in this area. Given its strong focus on carbon management by business, industry and consumers, we anticipate the bulk of our student intake to come from a business/economics background and so have based our projected intake on student numbers on existing Masters programmes within the School of Management and Economics.

The School of Management and Economics have examined the content of and fees for broadly comparable programmes in the UK. Very few provide the integrated business-economics-geosciences

programme we propose, though there is a clear move towards such programmes in the few leading Universities that possess the critical mass to achieve something along these lines. Based on the limited information available, those that come near to such a well-rounded programme appear to be in high demand.

Broadly comparable UK programmes:

University of St Andrews. MSc Managing Environmental Change. New for 2008. Geosciences focus, no real business/economics element.

University of Lancaster. MSc in Low-carbon Energy. New course. Engineering-based. Part-time (24 months). Limited business/economics input.

University of Cranfield. MSc in Environmental Management for Business. Limited geosciences input. 25 places per year.

University of Reading. MSc in Renewable energy. Aimed at engineers/geoscientists.

University of Glamorgan. MSc in Renewable Energy and Resource Management. Aimed at engineers/geoscientists.

University of Nottingham. MSc in Environmental Management. Aimed at Geoscientists.

University of Bath. MSc in Integrated Environmental Management. As above.

University of Hertfordshire. MSc in Environmental Management for Business. Aimed at Geoscientists.

Birkbeck College. MSc in Business Strategy, Politics and the Environment. Limited Geosciences input.

University of Manchester. MSc in Environmental Management. Generic course. High fees (£13,480 for all)

Brunel University. MSc in Environmental Science. Focus on Law.

University College London. MSc in Environmental and Resource Economics. Generic, but highly-regarded (and expensive) course.

University of Glasgow, MSc/Diploma in Carbon Management. New course in September 2007. Unknown intake. Dearth of expertise in terms of teaching/supervision. Focus on ethics and renewable energy.

University of Oxford (ECI): MSc Environmental Change and Management
300 applicants per year (from >40 countries) for 32 places. Limited business focus.

University of East Anglia, MSc Environmental Assessment and Management. Generic, climate change and carbon management only one component.

University of East Anglia, MBA in Carbon Management. First intake in Jan 2008, expensive (£13,800 per student), emphasis on business, likely to be greatest competitor for those applicants with a business/management background.

University of York, MSc/Diploma in Environmental Economics. Poorly integrated, generic, with climate change and carbon management only one component.

3. FINANCIAL ASPECTS

Please complete the associated spreadsheet available at:
https://www.geos.ed.ac.uk/postgraduate/Info_MSc_staff/ **and return it with this form to the GO
Manager.**