UCL DEPARTMENT OF GEOGRAPHY

MSc Climate Change

Handbook
2013-2014

This information is provisional as the programme may be subject to revisions.
It should be read in conjunction with:

MSc Climate Change web pages
www.geog.ucl.ac.uk/climate

UCL Graduate School web pages
www.grad.ucl.ac.uk

Sources of Funding for Graduate Students
www.grad.ucl.ac.uk/funds

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Other sources of information
This booklet must be read in conjunction with the following:

You may also find it helpful to consult the following:

- UCL Guide to Graduate Study
  www.ucl.ac.uk/prospective-students/graduate-study/
- Information for students from overseas
  www.ucl.ac.uk/prospective-students/international-students
- Sources of Funding for Graduate Students
  www.grad.ucl.ac.uk/funds/
- Department of Geography Graduate Programmes
  www.geog.ucl.ac.uk/admissions-and-teaching/postgraduates
- UCL Student Support and Wellbeing
  http://www.ucl.ac.uk/new-students/videos

Disclaimer
While every effort has been made to ensure that the information in this handbook is correct at the time of going to press, UCL cannot be responsible for any errors it contains. UCL Department of Geography reserves the right to cancel or make adjustments to the specifications of particular modules if necessary.

Introduction

There is a pressing national and international need to understand the nature and consequences of climatic change and to develop strategies to respond to them. The UCL Climate Change MSc provides rigorous scientific and vocational training for the next generation of climate change professionals. UCL has strengths across the board from reconstructing past climates (over a wide range of timescales from the geological to the recent historical), modelling current climate (including the ability to run state-of-the-art global and regional circulation models) and identifying climate change impacts and possible adaptations It has groups researching climate forcing of coastal, estuarine and freshwater systems; carbon cycling; palaeoclimate of the past few million years and the politics of climate change. The broad scope of our research allows us to present a more critical perspective on climate change than that offered by our competitors, whilst retaining a rigorous treatment of the fundamental science.

The course combines rigorous empirically-based science founded on our expertise in the reconstruction of climate and state-of-the-art modelling, specifically that concerned with understanding the impacts of climate change. It also introduces a critical perspective that places climate change within the context of broader anthropogenic environmental change and incorporates both social and policy dimensions. The programme is contextualised with reference to the challenges of understanding both natural and human-induced changes to a variety of environmental systems.

As one of the world's top universities, UCL excels across the physical and natural sciences, social sciences and humanities. The MSc is run by UCL Department of Geography, which enjoys an outstanding international reputation for its research and teaching. Research groups contributing to the MSc include those concerned with Environmental Modelling and Earth Observation, Past Climates; Biodiversity and Recent Environmental Change; and Environment, Landscape and Society. Students on this degree will join a vibrant but informal academic environment of mutual discovery and free-ranging debate.

Aims and core questions

The UCL Climate Change MSc is designed to appeal to students from a range of disciplines looking to obtain a sound appreciation of the science of climate change and its impacts. It will appeal not only to those with backgrounds in environmental sciences (such as geography, geology and oceanography) but also to those with a background in other sciences (physics, biology) or engineering who wish to develop their skills in a climate change context. The MSc provides an ideal foundation for PhD research, or for employment with environmental monitoring and protection agencies, industry and environmental consultancies.

The key aims of the MSc are:

- to develop a strong cross-disciplinary understanding of climate change.
- to provide a critical perspective on the impacts of climate change on the earth's natural systems and the challenges associated with modelling these.
- to provide structured training and practical skills in the selection and implementation of an appropriate research approach.
- to foster an ability to conceptualise a problem and to formulate and manage a research project.
- to produce highly marketable graduates who will be able to take leading roles in academic, government or industrial sectors.

Learning outcomes

Students taking the MSc will:

- develop a sound understanding of the physical dynamics of the coupled atmosphere-ocean system and the processes of climate variability and change.
- understand causes and mechanisms of natural climate variability as a basis for assessing future climate changes.
- have a clear understanding of the techniques used in past climate reconstructions and an awareness of the strengths and limitations of palaeoclimatic inferences.
- develop a critical awareness of the strengths and limitations of climate modelling and the challenge of predicting the impacts of climate change on local ecosystems and communties.
- acquire proficiency in scientific computing, including the ability to obtain and manipulate datasets and to model these.
- acquire transferable skills in project design, management, report production and presentation through independent projects and presentations.
- complete an independent study that demonstrates advanced knowledge of climate change and the selection and application of an appropriate research methodology.

Staff Research Interests

Research groups closely involved with the programme include the UCL Environmental Modelling Group (www.geog.ucl.ac.uk/emg), the Environmental Change Research Centre (www.geog.ucl.ac.uk/ecrc) and the Environment Landscape and Society Group (www.geog.ucl.ac.uk/research/environment-landscape-and-society).

Contributors may vary from year to year, but currently include:

Dr Chris Brierley	Uncertainty in climate projections; Climate modelling
Dr Helene Burningham	Coastal and estuary geomorphology; GIS and historical shoreline change; climate forcing of coastal morphodynamics
Dr Mat Disney	Remote sensing; vegetation modelling; fire ecology
Prof. Jon French	Environmental system modelling; coastal and estuarine processes; geomorphology; hydrodynamics
Prof. Jonathan Holmes	Ostracods as indicators of environmental change; palaeolimnology
Dr Viv Jones	Diatom analysis; recent environmental change in Polar regions; late-glacial environments; lake acidification
Prof. Philip Lewis	Modelling and monitoring vegetation using Earth Observation methods
Dr Anson Mackay	Palaeoecological reconstructions; wetland ecology
Prof. Mark Maslin	Climatology, palaeoceanography, causes of rapid climate transitions

Dr Sam Randalls	Relationships between environments, commerce and science, with a particular focus on weather and climate
Prof. Neil Rose	Impacts of atmospheric pollutants; pollutants in lake sediments; transboundary movement of pollutants to remote areas
Dr Richard Taylor	Impacts of climate change on freshwater resources; role of groundwater in improving food security and access to safe water
Dr Julian Thompson	Monitoring and modelling hydrological processes within wetlands
Prof. Chronis Tzedakis	Quaternary palaeoecology and stratigraphy

Course Structure and Timetable

In the first term, students take four compulsory core modules. In the second term, students select four optional modules from a range of choices and start to develop an individual dissertation research project. Modules are typically delivered through of a mixture of lectures and practical classes. The research project includes meetings with project supervisors, individual project presentations and skills training.

The structure and timetable of the programme is summarised below.

Term 1

Four compulsory core modules (15 credits each)

Climate Dynamics
Global Environmental Change
Models in Environmental Science
Past Climates

Term 2

Four option modules (15 credits each from the following selection)

Politics of Climate Change
Surface Water Modelling
Impacts of Climate Change on Hydro-ecological Systems
Terrestrial Carbon: Modelling and Monitoring
Climate Modelling
Non-Biological Indicators of Environmental Change
Biological Indicators of Environmental Change

Dissertation (60 credits)

An individual research dissertation involving a novel evidence-based study into an aspect of climate change.

On-Line Timetable:

The UCL Online Timetable (www.ucl.ac.uk/timetable) displays your personal timetable week by week, and lets you find out what is being taught, when, where and by whom across UCL. Use it to select course units, which will fit in your timetable. Your personal timetable will display all the course units you are registered to attend including lectures, seminars, tutorials, labs, film screenings, computer training and more. Check it regularly for changes to dates, times or locations.

Login with your standard UCL username and password to display your personal timetable, or select a department or subject area, a degree programme, or individual modules and create a custom timetable to find out when things are scheduled to be taught. There will be four types of timetable available to view:

- Personal timetables for students and teaching staff with a UCL username and password.
- Department or Subject Area timetables by year of study.

- Degree programme timetables by year of study.
- Custom timetable lets you choose modules to create a timetable.

The Online Timetable will also offer a calendar subscription service, allowing you to get a feed of your personal timetable directly to your live@UCL account, or to your smartphone or personal calendaring service (e.g. Google Calendar, Apple iCal). This service will be accessible via the Online Timetable.

The following pages provide indicative details of the core and option modules that are usually offered. Please note that the course detail is likely to vary from year to year and can change at short notice.

CORE GEOGG130 – Climate Dynamics
(15 credits; Term 1)

Term 1 (2013)

Staff: Chris Brierley, David Thornalley

Aim:

To introduce the students to the physical basis of climate change.

Content:
The module will cover:

- The global energy budget.
- Mechanisms of poleward heat transport.
- Fundamental interactions between atmosphere and ocean.
- The major modes of climate variability
- The role of atmospheric greenhouse gases.
- The effects of increased greenhouse emissions due to human activity.
- The changes in both regional and global climate due to other human activities.
- Discussions of "hot topics" in climate change such as extreme events; the reliability and communication of climate science.

