UNIVERSITY OF BIRMINGHAM

School of Geography, Earth and Environmental Sciences

Guide to Module Choices for Incoming Exchange Students

2019/20

Introduction

Please find enclosed module information for the Academic Year 2019/2020. This booklet includes all available modules that are available to incoming International Students from The School of Geography, Earth and Environmental Sciences (GEES).

Credits

If a student is here for one semester they should take 60 credits[1]. If a student is here for a full year they should take 120 credits. Students who are here for both semester 1 and 2 should ideally take 60 credits in each semester.[2]

Selecting Appropriate Modules

Incoming students may take modules that are aimed at first year students, second year students and third year students.

Please note: *Year 1 = Level C Year 2 = Level I Year 3 = Level H*

Students must check that their Home University is happy with their module selections. The responsibility is with the student.

Non-GEES Modules

Students may take modules from other schools if their home university permits this and if it is compatible with the student's timetable. However, it is the student's responsibility to find out whether the timetables are compatible, and to get in touch with different tutors in each school to make such arrangements possible.

Please note:

- Students that are here for only one Semester, are advised to take the 10 credit version of their chosen module(s) (where available).

- If no 10 credit version is available, and students are only in attendance for Semester 1, an alternative assessment will be offered in place of any examination in Semester 2.

- Additional modules are available at level M (Masters). However, it should be noted that Masters level modules have different assessment Regulations to Undergraduate. Please contact the School direct.

- There may be timetabling constraints with some module combinations where students have selected across different levels. Should this be the case, students will be asked to choose alternative module(s) following the publication of the Provisional Timetables.

[1] Exceptions to this need to be agreed with the student's Home University.

[2] 20 Birmingham Credits = 10 ECTS Credits

Year 1 Modules (Certificate Level) - All Programmes

Banner Code	Module Code/Title	Credits	Sem
Earth Science Modules			
03 29992	ESCM101 Earth Systems	20 credits	Both
03 27562	ESCM101 Earth Systems	10 credits	Sem 1
03 29208	ESCM139 Dynamic Solid Earth	20 credits	Sem 1
03 29210	ESCM140 Structural Geology	20 credits	Both
03 29202	ESCM141 Earth History and Life	20 credits	Sem 2
03 29209	ESCM142 Petrology, Volcanology & Geochemistry	20 credits	Both
03 29991	ESCM143 Earth & Environmental Systems	20 credits	Both
Geography and Environmental Science Modules			
03 23434	GGM101 Contemporary Human Geography	20 credits	Both
03 26642	GGM101 Contemporary Human Geography	10 credits	Either
03 23436	GGM103 Global Environmental Issues	20 credits	Both
03 27622	GGM103 Global Environmental Issues	10 credits	Either
03 30024	GGM110 Environmental Research Frontiers	20 credits	Both
03 30019	EVS116 From Molecules to Materials: Deconstructing the Environment	20 credits	Both
03 30018	EVS117 Environmental Science Research Frontiers	20 credits	Both
Planning Modules			
08 27026	URS101 Planning of the Built Environment: History & Evolution of Urban & Regional Planning	20 credits	Both
08 10800	URS101 Planning of the Built Environment: History & Evolution of Urban & Regional Planning	10 credits	Either
08 03434	URS102 Society, Space and Policy	10 credits	Sem 1
08 03133	URS103 Economy, Space and Policy	10 credits	Sem 2
08 27805	URS105 Planning in Action	10 credits	Sem 2

Year 2 Modules (Intermediate Level) - All Programmes

Banner Code	Module Code/Title	Credits	Sem
Earth Science Modules			
03 00538	ESCM203 Applied Geophysics	10 credits	Sem 1
03 20959	ESCM204 Continental Deformation	10 credits	Sem 2
03 24064	ESCM209 Sedimentology	20 credits	Both
03 26568	ESCM209 Sedimentology	10 credits	Either
03 29997	ESCM264 Igneous & Metamorphic Petrology	20 credits	Sem 2
03 29998	ESCM265 Resources and Hydrogeology	20 credits	Both
03 30000	ESCM266 Resources and the Environment	20 credits	Both
Geography and Environmental Science Modules			
03 19219	GGM203A Statistical Methods for Geographers	10 credits	Sem 1
03 24358	GGM203B Geomatics	10 credits	Sem 2
03 23438	GGM205 Environmental Assessment & Management	20 credits	Both
03 26502	GGM205 Environmental Assessment & Management	10 credits	Either
03 18180	GGM207 Hydroclimatology: climate and water	20 credits	Both
03 18182	GGM214 Ecological Systems	20 credits	Both
03 27623	GGM214 Ecological Systems	10 credits	Either
03 27798	GGM225 Cultural and Development Geographies	20 credits	Both
03 26663	GGM225 Cultural and Development Geographies	10 credits	Either
03 23142	GGM226 Social and Political Geography	20 credits	Both
03 26661	GGM226 Social and Political Geography	10 credits	Either
03 27827	EVS229 Environmental Pollution	20 credits	Both
03 29461	EVS229 Environmental Pollution	10 credits	Either
03 27800	GGM231 Economic Geographies: cities & regions	20 credits	Both
03 28665	GGM231 Economic Geographies: cities & regions	10 credits	Either
03 30971	GGM232 Geomorphology & Palaeoenvironments	20 credits	Both
03 30814	GGM233 Catchment Water Management	20 credits	Both