Assessment:

A written report on an independent analysis of climate data (70%) and a 1000 word essay (30%)

Format:

The module is based on lectures, class discussion and computer practicals.

Learning Outcomes:
At the end of the module, students should:

- be able to describe the broad features of the Earth's climate.
- have an appreciation for the complexity of feedbacks between the different elements of the climate system.
- have an understanding of the different forcing factors that influence climate over a range of time-scales.
- have an appreciation of the complexity of modelling future climate change.
- have an awareness of the difficulties in predicting future impacts of climate change.
- be able to investigate climate relationships from original data sources.

CORE GEOGG131 – GLOBAL ENVIRONMENTAL CHANGE

(15 credits; Term 1)

Staff:
Anson Mackay, Jonathan Holmes

Aims:
The primary aim is to investigate topical environmental themes (important to the well-being of our planet) within the context of a long-term perspective (using palaeoscience approaches). A secondary aim is to encourage students to publicly participate in the themes developed on the course by the creation and maintenance of a weblog ('blog') site.

Content:
Human impact on the earth is increasingly seen as having global implications, so much so that a new geological epoch, *the Anthropocene*, has been proposed. This course will provide in-depth coverage of human impacts on many of the Earth's ecosystems, drawing on research strengths within the department.

- Natural and anthropogenic drivers of climate change
- Global biogeochemical cycles
- Land-use change and Planetary Boundaries
- Abrupt climate change
- Aquatic environments
- Biodiversity and megafaunal extinctions
- Societal responses

Assessment:
Writing and maintaining a blog on an environmental topic for 12 weeks (approx 3000 words)

Format:
The course is based mainly upon lectures

Learning Outcomes:
At the end of the course students should:

- Be able to critically evaluate the drivers of climate change during the Holocene
- Understand global biogeochemical cycles (e.g. C, N and Si) and how they have been disrupted by human activity
- Understand the impact of humans on terrestrial and aquatic ecosystems
- Be aware of how palaeoecological techniques can be used to further our understanding of changing biodiversity and climate change
- Be able to critically evaluate human and climate impacts on different global ecosystems

CORE GEOGG120 – MODELS IN ENVIRONMENTAL SCIENCE
(15 credits; Term 1)

Staff:
Jon French, Julian Thompson, Richard Taylor, Anson Mackay, Helene Burningham, Chris Brierley, Alan Jenkins

Aims:
- to outline the nature and scope of modelling within the environmental sciences
- to introduce a variety of different approaches to environmental system modelling with particular reference to climate change impacts
- to present a range of modelling applications from hydrology, water chemistry, coastal science, and climate science
- to encourage a critical approach to the evaluation and application of model-based environmental and climate change science

Content:
The Models in Environmental Science core course commences with an introduction to the various types of model and the role of modelling in the environmental sciences in general and climate change science in particular. Lectures cover the basic principles of empirical modelling (with application examples drawn mainly from the field of past climate change and palaeoenvironmental reconstruction) and mechanistic modelling (with examples drawn from ecology, hydrology and geomorphology). A range of case study examples are presented in more detail, including the use of graphical system modelling building software (STELLA) to simulate hydrological processes, application of analytical models (MSExcel) to simulate soil moisture and groundwater recharge, coastal wave climate (including use of the SWAN numerical wave model), Earth Observation and environmental modelling, water chemistry (including use of the CEH MAGIC model of catchment acidification), and climate modelling. The course also covers key issues related to the validation of model outputs against observational data. Students are also introduced to scientific computing, including the unix operating system and some basic aspects of programming, data manipulation and visualisation using Matlab.

Assessment:
Course paper (3500 words; worth 8% of total assessment).

Format:
The course is based upon lectures, with some supervised and self-paced practical work.

Learning Outcomes:
At the end of the course students should:
- understand the role and nature of modelling in environmental and climate change science
- understand the basic principles of model building using both empirical and mechanistic modelling approaches
- have a clear understanding of the challenges and decisions associated with model implementation and validation of model output
- have an awareness of the strengths and limitations of different types of model
- have experience of Matlab and STELLA software and scientific computing in unix

GEOGG133 – PAST CLIMATES
(15 credits; Term 1)

Staff:
Mark Maslin (m.maslin@ucl.ac.uk)
Jonathan Holmes
Chronis Tzedakis

Aims:
- to provide an introduction to Past Climate Change
- to provide an understanding of the causes and mechanisms of natural climate variability as a basis for assessing future climate changes

Content:
The module will provide:
- An introduction to the theoretical framework of climate variability
- Fundamentals of reconstructing past environments
- Fundamentals of dating techniques and developing chronological frameworks
- An overview of climatic evolution through geological time
- An assessment of mechanisms of orbital- and millennial-scale climate variability
- A focus on the effects of climate changes on terrestrial ecosystems and human populations
- An assessment of anthropogenic climate changes within the context of natural climate variability

Assessment:
Coursework 100%

Format:
The course is based upon lectures and class discussion and coursework.

Learning Outcomes:
At the end of the module, students should:
- have an understanding of the techniques used in palaeoenvironmental reconstructions.
- have an awareness of the strengths and limitations of palaeoclimatic inferences
- have an understanding of the patterns and scales of natural climate variability
- have an appreciation of the role of climate on biotic evolution
- have an appreciation of natural vs anthropogenic causes of past climate change

OPTION GEOGG043 – POLITICS OF CLIMATE CHANGE
(15 credits; Term 2)

Staff:
Sam Randalls

Aims:
- To explore the ways in which different people frame climate change as an issue
- To examine the science and politics of these debates
- To critically assess proposed solutions to climate change

Content:
The course focuses upon the different ways in which climate change is framed as an issue. With political rows about climate policy and justice, regular interventions from activist scientists and skeptics, and the various analyses by economists and environmentalists, climate change encompasses far more issues than carbon dioxide science and policy. Each week of the course is devoted to a different approach to climate change, exploring economic, ethical, political, security and scientific framings amongst others. The focus is on the central arguments within each of these discourses. How climate change is considered a problem has significant repercussions for the types of solutions envisaged. Students will conduct research projects on proposed or existing responses to climate change (where responses are defined broadly to include mitigation, adaptation and scientific or political solutions). A critical assessment of the researched response, drawing upon social science debates, forms the assessment for the course.

Format:
The course is taught through a series of lectures and discussions.

Learning Outcomes:
By the end of the course students should be able to:
- Appreciate the diversity of debates and perspectives on climate change
- Critically assess the science and politics of climate change
- Apply this understanding to a practical example
- Engage in group discussions about and individual evaluation of social science literatures on climate change

Preliminary readings
Demeritt, D. 2001. The Construction of Global Warming and the Politics of Science, *Annals of the Association of American Geographers,* 91, 2, 307-337.
Giddens, A. 2009. *The Politics of Climate Change* Polity Press, Cambridge.
Hulme, M. 2009. *Why we disagree about climate change,* Cambridge University Press, 392pp
Malone, E. 2009. *Debating Climate Change: Pathways through argument to agreement,* Earthscan, London.
Maslin, M. 2009. *Global Warming: A very short introduction,* (2nd edition), Oxford University Press, 192pp.
Roberts, J.T. and Parks, B.C. 2007. *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy,* MIT Press, Cambridge, 404pp.
Vanderheiden, S. 2008. *Atmospheric Justice: A Political Theory of Climate Change,* Oxford University Press, New York.

OPTION GEOGG101 – SURFACE WATER MODELLING

(15 credits; Term 2)

Staff:
Jon French, Julian Thompson

Aims:

- to outline the principles of surface water modelling
- to introduce a variety of different mathematical modelling approaches, and the software available with which to implement them, with particular reference to the hydrodynamics of coastal and estuarine systems, ocean waves, and catchment hydrology
- to provide 'hands on' experience of advanced modelling software
- to encourage a critical approach to the evaluation and application of model-based aquatic and climate change science

Content:
The Surface Water Modelling option commences with an introduction to hydrodynamic modelling (including numerical schemes, dimensionality, boundary conditions and the construction of computational meshes and grids). Practical sessions take students through the implementation of an oceanographic 'box model', and a 2D finite element model of a tidal estuary and its sensitivity to climate change and sea-level rise. Hydrological modelling is then introduced, with particular reference to catchments and their sensitivity to climate change, and via a practical using the MIKE-SHE modelling system. The course also covers key issues associated with the provision of boundary condition data and model validation.

The main sessions include:

- Hydrodynamic modelling (numerical principles, discretisation, mesh generation, boundary conditions, stability issues)
- Coding of a simple box model (Matlab)
- Modelling of coastal and estuarine waters using SMS and RMA-2
- Hydrological modelling (catchment-scale models, data requirements, examples and applications)
- Catchment modelling using Mike-SHE

Assessment:
Written report based upon a write up of **one** of two practical exercises (max 2000 words).

Format:
The course is based upon lectures, and on supervised and self-paced practical work.

Learning Outcomes:
At the end of the course students should:

- understand physical basis of surface water modelling (including shallow water equations, parameterisation, numerical schemes)
- be able to conceptualise and implement a hydrodynamic or hydrological model using widely-available software tools
- have practical experience of research-level modelling software (e.g. RMA-2, Mike-SHE)
- have a clearer understanding of the challenges and decisions associated with model implementation and validation of model output
- have an awareness of the strengths and limitations of surface water models

OPTION GEOGG123 – IMPACTS OF CLIMATE CHANGE ON HYDROECOLOGICAL SYSTEMS

(15 credits; Term 2)

Staff:
Richard Taylor, Chiara Ambrosino, Mohammad Shamsudduha, Martin Kernan, Simon Dadson, Chris Brierley

Aims:

- to introduce students to the complex linkages between climate and hydrology and between hydrological change and aquatic ecosystems;
- to introduce both statistical and numerical modelling approaches to climate change impact assessment in hydro-ecological systems;
- to introduce a range of analytical techniques relevant to the interpretation of observational data and model outputs.

Content:
This course begins by outlining how anthropogenic warming impacts hydrological systems introducing concepts such as non-stationarity and the Clausius-Clapeyron Relation, and then relating these basic principles to empirical studies summarised in IPCC AR4 and more recent studies. This conceptual and empirically driven knowledge base of climate change impacts on terrestrial hydrology is then extended to a range of aquatic ecosystems including lakes and wetlands as well as groundwater and glacial environments around the world. These case study environments will serve to demonstrate the complexity of the involved interactions that involve changes in freshwater withdrawals and land-use, and include non-linear and non-intuitive responses to climate variability and change. These case studies will further demonstrate the use of specific analytical techniques for establishing linkages and evaluating trends, and highlight key challenges to current understanding of climate change impacts that include: (1) limited monitoring networks and observational datasets, and (2) uncertainty in hydrological projections of rainfall, evapotranspiration, river discharge, soil moisture and groundwater recharge. The course will conclude with examples the challenging task of communicating uncertain and complex impacts of climate change on water resources and hydro-ecological systems to water managers, policy makers and the general public.

Assessment:
1 piece of coursework, 3000 words, worth 8% of the overall degree.

Format:
The module will be delivered through:

- Lectures & seminars (sessions providing concepts, contexts, and case studies);
- Computer practicals that include (1) statistical analyses of hydroclimatological and hydro-ecological datasets and (2) analytical and numerical models including lumped and semi-distributed hydrological models;
- Moodle resources (hosting reading lists, lecture/seminar hand-outs, datasets, guides and practical support materials).

Learning outcomes:
At the end of the module, students should:

- have a good conceptual understanding of climate change impacts on a range of hydrological and ecological systems;
- have conceptual understanding and experience of modelling/analytical methods;
- appreciate the importance of quantifying uncertainty in climate change impact predictions.
- understand the importance and practicalities of stakeholder involvement.

OPTION GEOGG124 - TERRESTRIAL CARBON: MODELLING and MONITORING

(15 credits; Term 2)

Staff:
Prof. Philip Lewis

Aims:

The *Terrestrial Carbon: modelling and monitoring* module aims:

- To outline the role of vegetation in the carbon cycle and the wider climate system
- To outline how the vegetation carbon cycle can be modelled and use the models in prediction
- To provide the linkages between the models and remote sensing observations (radiative transfer)
- To enable the students to use remote sensing (and other) data to constrain, test and criticise the models
- To expose the students to modern statistical methods in combining data and models

Content:

The module will cover:

- The role of vegetation in the climate system
- Terrestrial vegetation dynamics modelling
- Remote sensing of vegetation
- Radiation interactions with vegetation
- Model inversion in remote sensing
- Concepts and maths of data assimilation
- Using remote sensing data to constrain and test vegetation dynamics models

Assessment:

2 hour unseen exam, 100% of the assessment.

Format:

The module will be delivered through:

- Lectures (3 hour sessions providing concepts, contexts, and critiques)
- Computer laboratory work (extended practical sessions progressing technical aspects of model implementation and options hands-on experience of relevant software). Practicals will initially be based around specific vegetation models and EO radiative transfer schemes, but also include advanced concepts such as data assimilation.
- Moodle resources (hosting reading lists, lecture handouts, datasets, guides and practical support materials)

Learning outcomes:

At the end of the module, students should:

- Appreciate the role of vegetation in the carbon cycle and the climate system
- Appreciate the role, strengths and weaknesses of models of global vegetation processes
- Understand the factors affecting remote sensing measurements of vegetation (radiative transfer theory)
- Understand how to use models and observations in combination to improve estimates of carbon fluxes and pools
- Have an understanding of data assimilation

OPTION GEOGG134 – CLIMATE MODELLING

(15 credits; Term 2)

Staff:
Chris Brierley

Aims:
The Climate Modelling module aims to:

- Introduce a range of models commonly used to understand climate change
- Recognise the processes involved to run a climate model
- Understand the science behind future climate projections

Content:
The module will cover the fundamental physics, construction, testing, and use of various climate models. This will include box models, intermediate complexity models and fully-coupled General Circulation Models (GCMs). The course will explain how physical processes are incorporated within each type of model. It will also examine how models are calibrated and compared. The course will discuss error analysis and confidence limits on model output. The course is built around running and analysing a climate change experiment using HadCM3 (a GCM developed by the UK Met Office).

Assessment:
Analysis of the climate model simulations performed during the course (max 3000 words; worth 8% of the total assessment).

Format:
The course is based upon lectures, practical computer sessions and project work.

The module will be delivered through:

- Lectures (providing concepts, methods, examples and literature context)
- Computer laboratory work (extended practical sessions progressing technical aspects of understanding and providing hands-on experience of relevant software and computational problems).
- Moodle resources (hosting reading lists, lecture handouts, datasets, guides and practical support materials)

Learning outcomes:
At the end of the module, students should:

- have an understanding of spatial resolution/parameterization of models
- have an appreciation for the complexity of feedbacks in the climate system
- have an understanding of different types of models
- have an awareness of model limitations
- have the ability analyse climate projections from multi-model archives

GEOGG135 BIOLOGICAL INDICATORS OF ENVIRONMENTAL CHANGE

(15 credits: Term 2)

Staff: Viv Jones, Chronis Tzedakis, Jonathan Holmes, Steve Brooks and others

Aims:

- to introduce students to the range of biological indicators used for determining environmental change
- to provide students with practical skills in the identification of biological indicators of environmental change

Content:

The course aims to cover the variety of biological indicators used in both present-day aquatic ecosystem monitoring and in assessing past conditions using a palaeoecological approach.

A selection from the following biological indicators are covered:

- diatoms
- pollen
- plant macrofossils
- chironomids
- ostracods
- foraminifera

Assessment:

Laboratory book from weekly practical exercises (50%)
Data analysis exercise (50%)

Format:

The course is based upon a 5 hr lecture and practical class which enables us to integrate the lectures and the practicals

Learning Outcomes:

At the end of the course students should:

- understand how to classify and identify a range of biological materials.
- have an experience of a range of microscopical techniques
- have an understanding of how biological proxies are used for aquatic monitoring and environmental reconstruction
- appreciate the advantages and disadvantages of different biological indicators of environmental change

GEOGG136 NON-BIOLOGICAL INDICATORS OF ENVIRONMENTAL CHANGE

(15 credits; Term 2)

Staff:

Jonathan Holmes (convenor) and others

Aims:

The aim of this module is to introduce students to a range of physical and geochemical techniques used for environmental reconstruction. The module will:

- provide an overview of the application of non-biological proxies in sediments to the reconstruction of environmental variables
- provide specific theoretical and practical training in the use of selected techniques for the analysis of sediments for environmental reconstruction
- explore the limitations of specific techniques and associated uncertainties in reconstructions

Content:

The module will cover theoretical and practical training in the use of non-biological indicators in environmental reconstruction, with particular emphasis on the laboratory analysis of Quaternary sediments. Techniques to be covered will be selected from the following: basic sediment description and characterization; particle-size analysis; mineral magnetics; sediment geochemistry using XRF; analysis of contaminants; carbonate geochemistry using ICP-OES; stable-isotope analysis of carbonates and organic material.

Assessment:

Lab-book write-up for practical classes (50%) and a 2000-word essay on application of non-biological indicators to environmental reconstruction (50%)

*Format***:**

The module is based upon lectures and on supervised practical classes.

Learning Outcomes:

At the end of the module students should have:

- a knowledge of the range of techniques used in environmental reconstruction;
- an understanding of the complexities associated with the interpretation of non-biological data;
- a critical appreciation of the advantages and limitations of the different techniques for reconstruction of past environments.