Year 3 Modules (Honours Level) - All Programmes

Banner Code	Module Code/Title	Credits	Sem
Earth Science Modules			
03 24059	ESCM308 Petroleum Geoscience	20 credits	Sem 2
03 10820	ESCM319 Evolution of Vertebrates	20 credits	Sem 2
03 29212	ESCM323 Engineering Geology and Hydrogeology	20 credits	Sem 2
03 29214	ESCM329 Geological Natural Hazards	20 credits	Both
03 29231	ESCM341 Tectonic & Magmatic Processes	20 credits	Both
03 29299	ESCM343 Evolutionary Palaeobiology	20 credits	Sem 1
03 29996	ESCM345 Palaeoclimates	20 credits	Sem 2
03 32166	ESCM352 Sustainable Resource Geology	20 credits	Both
Geography and Environmental Science Modules			
03 23395	GGM305 Environment & Landscape Change	20 credits	Sem 1
03 25908	GGM308 Wetland Environments	20 credits	Sem 1
03 19216	GGM310 Weather, Climate & Society	20 credits	Sem 1
03 19134	GGM312 Landscape & Urban Ecology	20 credits	Sem 2
03 19136	GGM314 Applied Micrometeorology	20 credits	Sem 2
03 27192	GGM317 Biodiversity & Conservation Management	20 credits	Sem 1
03 27621	GGM317 Biodiversity & Conservation Management	10 credits	Sem 1
03 27193	GGM332 Cultural Geographies of Development	20 credits	Sem 1
03 25907	GGM337 War and Peace in the Middle East	20 credits	Sem 2
03 27196	GGM338 Understanding Nature-Society Relations: the Ecological Century	20 credits	Sem 1
03 26337	GGM339 Environmental Justice	20 credits	Sem 1
03 23433	EVS341 Environmental Protection	20 credits	Both
03 26490	EVS341 Environmental Protection	10 credits	Either
03 30021	EVS342 Climate Change in the Earth System	20 credits	Sem 2
03 21780	GGM342 Environmental Governance	20 credits	Sem 2
03 26374	GGM348 Remote Sensing of the Cryosphere	20 credits	Sem 2
03 24061	GGM349 River Processes, Deposits & Environments	20 credits	Sem 1
03 28684	GGM351 Carceral Geographies	20 credits	Sem 2
03 24969	GGM353 Welfare, Work & Wealth	20 credits	Sem 1
03 30050	GGM358 Geographies of the Body	20 credits	Sem 1
03 30051	GGM359 Russia in a Global Context	20 credits	Sem 1
03 30810	GGM360 Cities and Conflict	20 credits	Sem 2
03 30812	GGM361 The Political Economy of Agrarian Change in the Global South	20 credits	Sem 2
03 30813	GGM362 Urban Analytics and Geospatial Analysis	20 credits	Sem 2
03 32050	GGM363 Urban Environments in the Global South	20 credits	Sem 1
03 32088	GGM364 Extractive Politics	20 credits	Sem 2
Planning Modules			
08 10698	URS305 Contemporary Issues in Urban Development & Planning	20 credits 20 credits	Both* Both*
08 22865	URS306 Regenerating Urban Communities	20 credits	Both**

**May also be taken in Semester 1 only but remains at 20 credits*

***May also be taken in either semester 1 or 2 but remains at 20 credits*

Year 4 Modules (Masters Level)

PLEASE NOTE THAT THE PASS MARK FOR ALL 4TH YEAR MODULES IS 50%

Banner Code	Module Code/Title	Credits	Sem
Earth Science Modules			
03 24681	ESCM424 Inorganic Chemistry and Groundwater	10 credits	Sem 1
03 24680	ESCM426 Environmental Geophysics	10 credits	Sem 1
03 24881	ESCM428 Groundwater Organic Contaminant Pollution & Remediation	20 credits	Sem 2

Additional modules are available at Level M (Masters). However, it should be noted that Masters level modules have different assessment regulations to undergraduate. Please contact the school direct.

Year 1: all Programmes

Module Information

03 29992	**ESCM101**	**Earth Systems**	**20 credits**
Level: C	**Semester: 1 & 2**	**Module Leader: Paul Anderson**	
NB: A 10-credit version of this module (03 27562), that can be taken in Semester 1, is available. Please contact the School.			
Description:	This module explores the Earth as a system of interconnected geological processes. Focus is placed on fundamental aspects of Earth Sciences and how knowledge of these underpins understanding of the overall Earth system. Major themes are 1. Earth in Context, 2. Earth's Mineral Wealth, 3. Geochemistry, 4. Sedimentary Processes & Rocks and 5. Climates of the Past. Within each of these broad themes important research questions are addressed and unpacked by working from first principles, thus instigating the transition of students into researchers. Both the specific themed content within this module and the overall systems approach provide a foundation for later LI and LH/M modules.		
Learning Outcomes:	By the end of the module the student will be able to: • Understand that the Earth represents a system of interconnected geological processes • Distinguish processes involved in the formation of igneous, metamorphic and sedimentary rocks Interpret geological processes using evidence from rock/mineral samples and geological data • Use evidence from the geological record to assess past climates and climatic change • Recognise key research questions across the Earth science discipline. • Critically analyse geological research theories and conceptualisations. • Balance chemical equations and use stoichiometry, the periodic table, and the concept of moles to perform basic calculations. • Understand key concepts such as the pH scale and equilibrium reactions • Appreciate the effects of thermodynamics and kinetics on chemical reactions • Understand key controls on mineral solubility, precipitation, dissolution • Trace the biogeochemical cycling of carbon through the Earth system • Understand basic redox chemistry and the role of microbes in biogeochemical systems • Calculate residence times and understand their importance in natural systems • Show a basic understanding of stable isotopes and how they can be used as tracers of process • Perform calculations related to fluid mixing • Trace the biogeochemical cycling of carbon and other critical rock-forming elements through the Earth system		
Assessment:	Assessments: January multiple choice/short answer exam(s) (for Earth in Context, Mineral Wealth + Geochemistry) (50%) - could be run as 2 or 3 separate exams Summer multiple choice/short answer exam (s) (for Sedimentary Processes, Climates of the Past and Earth in Context (2)) (50%) - could be run as 2 or 3 separate exams		

03 29208	**ESCM139**	**Dynamic Solid Earth**	**20 credits**
Level: C	**Semester: 1**	**Module Leader: Marco Maffione**	
Description:	The evolution of the Earth's crust and mantle over geological time involves a variety of dynamic processes including the generation and evolution of magma and tectonic processes that drive deformation and mountain building. This module provides essential level C introduction and grounding in crystallography, mineralogy, tectonics, structural geology, volcanology and igneous and metamorphic petrology. Key skills include identifying and describing structures, tectonics, map interpretation, thin section petrography, igneous and metamorphic petrology and geochemistry.		
Learning Outcomes:	By the end of the module students should be able to: • Understand the relationship between stress and strain. • Identify and interpret basic geological structures. • Interpret basic geological maps. • Measure and plot structural data stereographically. • Understand the solar system and interstellar objects. • Understand basic transmitted light microscopy. • Understand basic mineralogy and crystallography. • Understand and identify the main mineral groups and igneous rock types. • Understand the fundamentals of igneous and metamorphic petrology. • Understand the fundamentals of magmatic evolution using geochemical data. • Understand the principles of tectonics		
Assessment:	Practical class test (microscope) - 2 hours (50%); Theory class test (MCQ) - 1.5 hours (50%)		

03 29210	**ESCM140**	**Structural Geology**	**20 credits**
Level: C	**Semester: 1 & 2**	**Module Leader: Marco Maffione**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	Structural geology is concerned with the geometry and distribution of rocks in the subsurface and is therefore absolutely crucial for any applied aspect of geology and geosciences. The field of structural geology includes analyzing how rocks deform, flow and are transported due to tectonics and other forces. Therefore several types of quantitative analyses are important to help to understand the strain and tectonic history of rocks and interpret their tectonic setting. This module provides an introductory level grounding in structural geology, deformation, rheology and tectonics at a university level. It covers geological structures and tectonics at a variety of scales and uses map interpretation and practical experiments as the main practical component. Topics include identifying and understanding geological structures, the basis and origins of plate tectonics theory, geological map interpretation, identifying various structures from maps, plotting structural data stereographically, stress and strain analysis and deformation processes and rheology. The module is delivered through a combination of lecture, practical and hands-on lab classes where analogue geological processes are tested and the relevant concepts explored.		
Learning Outcomes:	By the end of the module students should be able to: • Identify and understand key geological structures. • Understand the basis of plate tectonics. • Interpret geological maps. • Plot and read stereonets. • Understand the relationship between stress and strain. • Carry out basic strain analysis.		
Assessment:	Practical exam – 2 hours (50%) Theory exam (mainly short answer and MCQ) – 1.5 hours (50%)		