Individual Research Project (Dissertation)

An individual research dissertation of up to 12,000 words is to be completed by the end of August. While projects are offered to students we also encourage them to design their own study. The diversity of expertise of lecturers involved with the course means that good supervision can be found for a broad range of environmental modelling subjects. We also encourage projects that are undertaken in conjunction with environmental agencies or consultancies, which may of course lead to future employment opportunities.

Encouragement will be given for students to publish good dissertations in scientific journals and project supervisors will be offer help with this.

The presentations count towards 10% of the assessment for the whole module.

Dissertation process

1) A one-page dissertation proposal is submitted on the Monday following the Term II reading week (Mon 24th Feb 2014). This will include an initial indication of the primary skills/methods that the student will be using in their research, and reference to whether the project is linked with a specific member of staff.

2) Supervision starts in the second half of term two and students must attend at least one supervision session before the end of that term.

3) One-to-one supervision should not exceed 3hrs in total, and all supervision meetings are conducted before the end of term three.

4) The dissertation must be submitted in hard copy and uploaded to Moodle by the **29th August 2014**. Assessed dissertation presentations will be scheduled for sometime in September, date to be confirmed. All students must attend these presentations; failure to do so will result in a mark of incomplete for the dissertation.

Administration

MSc Course Tutor	Dr Chris Brierley x 30571 Pearson 111 c.brierley@ucl.ac.uk
MSc Admissions:	Fiona Mannion, x 30575 Pearson G12 f.mannion@ucl.ac.uk
MSc Physical Geography Tutor:	Dr Mat Disney, x 30592 Pearson 113 mathias.disney@ucl.ac.uk

Office Hours:
The Geography Department requires staff to post office hours during which they are expected to be present in their offices to see students. This benefits both staff and students. It is frustrating for students to find that a member of staff is not in their office when they want to see them, whilst constant interruptions can make research and teaching preparation difficult for staff. Please observe office hours and do not drop in on staff outside of these hours unless it is really urgent. If you cannot make the office hours posted you may find it easier to e-mail the staff member concerned to make an appointment.

The course tutor will post office hours but **will always do their best to see students in an emergency**. In the case of an emergency and if the course tutor is not in their office, please see either of the MSc Secretaries who should be able to advise you.

PORTICO: The UCL Student Information Service
UCL uses an administrative system called **PORTICO**.

Access to PORTICO is available to everyone across UCL – both staff and students alike - via the web portal www.ucl.ac.uk/portico. You will need to logon using your UCL userid and password, which are issued to you once you have enrolled. These are the same as the ones used for accessing UCL restricted web pages, UCL email and the Windows Terminal Service (WTS). If you do not know them, you should contact the IS Helpdesk as soon as possible (www.ucl.ac.uk/is/helpdesk). You can change your password on the web, at any time, at https://www.ucl.ac.uk/is/passwords/changepw.htm. More information can be found at http://www.ucl.ac.uk/isd/common/servicedesk .

As a student you can take ownership of your own personal data by logging on to PORTICO.

In PORTICO you can:

- edit your own personal data (e.g. contact details);
- complete online module registration, in accordance with the rules for your programme of study (subject to formal approval and sign off by the Department);
- view data about courses/modules;
- view your own examination results online.

On-line module registration
This facility enables you to choose your modules in accordance with the rules for your programme of study. You can access the Module Selection screen in Portico via the option

'Select your modules/course components' in the Student Academic Details container. Clicking on this option opens the following screen:

Module Selection

Select Your Modules/course components

This page shows the selections you have already made (as they may be compulsory modules) and also those selections which you need to make. Note that any selections that you make will be subject to the approval of the teaching department for each module and your parent department.

Details for the current student including which year and period the selections are for	
Student	40193311/1
Name	JESSICA POTTS
Programme	BSc(Econ) Economics
Route	BSC(ECON) ECONOMICS
Mode of Attendance	Full-time
Registration Year	2005
Registration Period	
Selections	You have currently selected 3 Module(s) with a total of 3 Credit(s)

Module	Occ	Period	Level	Credits	Status	Module Name
ECON2001	A	T1/2	2	1.00	Compulsory	Microeconomics
ECON2004	A	T1/2	2	1.00	Compulsory	Macroeconomic Theory and Policy
ECON2007	A	T1/2	2	1.00	Compulsory	Quantitative Economics and Econometrics

Shown below is a list of selections that you need to make. Use the Select button on each row to open the module selection screen. The Clear button can be used to clear the current rows selections. When all selections are complete, use the Submit Selections button to continue the process.

Select	Rule	Overarching	Selections	Total	State	Clear
Select	(Take a maximum of 1 credit from All undergraduate modules in Autumn/Spring term	Subject to an overall minimum of 1 credit and an overall maximum of 1 credit				Clear
Select	Take a maximum of 1 credit from ECON7001/A, ECON7002/A, ECON7003/A, ECON7004/A, ECON7005/A, ECON7006/A, ECON7007/A, ECON7008/A, ECON7009/A in Autumn/Spring term)					Clear

Clear All Selections | Submit Selections

The top of the screen shows any compulsory modules. To complete the module registration process you should select any optional/elective modules as listed at the bottom of the screen. Clicking on the 'Select' button next to the appropriate rule, which will open the optional/elective selection screen.

Selection screen – optional modules

If the rule specifies choosing a module from a defined list (an optional module), you will be presented with a screen as follows:

Module Selection

Select Your Modules/course components

This page allows you to select your modules from the available choices. Note that any selections that you make will be subject to the approval of the teaching department for each module and your parent department.

Details for the current student including which year and period the selections are for.	
Student	40193311/1
Name	JESSICA POTTS
Programme	BSc(Econ) Economics
Route	BSC(ECON) ECONOMICS
Mode of Attendance	Full-time
Year	2005
Period	T1/2
Current Selection	2
Total Selections	2

If a list of modules is displayed then choose the required number of modules from the list by clicking in the 'Select' box next to the appropriate module. If there is no list displayed then you should input the appropriate module code and insert an 'A' in the 'Occ' field and click on the Validate button to check that you have input the correct code and it is a valid module. If you do not know the module code then use the 'Search' button to find the module you want to select. Once you have completed your selections on this page, click on the 'Submit Selections' button to return to the main screen.

You must select a minimum of 0.00 credit and a maximum of 1.00 credit in total.

Select	Module	Occ	Period			Level	Credits	Module Name
☐	ECON7001	A	T1/2			INTER	0.50	Economics of Labour
☐	ECON7002	A	T1/2			INTER	0.50	Economics of Finance
☐	ECON7003	A	T1/2			INTER	0.50	Money and Banking
☐	ECON7004	A	T1/2			INTER	0.50	The Economics of Industrial Relations
☐	ECON7005	A	T1/2			INTER	0.50	Economics of the Public Sector
☐	ECON7006	A	T1/2			INTER	0.50	Economics of Regulation
☐	ECON7007	A	T1/2			INTER	0.50	Environmental Economics
☐	ECON7008	A	T1/2			INTER	0.50	Economics of Tax Policy
☐	ECON7009	A	T1/2			INTER	1.00	Public Economics

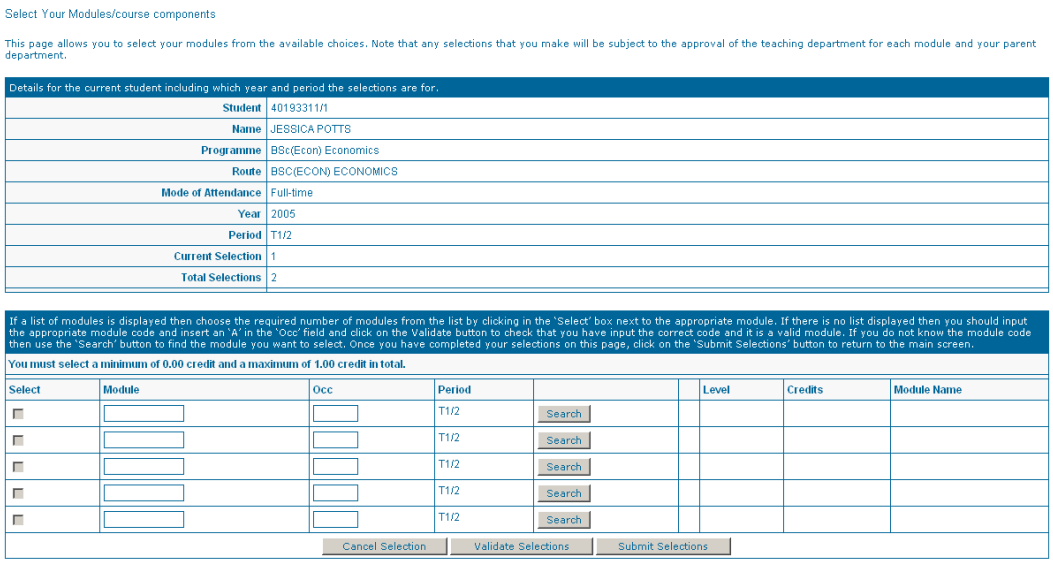
Cancel Selection | Submit Selections

Click in the 'Select' box next to the appropriate module to choose the module(s) you wish to take. To view further details about the module, click on the module name. The rule in the header above the list of modules states how many modules/credits you should choose. You must enter the correct number and then click on the 'Submit Selections' button to return to

the main screen. To return to the main screen without submitting any selections, click on the 'Cancel Selection' button.

Selection screen – elective modules

If the rule specifies choosing 'any undergraduate' or 'any postgraduate module' (an elective module, subject to approval), clicking on the 'Select' button next to the appropriate rule on the main screen will open the following screen:



Select Your Modules/course components

This page allows you to select your modules from the available choices. Note that any selections that you make will be subject to the approval of the teaching department for each module and your parent department.

Details for the current student including which year and period the selections are for.

Student	40193311/1
Name	JESSICA POTTS
Programme	BSc(Econ) Economics
Route	BSC(ECON) ECONOMICS
Mode of Attendance	Full-time
Year	2005
Period	T1/2
Current Selection	1
Total Selections	2

If a list of modules is displayed then choose the required number of modules from the list by clicking in the 'Select' box next to the appropriate module. If there is no list displayed then you should input the appropriate module code and insert an 'A' in the 'Occ' field and click on the Validate button to check that you have input the correct code and it is a valid module. If you do not know the module code then use the 'Search' button to find the module you want to select. Once you have completed your selections on this page, click on the 'Submit Selections' button to return to the main screen.

You must select a minimum of 0.00 credit and a maximum of 1.00 credit in total.

Select	Module	Occ	Period			Level	Credits	Module Name
☐			T1/2	Search				
☐			T1/2	Search				
☐			T1/2	Search				
☐			T1/2	Search				
☐			T1/2	Search				

Cancel Selection | Validate Selections | Submit Selections

As with the optional module selection screen, the rule in the header will state how many modules/credits you should choose. You should input the appropriate module code(s) in the module box and insert an 'A' in the 'Occ' (Occurrence) field. Alternatively, you can use the 'Search' button to find a module. Use the 'Submit Selections' button to enter the modules, or the 'Cancel selections' button to return to the main screen without submitting anything. Please note that you can "save for later" your course choices, which means if you change your mind you can go back into Portico and amend your selection before finally confirming your choices. Once you have "saved for later" your module choices will show up in your on-line personal timetable so you can see if there are any timetable clashes.

Validation/Confirmation of selections

Once you have completed all of your selections, ensure that they comply with any 'Overarching rule' indicated in the 'Overarching' column on the main screen and then click on the 'Submit Selections' button on the main screen.

Once you have submitted your selections, you will be presented with a final screen, where you can either undo your last change or you can confirm your selections by clicking on the 'Confirm Selections' button. **Note that once you have clicked on this button you cannot go back – you will then need to contact the Departmental office to make any amendments to your selections**. Following your confirmation, you will be presented with a screen that confirms you have completed the module registration process, listing the modules you have selected.

All of your selections are subject to Departmental approval. You will receive an automatic email to your UCL email address if any of your selections are rejected and **you must ensure that you respond to this by contacting the Departmental office**, whom you should also contact if you wish to amend a selection. You can check on the approval status for each of your modules by clicking on the 'View Module Selection status' option in your Student Academic Details container.

Assessment

The MSc Climate Change is assessed on the following basis:

Coursework: 64% (four core modules and four option modules at 8% each)

Dissertation: 36% (10% of which is assessed through an oral presentation of the research proposal)

The full Scheme of Award for MSc Climate Change is given below.

1. Requirements for a Pass

In order to achieve a Pass on this Master's programme, candidates must achieve a mark of 50% or above in:

- six of the eight module assessments
- and the dissertation

The weighting applied between the elements is as follows:

4 core modules (Term 1) @ 8 % each:	32%
4 specialised (option) modules (Term 2) @ 8 % each:	32%
Dissertation (including assessed presentation of the dissertation post submission):	36%
	100%

A condoned pass (40-49%) is allowed in up to two modules. The total allowable number of condoned passes applies to all modules but not the dissertation. When three or more results are in the condoned pass range, students must retake the appropriate assessments. Where the assessment is coursework only, this may be resubmitted in the same session with the permission of the MSc convenor (who will consider the impact of the additional workload).. Students must note that resubmission within the same session will count as the second and final attempt at a module. Assessments graded at less than 40% must be resubmitted.

Students who successfully complete the four core and four specialised option modules but do not submit the dissertation can be awarded a Diploma, provided that at least six modules achieve a mark of 50% or more. Two condoned passes (40-49%) are allowed for module assignments, in the same manner as for the MSc.

Students who successfully complete the four core modules (and all associated coursework) in Term 1 can be awarded a Certificate. An alternative assessment of a 2500 word course paper will be made available for core modules without coursework (which would otherwise be examined through the exam at the end of Term 2) to allow the Certificate programme to be completed in a contiguous period.

Other compulsory element
The dissertation oral presentation to members of the Examination Board is formally examined and is compulsory. This element represents 10% of the total dissertation assessment, *i.e.* 3.6 % of the overall weighted mean for the MSc.

2) Requirements for a Distinction
The criteria for the award of a Distinction are that: (a) the mark for the dissertation, after rounding to the nearest integer, is 70% or more, (b) the overall weighted mark (combining the taught elements and the dissertation) is 70% or more (c) where there is no mark below 50% after rounding and (d) where there are no re-sit marks and all the marks for the modules are first attempts. If the overall mark is 69% a candidate is in the borderline zone. In this case, an award of a Distinction can be made:
(a) where the mark in the dissertation is 70% or above; and
(b) where at least half of the taught credits are at or above 70%, after rounding; and
(c) where there is no mark below 50%, after rounding; and
(d) where there are no re-sit marks and all the marks for the modules are first attempts.

Rounding should be applied to obtain the integer marks given above:
for example, 64.4 is rounded to 64%, but 64.5 is rounded to 65%. In either case, all criteria must be satisfied.

3) Requirements for a Merit
The criteria for the award of Merit are that:

(a) the overall mark, based on 180 credits, is 60% or greater; and
(b) the mark for the dissertation is 65% or greater, and
(c) there are no marks below 50%, no condoned marks, no re-sits, and all marks are based on first attempts.

Rounding should be applied to obtain the integer marks given above.
All criteria, a to c, must be satisfied.

If the weighted overall mark is 59%, an award of a Merit can be made:

(e) where, after rounding to the nearest integer, the mark in the dissertation is 65% or above; and
(f) where at least half of the taught credits are at or above 60%, after rounding; and
(g) where there is no mark below 50%, after rounding; and
(h) where there are no re-sit marks and all the marks for the modules are first attempts.

Again, all criteria must be satisfied.

4. Coursework submission regulations
All coursework should state the number of words in the text (excluding tables and figures, footnotes, reference list and appendices, but including quotations and citations in the text) r. Please note that the following penalties will apply for work that is overlength:

i) The length of coursework will be specified in terms of a word count or number of pages.

ii) Assessed work should not exceed the prescribed length.

iii) For work that exceeds the specified maximum length by less than10% the mark will be reduced by ten percentage marks; but the penalised mark will not be reduced below the pass mark, assuming the work merited a pass.

iv) For work that exceeds the specified maximum length by 10% or more, a mark of zero will be recorded.

v) The method of measuring the length of coursework should be specified to students in writing. For example, a word count will depend on the software application and a page count on the margins, font and point size.

vi) For discipline specific practices such as bibliographies, tables, pictures and graphs, departments/divisions should specify in writing to students whether these are recorded as part of the maximum length and how this will be determined.

vii) In the case of coursework that is submitted late and is also over length, the lateness penalty will have precedence.

In addition to these regulations, the Department of Geography has specified the following:

Abstracts and appendices

- If an abstract is included in the assignment, it will be included in the word count unless the instructions for the specific assignment state explicitly otherwise.
- If appendices form part of the assignment, they will be included in the word count unless the instructions for the specific assignment state explicitly otherwise (e.g. dissertations – refer to the dissertation handbook for your course for specific guidance on the use of appendices in dissertations).

The following will not be included in the word count:

- Assignment title
- Author name/examination code
- Page numbers
- Reference lists
- Footnotes, but only when used to reference primary source material
- Figures captions and table titles. A figure caption or table title should be restricted to a succinct description of the figure or table to which it refers. Figures and tables themselves are not counted as part of the assignment length

All other material not covered in the above lists will be included in the word count unless the instructions for the specific assignment state explicitly otherwise.