03 29202	ESCM141	Earth History and Life	20 credits
Level: C	**Semester: 2**	**Module Leader: Ivan Sansom**	
Description:	The module focusses on how planet Earth has changed physically and biologically through geological time and introduces the principles of stratigraphy and palaeontology. The concepts of deep-time and the geological timescale are developed and provide a fundamental framework for studies in Geological and Earth Sciences. Through lectures, case studies are presented from the geological timescale that address key events in Earth history including the plate tectonic and palaeogeographic history of the planet, the development of global biogeochemical cycles, profound episodes of evolutionary diversification and extinction, as well as global patterns of climate and environment change through time. Integrating lecture and practical content the module will introduce invertebrate macrofossils and trace fossils, and their modes of preservation, and palaeontological topics dealt with include the classification, morphology and modes of life and geological importance of trilobites, brachiopods, molluscs, graptolites, echinoderms and corals. Trace fossils are dealt with in terms of their classification and evidence for organism:sediment interactions. Delivery methods are based on a combination of 25 lectures focussing on principles of stratigraphy, case studies though Earth History and introductory level palaeontology, and 20 hours of specimen based laboratory classes to provide both theoretical and practical experience of the subject.		
Learning Outcomes:	By the end of the module students should be able to: • Recount the major systems of the geological timescale and understand the principles of stratigraphy and deep-time. • Demonstrate how the planet Earth has changed through geological time as a result of past geological processes. • Explain the relationship between changing climates and geological processes at a global to local scale. • Understand key events in Earth History and link these to likely causal mechanisms. • Identify and classify the commoner types of invertebrate macrofossils and trace fossils. • Describe, in basic terms, the modes of fossil and trace fossil preservation. • Demonstrate how fossils can be used in biostratigraphy. • Use fossils and trace fossils to aid inference of sedimentary environnment and in palaeogeographical reconstruction.		
Assessment:	2 hour written exam (1 seen question, 5 short answer questions) (60%) Practical assessments (40%)		

03 29209	**ESCM142**	**Petrology, Volcanology and Geochemistry**	**20 credits**
Level: C	**Semester: 1 & 2**	**Module Leader: Alan Hastie**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	The module begins with an investigation into the physical and chemical makeup of the primitive solar nebula the solar system, asteroids/meteorites and planets – with emphasis on Earth. Focus then moves onto the planet Earth where the major planetary reservoirs are examined. The discussion begins with the crystals and minerals that represent the "basic building blocks of rocks". Time is spent learning about basic theory about crystallography and mineralogy. The properties of all classes of minerals (including structure and composition) are discussed so that mineral identification can be accomplished in hand specimen. However, particular reference is given to the main rock-forming mineral groups. The module then moves on to the introduction of the petrological microscope whereby the principles of basic petrography are undertaken. This enables the rock-forming minerals to be studied in thin section. After the principles of petrography have been introduced the skill is developed throughout the rest of the module alongside the discussion of basic rock analytical techniques and igneous rock classification. This leads on to the introduction to metamorphism and magmatic processes with an emphasis on the larger impacts of volcanological hazards. The basic knowledge acquired in the first part of the module is now used to understand the mechanisms of magma production across global tectonic settings. Geothermal gradients, decompression, volatile release and high temperature processes are discussed for generating magmas and volcanic products. Basic information about magma ascent and processes operating in magma chambers is also given. Introduction to metamorphic rocks and development of metamorphic textures and metamorphic minerals follows on from knowledge of igneous processes. Major and trace element geochemistry; the use of one- and two-component phase diagrams in understanding magma origins and evolution; applications of radiogenic isotopes are finally used to understand more complex concepts in petrology.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate a basic understanding of the overall chemical composition and structure of the solar system and the Earth and the major processes regulating distribution of the elements. • Identify and describe the common types of igneous and metamorphic rocks and rock-forming minerals. • Understand how mineral properties are controlled by chemistry and structure. • Understand the origin and nature of igneous and metamorphic rocks from source region, to magma chambers to secondary deformational events. • Understand the application of geochemical principles to rock and mineral interpretation. • Be able to interpret magmatic processes through the use of simple phase diagrams. • Use the petrological microscope to identify common primary minerals in igneous and metamorphic rocks. • Understand how the use of major and trace elements and simple radiogenic isotopes can determine the petrogenesis of igneous and metamorphic rocks. • Understand the basic processes involved with magma generation, including geothermal gradients, potential temperatures, decompression and the role of volatiles. • Appreciate tectonomagmatic processes in several geological environments.		
Assessment:	Exam – MCQ (1.5 hr, 60%) Practical in-class test (2 hrs, 40%)		