If you have any doubts about this, please check with the course lecturer/convenor.

ALL coursework essays MUST be handed in between **11.00-12.00 noon** (unless otherwise specified) on the due date, to room G03 Pearson building and via Moodle for TurnItIn® (see details below). **It is your responsibility** to ensure that work is submitted on time; please do not entrust your work to other students for delivery. It should never be left in staff pigeonholes; work that is left for a member of staff to collect will be counted as not having been submitted.

Please note that:

i) A penalty of 5 percentage marks should be applied to coursework submitted the calendar day after the deadline (calendar day 1).

ii) A penalty of 15 percentage marks should be applied to coursework submitted on calendar day 2 after the deadline through to calendar day 7.

iii) A mark of zero should be recorded for coursework submitted on calendar day 8 after the deadline through to the end of the second week of third term. Nevertheless, the assessment will be considered to be complete provided the coursework contains material than can be assessed.

iv) Coursework submitted after the end of the second week of third term will not be marked and the assessment will be incomplete.

v) Coursework submitted after solutions have been released will receive a mark of zero, and may not be formally marked, even when the coursework was submitted within seven calendar days of the deadline. Nevertheless, the assessment will be considered to be complete provided the coursework contains material that can be assessed.

vi) In the case of dissertations and project reports submitted more than seven calendar days after the deadline, the mark will be recorded as zero but the assessment would be considered to be complete.

vii) Where there are extenuating circumstances that have been recognised by the Board of Examiners or its representative, these penalties will not apply until the agreed extension period has been exceeded.

vii) In the case of coursework that is submitted late and is also over length, only the lateness penalty will apply.

Extensions are authorised by the Chair of the Board of Examiners; they are normally **only** granted for illness of some other **serious** reason. If you wish to seek an extension you should contact the Department Office (Pearson G02) and speak to Lyn Hollyman. You may be required to complete a special circumstances form and will have to provide medical evidence where appropriate. Coursework for which an extension has been granted should be submitted to the Geography Office by the date of the extension and via Moodle.

Computer or printer problems are not acceptable grounds on which to seek an extension. You should **always** keep backup copies of files and also paper copies of draft course papers. If all else fails, these, or hand written notes, should be submitted by the deadline indicated and the course tutor or chair of the board of examiners should be informed of the problem.

Never assume that an extension will be granted retrospectively. You need to inform us as soon as any circumstances that might lead to an extension request arise.

5. Grievances with the examination process

Any grievances with the examination process should be addressed to the first instance to the Chair of the Board of Examiners. Formal representations to the university are only considered if there appear to be genuine grounds for review of the result of the examination concerned. Representations on the grounds that the examiners' assessment of the performance of the candidate in the examination was incorrect, or against academic decisions properly arrived at in accordance with approved procedures, will not be considered.

6. Over-reliance and plagiarism

It is a form of cheating to present the work of others as if it is your own work. Copying the work of others in its entirety or in part, without acknowledgement and without the use of

quotation marks, is referred to as PLAGIARISM. It does not matter whether the work you copy is published (as part of a book or an article) or unpublished (a research report, a planning document, a web page or an essay submitted by somebody else at some time in the past), copying is still cheating. It is also unacceptable to **SELF-PLAGIARISE** by submitting the same piece of work or sections of work for two different assessments. Quotes from your own or other peoples' work must be clearly identified as such by being placed inside "quotation marks". However, direct quotations should be used very sparingly and it is much better to paraphrase appropriately and to include the appropriate citation of the original source. Module assignments and exam essays will be screened for plagiarism using Turnitin. Students are advised to consult the plagiarism guidelines that are available at http://www.ucl.ac.uk/current-students/guidelines/plagiarism

Submission of coursework

Students are required to submit a copy of their coursework by **hard copy** as well as an **electronic copy** submitted to TurnItIn® via Moodle. Deadlines for submission of the electronic and hard copy of coursework are the same.

When submitting the **hard copy** of each piece of coursework, you will have to sign a form to:

1. Confirm that you understand the meaning of plagiarism and that you may be penalised for submitting work that has been plagiarised.
2. Confirm that any work submitted is your own unaided work and that all sources used in its preparation and all quotations are clearly cited.
3. Confirm that all work will also be submitted electronically and that this can be checked using the JISC detection service, TurnItIn®.
4. Confirm that you understand that the work cannot be assessed unless you have handed in both hard copy and electronic versions.

You will need to submit a copy of your work electronically as a single file in one of the following formats: Microsoft Word (.doc), PDF, Postscript (.PS), HTML, RTF or plain text.

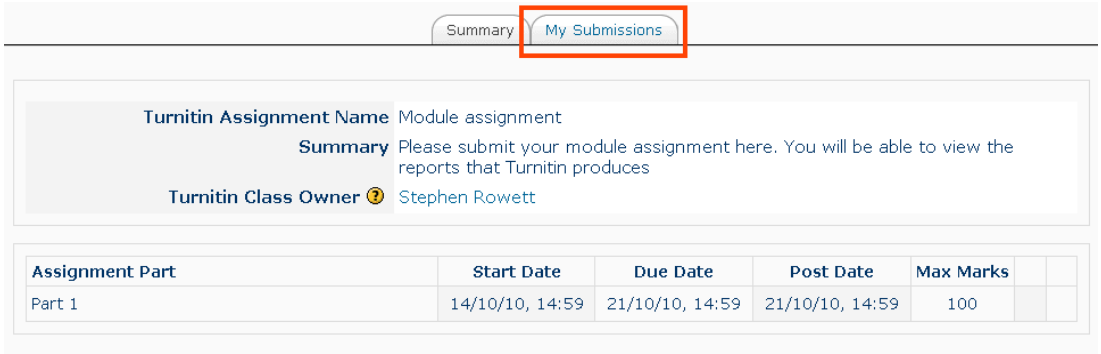
Any student who submits a hard copy that is different from the electronic version risks failing their degree, as this will be considered evidence of intention to cheat.

How to submit work to Turnitin via Moodle

Step 1:

Access the relevant Moodle course page and find the correct assignment, such as the one shown below. Click on the assignment. You will see instructions and the date that it is due:

Step 2:
Click on the **My Submissions** tab:



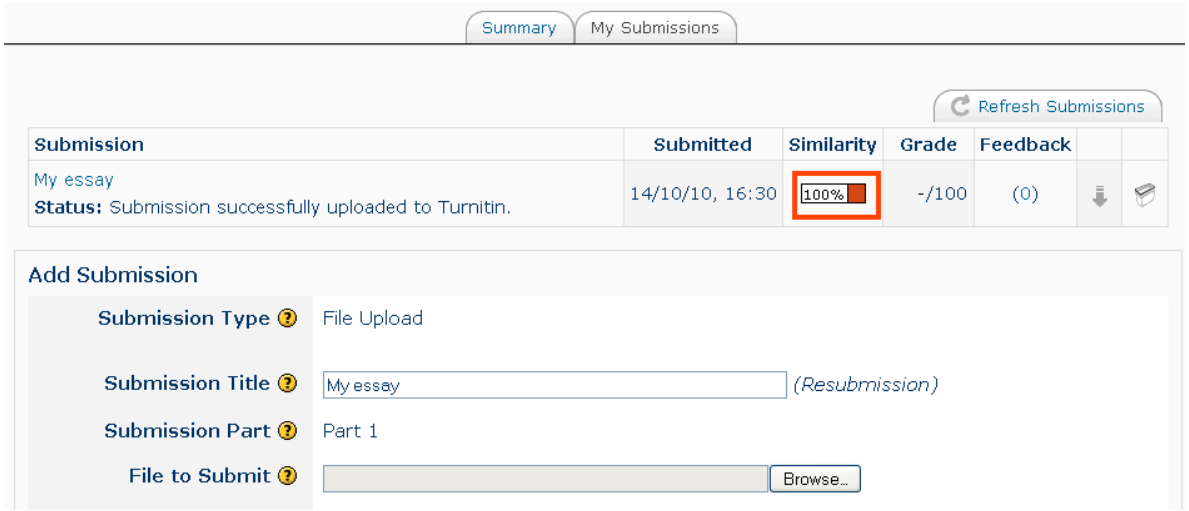
Step 3:

Enter a title for your assignment and click **Browse** to find the file on your computer. Read the declaration carefully, and if you confirm all of the points listed, then click the check box next to it. Finally click **Add Submission** to upload your work.

Once your submission has been accepted, you will receive a digital receipt of your submission by email. Make sure you keep this.