03 29991	**ESCM143**	**Earth & Environmental Systems**	**20 credits**
Level: C	**Semester: 1 & 2**	**Module Leader: Paul Anderson**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	This module explores the Earth and environment as a system of interconnected geological, geomorphological and biological processes. Focus is placed on fundamental aspects of Earth Sciences and Physical Geography and how knowledge of these underpins understanding of the overall Earth system. Major themes are 1. Earth in Context, 2. Earth's Mineral Wealth, 3. Sedimentary Processes and Rockc, 4. Climates of the Past, 5. Geomorphology and 6. Ecology. Within each of these broad themes important research questions are addressed and unpacked by working from first principles, thus instigating the transition of students into researchers. Both the specific themed content within this module and the overall systems approach provide a foundation for later LI and LH/M modules.		
Learning Outcomes:	By the end of the module students should be able to: • Understand that the Earth and environment can be viewed as a system of interconnected geological, geomorphological and biological processes • Distinguish processes involved in the formation of igneous, metamorphic and sedimentary rocks • Identify, classify and describe the main types of sedimentary rocks • Interpret geological processes using evidence from rock/mineral samples and geological data • Recognise key research questions across the Earth science and physical geography disciplines. • Use evidence from the geological record to assess past climates and climatic change • Critically analyse geological and geographical research theories and conceptualisations. • Implement scientific measurement methods and data assessment approaches. • Clearly and concisely present scientific research findings and concepts in a manner appropriate for the given audience.		
Assessment:	January Canvas MCQ (25%) Summer Canvas MCQ (25%) Coursework Assignments and Module Exam (50%)		

03 23434	GGM101	Contemporary Human Geography	20 credits
Level: C	**Semester: 1 & 2**	**Module Leader: Lloyd Jenkins**	
NB: A 10-credit version of this module (03 26642), that can be taken in either semester, is available. Please contact the School.			
Description:	**Semester 1 :** The course will begin with an introduction of its aims and content and discuss the nature of human geography as an academic discipline. Subsequent sections will consider some current issues and debates in historical geography, environmental geography, urban geography and political geography. **Semester 2:** These sections will consider some current issues and debates in cultural geography, development geography, economic geography, and social geography. The semester will finish with a conclusion to the course, revision meetings and a discussion of the type of exam to be expected.		
Learning Outcomes:	<u>By the end of semester 1, students will</u>: • have achieved a basic understanding of the nature of human geography at degree level • be able to identify some key themes and concepts within human geography's sub-disciplines, with particular reference to historical geography, environmental geography, cultural geography and political geography • understand human geography as a discipline rooted in real-world issues <u>By the end of semester 2, students will</u>: • have achieved a broader understanding of the scope and changing nature of human geography at degree level • be able to identify some key themes and concepts within human geography's sub-disciplines, with particular reference to urban, development, economic and social geography • be able to relate basic conceptual understandings within human geography to real world issues • have established a solid foundation for progression to Level 2 human geography courses		
Assessment:	2000 word essay (33%) Two-hour examination (67%).		

03 23436	**GGM103**	**Global Environmental Issues**	**20 credits**
Level: C	**Semester: 1 & 2**	**Module Leader: Chris Bradley**	
NB: A 10-credit version of this module (03 27622), that can be taken in either semester, is available. Please contact the School.			
Description:	This 20 credit module examines the conflict between the use of natural resources, growing environmental degradation and increasing population. It assesses the difficulties in distinguishing human impacts from natural environmental changes, and examines a number of specific environmental issues grouped within broad inter-disciplinary themes spanning key areas of research excellence in GEES including a selection of: 'Water', 'Environment and Society', 'Climate Change','Forests', 'Environmental Health', 'Urban Environments' and 'Global Challenges'.		
Learning Outcomes:	By the end of the module you will be able to: • Understand the key drivers responsible for global environmental issues • Recognise the nature of short-term and long-term human impacts on the environment • Synthesise the literature to derive an objective assessment on the significance of selected environmental issues.		
Assessment:	2,000 word essay (33%) 2 hour examination, essay style, 2 questions (67%)		

03 30024	**GGM110**	**Environmental Research Frontiers**	**20 credits**
Level: C	**Semester:1 & 2**	**Module Leader: Nicholas Ketteridge**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	This module explores key areas of scientific investigation along the cutting edge of the Physical Geography and Environmental Science disciplines. It instigates the transition of students into research, considering environmental questions of global and regional concern, the theories and concepts that underpin our knowledge base, and state-of-the-art scientific investigations within these areas. It encourages new researchers to explore, apply and critically assess current understanding and consider the direction these disciplines will take into the future to address environmental challenges at varying spatial and temporal scales. This will provide the foundation for researchers to develop future specialisation and expertise within chosen areas of environmental research.		
Learning Outcomes:	By the end of the module students should be able to: • Recognise key research questions across the earth science and physical geography discipline. • Critical analyses environmental research theories and conceptualisations. • Implement scientific measurement methods and data assessment approaches. • Clearly and concisely present scientific research findings and concepts in a manner appropriate for the given audience.		
Assessment:	Assessments: 50% Laboratory/practical notebooks. 50% Multiple choice exam.		

03 30019	EVS116	From Molecules to Materials: deconstructing the environment	20 credits
Level: C	**Semester: 1 & 2**	**Module Leader: Iseult Lynch**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	The module provides an introduction to the fundamental building blocks of matter and how they interact to the provide a habitable and functioning environment. Focus will be on deconstructing the building blocks of the environment in order to understand how they fit together. Theoretical concepts will be introduced in lectures and through online resources, and their application demonstrated within an environmental context through laboratory practicals and in-class problem-solving exercises. In semester 1: Specific environmental and geological topics covered include : The unique properties of water that enable life; the environmental behaviour of specific elements and classes of compounds, including biogeochemical cycles (e.g. nitrogen, phosphorus; mercury etc.); important classes of chemical reactions in the environment, such as acid-base and redox reactions; radioactive decay and the application of stable and unstable isotopes in geochemistry and pollution monitoring; chemistry of rocks, soils and sediments, and natural waters. In semester 2 Environmental topics covered / expanded upon include: The environmental behaviour of specific elements and classes of compounds, including carbon and its compounds, polymers, surfactants, colloids and nanoparticles etc; further important examples of chemical reactions in the environment, such as acid-base and redox reactions as applied in wastewater treatment (for example); chemistry of the atmosphere - anthropogenic inputs.	
Learning Outcomes:	By the end of the module students should be able to: • Understand key concepts such as bonding, reactivity, states of matter, reaction kinetics. • Write/balance chemical equations and use periodic table to calculate formulas, moles etc. • Show an understanding of acid-base and redox reactions, pH, and their implications for environmental and geological processes. • Appreciate the reactivity and structure of selected environmentally important elements & pollutants and understand how they are cycled within environmental compartments. • Show an awareness of common isotopes, radioactive decay processes, and their application to environmental science. • Show a basic understanding of the natural and anthropogenic processes affecting atmospheric, soil and aquatic composition. • Perform prescribed laboratory experiments with a high degree of accuracy and understanding, including analysing and reporting data and the use of data to support a hypothesis.	
Assessment:	Assessments: 1 x laboratory notebook (50%) 1.5 hour Exam (50 %)		

03 30018	**EVS117**	**Environmental Sciences Research Frontiers**	**20 credits**
Level: C	**Semester:1 & 2**	**Module Leader: Nicholas Ketteridge**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	This module explores key areas of scientific investigation along the cutting edge of the Physical Geography and Environmental Science disciplines. It instigates the transition of students into research, considering environmental questions of global and regional concern, the theories and concepts that underpin our knowledge base, and state-of-the-art scientific investigations within these areas. It encourages new researchers to explore, apply and critically assess current understanding and consider the direction these disciplines will take into the future to address environmental challenges at varying spatial and temporal scales. This will provide the foundation for researchers to develop future specialisation and expertise within chosen areas of environmental research.		
Learning Outcomes:	By the end of the module students should be able to: • Recognise key research questions across the earth science and physical geography discipline. • Understand that the Earth and environment can be viewed as a system of interconnected geological, geomorphological and biological processes. • Critical analyses environmental research theories and conceptualisations. • Implement scientific measurement methods and data assessment approaches. • Clearly and concisely present scientific research findings and concepts in a manner appropriate for the given audience.		
Assessment:	Assessments: 50% Laboratory/practical notebooks. 50% Multiple choice exam.		