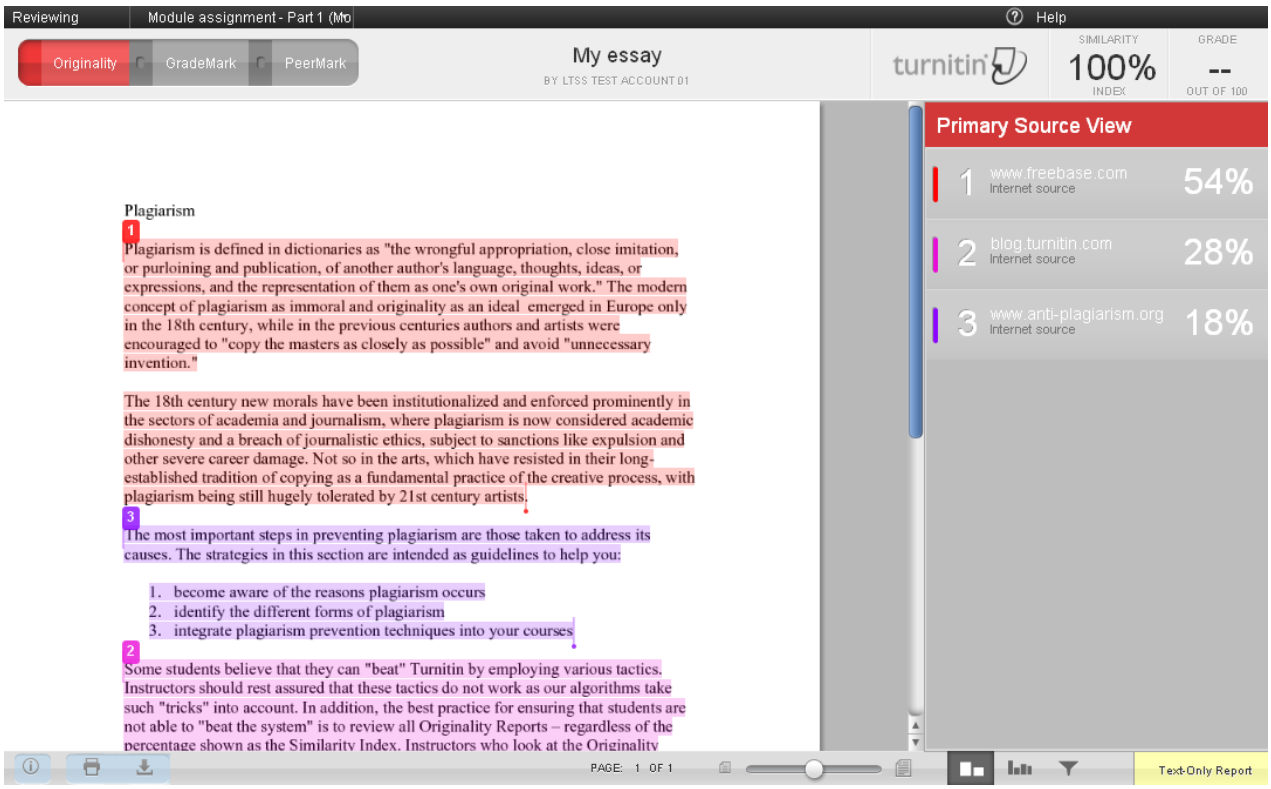
Step 4:
You will then see this screen (see overleaf), although the Similiarity will just show as 'Pending' until the report is completed. It normally only takes a minute or so, so click on 'Refresh submissions' to check if it is available.

The number in the similarity score (in this case 100%) shows how much of your work Turnitin has matched against other sources – but a number above 0% doesn't automatically mean that it is plagiarism. Click on your similarity score to view your full Turnitin report.



You should be allowed to resubmit again before the deadline.

In the unoriginality report (example below) you can see the work you submitted with colour-coded sections highlighting where Turnitin has identified a match from another source. The details of the match (e.g. the website, journal or student essay) are shown on the right. In this document there are three matches that Turnitin has found, covering all of the student's essay – hence the similarity score of 100%



Interpreting the unoriginality score and report

There are a number of things to note when interpreting your unoriginality score and report.

- The score that you receive and any matches found in the report do not automatically indicate that you have committed an offence of plagiarism. For example, if you have included quotes in your document, these may show up as matching the original sources and count towards your unoriginality score. However, provided they are correctly referenced they are perfectly legitimate in academic writing and are not an example of plagiarism.

- If your document includes references, it is very common for them to show as matches and count towards your unoriginality score, simply because another source has used the same reference as you. Again, simply having references that are the same as those used by other sources does not indicate plagiarism.

- There is no particular score to aim for – a high score does not necessarily indicate plagiarism and a low score does not necessarily indicate original work. Do not try to aim for the lowest score possible, instead aim to make sure that you are using your sources correctly and referencing the work you use.

- Some common phrases and short pieces of text (typically 5-10 words) may show as matches just because they are in common usage. Unless they are particularly relevant phrases in your subject or have a particular relevance to your work that you wish to emphasise, they do not need to be referenced.

If you do find matches in your document:

- Where you have copied text from a source word-for-word, ensure you are using quotation marks around the copied text and that the source is correctly referenced.

- Where you are paraphrasing from a source, ensure that you have NOT copied the text word-for-word and that the source is correctly referenced.

In advance of the deadline you are allowed to amend your work based on your Turnitin report, and then re-submit the assignment. You will need to wait 24 hours after the first draft submission before you can see your new originality report. Therefore, you must make sure that you submit your draft to Moodle at least 24 hours before the coursework deadline if you wish to see an unoriginality report before you submit your final version.

Assessment Criteria

All work is marked using on a percentage scale, from which your final classification of degree is calculated. Feedback through the year will either use a percentage or an alpha grade scale (usually until the work has been double marked and moderated by the external examiner). The following table explains the broad criteria used for assessment, and the equivalence of these marking systems. Please note this is a guideline only as criteria for assessment may vary according to the assignment set. Please consult module convenors for further information about assessment criteria for individual assignments.

	Classification/Mark	Guidelines
Distinction	Distinction: *Outstanding* 90-100%	Surpasses the standards associated with the 80-89% level. Outstanding contribution to the discipline, which, with minor changes, is publication quality, in terms of content, approach, critical insight and presentation.
	Distinction: *Excellent* 80-89%	Surpasses the standards associated with the 70-79% level. Superior work that demonstrates clear, independent thinking beyond taught elements of the programme/module. Excellent, critically perceptive and detailed contribution.
	Distinction 70-79%	Distinction level that demonstrates clarity, exceptional understanding, analytical ability and critical thought, which are achieved through and evidenced by extensive reading, comprehensive analysis, original insights and thorough interpretation.
Pass	Pass: *Merit* 60-69%	Clear understanding of the topic, and a well organised and informed approach. Evidence of good analytical skills, critical thinking and a logical argument, but does not display the critical acuity or originality of distinction level work.
	Pass 50-59%	Overall satisfactory pass that presents some competent reproduction of ideas/concepts and demonstrates a general understanding, but is limited in terms of context and wider reading, and the lack of critical approach and independent evaluation.
Fail	Fail: *Marginal* [May become a condoned pass] 40-49%	Shows some understanding of the topic and broader discipline, but provides little evidence of detailed knowledge and wider reading, and/or not sufficiently focused on the subject area.
	Fail 30-39%	Presents a muddled or incomplete attempt that shows a partial understanding of the topic, but poor or limited and uncritical consideration of material.
	Fail: *Serious* 0-29%	Fundamental lack of understanding of the topic and the context of the work required. Very poorly expressed and presented, with inadequate analysis and interpretation.

Teaching and Research Resources

Wider Participation in the UCL academic community

The Department of Geography, UCL admits over 120 Masters students annually and over 60 PhD students. This gives rise to a vibrant postgraduate community and access to well-established procedures/facilities including induction/training programmes and excellent teaching facilities/IT access. In particular, MSc Climate Change benefits from close collaboration with the MSc Environmental Modelling with a shared core course (Global Environmental Change) and various common options. Option courses are also shared with MSc programmes in Aquatic Science, Conservation and Environmental Mapping.

MSc Climate Change students are encouraged to attend other relevant lectures and seminars from the wide range of programmes in and around UCL. Seminar programmes and meetings of interest include the UCL Geography Research for the Environment lunchtime seminar series, and the UCL Environment Institute Water and Climate seminar series.

Facilities

Students have access to world class library resources, including the central collections of the University of London and UCL library systems and Departmental collections of key papers, unpublished reports, and teaching resources. The UCL Geography Department is home to specialist laboratories for water chemistry, sediment analysis, and microscopy with associated technical support as well as the new SRIF I and II funded Bloomsbury Environmental Isotope Facility (BEIF), which provides state-of-the-art facilities for mass spectrometry and gamma spectrometry.