08 27026	**URS101**	**Planning of the Built Environment: History and Evolution of Urban and Regional Planning**	**20 credits**
Level: C	**Semester: 1 & 2**	**Module Leader: to be confirmed**	
NB: A 10-credit version of this module, (08 10800) that can be taken in either semester, is available. Please contact the School.			
Description:	Urban and regional planning plays a critical role in shaping the nature of the built environment in which we all live. Our towns and cities are constantly evolving and the need to manage this change in order to create much better quality urban environments is critical. The recent transformation of Birmingham City Centre is testament to the important role that planning can play. If you are interested in towns and cities, how they have evolved and why, these modules are for you. A key objective of these modules is the understanding of how cities and planning should be understood today. In the first semester we will examine the roots and the development of planning from its origins up to the present day. Here we will pick up on a number of the themes in the recent BBC2 series The History of our Streets.that will be of relevance to the story of the development of planning. Key texts for this part of the module will be Hall, P (2002) Cities of Tomorrow, Blackwell Publishing (3rd edition) and LeGates, R.T and Stout, F.(eds) (2007) The City Reader, Routledge (4th Edition) In semester 2 we look at the contemporary operation of the planning system and examine the tools that urban planners have at their disposal to help shape the nature of the built environment. Here we will cover key issues such as the spirit and purpose of planning, the organisation and management of the planning system, and how we engage the community in the process. We will also examine key contemporary planning issues such as the impact of localism on planning, climate change, urban design and transport. A key element of the second semester teaching will be the inclusion of planning practitioners who are actively engaged in the delivery of the system.	
Learning Outcomes:	By the end of the module you should be able to: • List the factors that led to the emergence of urban and regional planning as a form of public policy; • Understand what urban and regional planning is and how it impacts on the built environment; • Explain the rationale for establishing urban and regional planning as a form of public policy; • Identify the key contemporary issues in the urban and regional environment; • Demonstrate essay writing skills.		
Assessment:	Poster (20%) 2,000 word essay (30%) 2-hour Examination (50%)		

08 03434	URS102	Society, Space and Policy	10 credits
Level: C	**Semester: 1**	**Module Leader: Austin Barber**	
Description:	This 10-credit module provides an introduction to key concepts underpinning the study of urban development and to the dynamics of social and spatial changes in major cities of Britain, Europe and North America. It explores how major processes of change influence different kinds of cities and the diverse groups within urban society. The context for the course is the apparent *"urban renaissance"* of recent years and new challenges posed by the economic crisis since 2008. Many big cities have enjoyed an impressive economic revival, their centres have undergone striking physical transformations and their populations have been growing for the first time in decades. But these changes are creating new social complexities that are reflected in patterns of urban development and in new challenges for urban planners and policy makers. These pressures have been compounded by the severe economic downturn that took hold in 2008.		
Learning Outcomes:	By the end of the course students should be able to: • Demonstrate an understanding of key concepts relevant to the analysis of socio-spatial change in contemporary cities • Explain the broad social and spatial processes of change influencing the development of cities in Britain, Europe and North America • Use the skills of essay writing and research to analyse the differential impact that these social and spatial processes are exerting on the fortunes of cities and on the shaping of urban planning and policy priorities.		
Assessment:	2500 word essay		

08 03133	URS103	Economy, Space and Policy	10 credits
Level: C	**Semester: 2**	**Module Leader: Austin Barber**	
Description:	This 10-credit module provides an introduction to key processes of economic change shaping the fortunes of cities in Britain, Europe and North America. It complements URS 102 (Society, Space and Policy), which emphasised how processes of social change in urban areas are strongly driven by underlying economic forces. This module explores these economic issues in more detail and highlights the role they play in shaping urban policy and planning priorities in cities. It adopts an accessible and practical approach to contemporary economic issues, their urban implications, and the impact upon city planning. Throughout the module we draw upon current case studies of economic change in major cities such as Munich, Barcelona, Manchester, Toronto, Berlin and Detroit. The fortunes of our cities have been affected by profound structural changes in the economy in recent years. We consider how these trends have shaped the physical and social fabric of major cities and the implications for urban planning and policy priorities. The issues explored in the module are particularly relevant in the recent climate of financial crisis and recession.		
Learning Outcomes:	By the end of the course students should be able to: • Demonstrate an understanding of key processes of structural change in the contemporary British and European economy. • Illustrate how these influence the differential fortunes of cities and regions in Britain and Europe. • Explain how these impact upon public policy formulation and priorities, particularly at the sub national scale. • Combine these skills in the analysis of contemporary economic and spatial policy debates.		
Assessment:	2,500 words Report.		