Excellent computational resources are available to support work in environmental modelling Geography Department has a network of about 40 multi-user Linux (RedHat) workstations with high quality LCD monitors and a total data storage capacity of >20Tb. The Department has the usual peripherals including A4 PostScript laser printers, an A3 colour scanner and printer and a selection of backup devices. It is possible to access the UCL Windows Terminal Server (WTS) system via the Solaris and Linux workstations. Some of the Geography machines are available via secure shell networking from outside UCL so many applications can be run remotely. The Department also has a number of open-access computer rooms for students with numbers of PCs connected to the UCL managed PC system. The Geography Department also has access to the Chorley Institute 100 cpu Linux cluster for large processing and modelling tasks. UCL's main linux cluster (a 5728 core machine called Legion with a ~200TB Lustre file-system) is also available.

Software includes FORTRAN, C, C++ and Prolog programming languages, and a wide range of free/open-source scientific software. We have a site licence for MATLAB (including virtually all the toolboxes) ERDAS Imagine and Arc/GIS. There are also some 20 licenses for IDL/ENVI. Specialist modelling packages include FVCOM, Telemac, RMA-2, SMS, SWAN (hydrodynamics), Mike-SHE (hydrology), and Stella (system modelling).

Health and Safety

Sources of Information
All MSc Climate Change students, at the start of their course, should read the Geography Departmental Safety Policy at:
http://www.geog.ucl.ac.uk/safety

and UCL Safety Office statements at
http://www.ucl.ac.uk/estates/safetynet/

Safety Issues and Fieldwork: A full risk assessment must be carried out prior to every piece of research.

Statement of safety policy for the Department of Geography:

1. The policy of the Department is to promote the safety, health and welfare of all its staff, students, visitors, contractors and members of the public on the Department's premises and to protect them elsewhere from any adverse effect on their health or safety arising from the activities of the Department.
2. The Department is committed to ensuring that risk assessments are carried out as required by the Management of Health and Safety at Work Regulations 1992 and other regulations. These risk assessments will be made by the staff responsible for the work, set out in writing and signed by the relevant manager or supervisor. No work is permitted to start unless it is covered by a suitable and sufficient assessment of the risks involved in the work.
3. The Department arranges for all work activities to be performed by persons competent to perform those activities. To this end, the Department is committed to ensuring that all members of the Department receive such training as required for them to be able to discharge their tasks and duties in a competent manner.
4. The Department arranges for staff activities and work activities to be supervised by competent people.
5. A person can only be competent in discharging a duty if they accept that duty, understand the responsibility of that duty and are allocated sufficient time to be able to discharge that duty.
6. The Department is a Department of University College London, and as such is responsible to the Provost, through the Management Team, for the implementation of the arrangements in the College Statement of Safety Policy.
7. It is a legal duty for all staff, students and visitors in the Department to co-operate with the arrangements for safety set out in this document.
8. To give effect to this policy, the organisation and arrangements as described in this document have been approved and authorised by the Head of Department upon whom rests the ultimate responsibility for the standard of safety within the Department.
9. This policy is intended to reflect the current state of affairs within the Department. To this end, it will be revised upon any substantial change of organisation or arrangements within the Department, and in any case, annually. This policy and its revision will be communicated to all persons affected by the activities of the Department.

The following members of staff have primary responsibility for Health and Safety arrangements in the Department of Geography:

Title	**Name**	**Telephone**
Head of Department	Prof. JR French	3 0580
Departmental Radiation Protection Supervisor	Dr JR Thompson	3 0589
Departmental Safety Officer	Ms. J. Hope	3 0551

The following UCL Safety Office Representative is the primary Area Safety Officer assigned to the Department:

Ms. E. Clarke elaine.clarke@ucl.ac.uk 6363

Fire Safety Information

In the interest of safety all staff and students in the **Pearson Building** of the Department of Geography are asked to follow this procedure.

When the fire alarm bells sound:

1. Close all windows and doors.

2. If it does not interfere with experiments in progress:

   (a) stop all machinery;
   (b) switch off electrical supplies to equipment; and
   (c) turn off gas supplies and gas cylinders.

3. DO NOT use the lifts.

4. Leave the premises by the nearest fire exit or staircase that is free from smoke.

5. On leaving the premises, assemble in **the front quad**. Do not stand in the roadway or obstruct exits.

   On each floor Fire Wardens have been appointed, their main duties are:

a) to ensure as far as possible, taking due regard of their own safety, that all personnel under their control leave the building speedily and safely;

b) to report to the Departmental Safety Officer at the assembly point when they leave the building.

Staff and students in **26 Bedford Way** should follow the same steps as those listed above in the event of a fire. On leaving the premises assemble in **Woburn Square,** beyond the rear access**.**

Staff and Students should, in their own interest, make themselves familiar with all fire exits, and should not rely on Fire Wardens being present.

YOUR SAFETY DEPENDS ON YOUR CO-OPERATION

Fees and Funding

Fees
Tuition fees for full time UK/EU students for 2013-14 are £8,250. Fees for full time overseas students for 2013-14 are £16,250. For further information on fees and costs, please visit the UCL web pages at www.ucl.ac.uk/prospective-students/graduate-study/fees-costs.

Funding
Full information on a variety of sources of funding for graduate study can be obtained via the UCL Admissions Scholarships homepage

Overseas Students
You are also strongly encouraged to contact your own Ministry of Education or Education Department, who will have details of most funding schemes and who will be able to advise you of your own government's conditions for studying abroad. You should also contact the nearest British Council office in your own country, which will have details of scholarship schemes and provide information and advice on educational programmes and living in the UK. If there is no British Council office, then contact the nearest British Embassy, High Commission or Consulate. There is additionally funding available from sources such as the World Bank, the Asian Development Bank, African Development Bank and the European Commission, whom you should contact directly.

Admission Requirements

Potential applicants are expected to have a first or upper second-class Honours degree in a relevant discipline (e.g. oceanography, marine studies, geography, civil engineering, earth or environmental science, meteorology, mathematics, and physics) from a UK university or an overseas qualification of an equivalent standard. Applicants with relevant professional experience in climate science or environmental management may also be considered. Formal qualifications in mathematics are not a prerequisite for entry, but students are expected to have an aptitude for mathematical studies and if necessary to undertake revision prior to the start of the programme.

Application for 2013-14 admission closes Friday August 2nd. We will not accept any applications after this date. Applicants who require a student visa should do their utmost to submit the programme application form before 31st July to ensure that there is enough time to process all the necessary paperwork.

Students whose first language is not English must be able to provide recent evidence that their spoken and written command of the English Language satisfies the UCL English language proficiency requirement. Necessary grades for IELTS and TOEFL are:

International English Language Testing System (IELTS) Academic
Standard level: Overall grade of 6.5 with a minimum of 6.0 in each of the subtests.
Good level: Overall grade of 7.0 with a minimum of 6.0 in each of the subtests.
Advanced level: Overall grade of 7.5 with a minimum of 6.5 in is each of the subtests.

Test of English as a Foreign Language (TOEFL)
Paper based version
Standard level: Score of 580, plus 4 in Test of Written English (TWE).
Good level: Score of 600, plus 5 in Test of Written English (TWE).
Advanced level: Score of 630, plus 5 in Test of Written English (TWE).

Internet based version
Standard level: Score of 92, plus 24/30 in the reading and writing subtests and 20/30 in the listening and speaking subtests.
Good level: Score of 100, plus 24/30 in the reading and writing subtests and 20/30 in the listening and speaking subtests.
Advanced level: Score of 109, plus 24/30 in the reading and writing subtests and 20/30 in the listening and speaking subtests.

Careers Service

Maximise your chances of landing an attractive job or academic position after your degree by getting involved early on in UCL's extensive careers and employer skills programme. The Careers office has put together a handy 5-step guide to get you off to a flying start. They have developed a webpage at http://www.ucl.ac.uk/careers/students/department specifically for geographers, but remember that this MSc course also opens up career options traditionally targeted at Earth Science graduates

At UCL you will be given every opportunity to gain skills and experience that will make you stand out in future applications. Key programmes include Education for Global Citizenship, Key Skills, and the Skills4Work programme. If you have any questions, please get in touch, and we hope you have a rewarding time at UCL.

The UCL Careers Service
www.ucl.ac.uk/careers
4th Floor, ULU Building, Malet Street, London, WC1E7HY
careers@ucl.ac.uk , 020 7866 3600

Career opportunities

The MSc Climate Change provides an ideal foundation for PhD research, or for employment with environmental monitoring and protection agencies, industry and environmental consultancies. Student dissertations may be undertaken in collaboration with external organisations. In this way, students receive regular and direct contact with potential employers and in turn gain a good knowledge of the requirements and challenges associated with alternative careers. During term 3, students are also encouraged to arrange informal careers discussions with their dissertation supervisors and the course champion.

Further Enquiries

Application materials may also be downloaded at:
http://www.ucl.ac.uk/prospective-students/graduate-study/index/graduate-study/application-admission

Academic enquiries may be addressed to geog-climate@ucl.ac.uk