08 27805	URS105	Planning in Action	10 credits
Level: C	**Semester: 2**	**Module Leader: Mike Beazley**	
Description:	This weekly tutorial programme provides an opportunity to explore urban and regional planning issues covered in the URS modules in small group discussion sessions. The programme involves a combination of class discussion, presentations, local visits, and small-group project work. We will be exploring planning in action and using local sites to explore some key issues as part of our planning laboratory.		
Learning Outcomes:	By the end of the module you are expected to: • Have an understanding of some of the real life planning issues facing the City of Birmingham and the wider region. • Have developed some of the basic skills required of being a planner. • Be able to respond to a brief and make a presentation of findings to the wider group. • Have extended your knowledge of what urban planning is all about.		
Assessment:	Presentation (20%) Individual Project Report, 1,500 words (60%). Group Presentation (20%).		

Year 2: all Programmes

Module Information

03 00538	**ESCM203**	**Applied Geophysics**	**10 credits**
Level: I	**Semester: 1**	**Module Leader: Tim Reston**	
Description:	The module introduces the principal techniques of geophysical exploration: seismic reflection and refraction; ground penetrating radar, gravity surveys; magnetic surveys; electrical methods - resistivity. It covers basic principles, applications and simple interpretation. *Aims:* To develop an understanding of the principal methods of applied geophysics used to provide geological information.		
Learning Outcomes:	By the end of the module, students should be able to: • describe the principals of acquiring remotely measurable geophysical information • outline the applications of the principal geophysical exploration techniques • discuss the usefulness and limitations of geophysics in geological applications • apply geophysical techniques to resolve geological problems		
Assessment:	3 pieces of coursework: Seismic reflection exercise (500 words + diagrams/tables/calculations; 40%) Gravity/magnetics exercise (500 words + diagrams/tables/calculations; 40%) Multiple choice problem sheets covering entire module: (1 week to complete sheet of 20 questions: 20%)		

03 20959	**ESCM204**	**Continental Deformation**	**10 credits**
Level: I	**Semester: 1**	**Module Leader: Carl Stevenson**	
Description:	Building on material covered in Year 1, this module uses the principles of stress, strain and the physical conditions in the crust to examine the processes and products of rock deformation at a range of scales and interpret the deformation history of the crust. The module considers deformation of the crust in terms of stresses leading to strain and examines and tests the underlying theories about how stresses operate in the crust and the structures that are produced and deformation processes that operate in response to this. Emphasis is placed on quantitative analysis of geological deformation using, for example, strain determination methods, cross-section construction, stress analysis, analogue experiments, etc.		
Learning Outcomes:	By the end of the module you will be able to: • Understand how quantitative techniques such as stereographic projection, strain analysis and balanced cross sections can be used to analyse geological structures • Understand stress analysis using Mohr diagrams • Interpret the structural and tectonic evolution of an area or region • Understand several key concepts and theories about geological deformation and regional tectonics		
Assessment:	Coursework 2000 word report on lab experiment (50%) Exam (1 hour and 30 minutes) (50%)		

03 24064	ESCM209	Sedimentology	20 credits
Level: I	**Semester: 1 & 2**	**Module Leader: James Wheeley**	
NB: A 10-credit version of this module (03 26568), that can be taken in either semester, is available. Please contact the School.			
Description:	This module covers the physical characteristics of the major environments of deposition of the main types of siliciclastic, carbonate and evaporitic sediments and the processes involved with their deposition. It takes account of the different types of sedimentary basin in which they accumulate and the large-scale controls. Links are made between modern sedimentary environments and those preserved in the stratigraphic record especially through the application of sedimentary facies analysis. Where appropriate emphasis is placed on the techniques employed for the study of sedimentary rocks in the field and laboratory. The module covers the processes and products of diagenesis of siliciclastic and carbonate sediments. *Aim*: To develop the skills needed for the description and interpretation of the detrital composition and diagenesis of clastic and carbonate rocks.		
Learning Outcomes:	By the end of the module the student should be able to: • Describe in technical detail the physical characteristics of sedimentary rocks from • microscope to field scale and record these data in appropriate ways including graphically • Infer 3-dimensional environments from available data • Evaluate the role of base-level shifts as a control on the spatial and temporal variations in depositional systems • Log, describe and interpret facies in core • Describe quantitatively the mineral composition of sedimentary rocks in thin section • Identify, describe and interpret diagenetic processes and products in thin section and their influence on the generation of porosity and permeability.		
Assessment:	1.5 hour examination (50%) Assessed core logging exercise and 1000 word write-up (25%) Assessed carbonate thin section exercise and 1000 word write-up (25%)		

3 29997	ESCM264	Igneous and Metamorphic Petrology	20 credits
Level: I	Semester: 2	Module Leader: Alan Hastie	

Description:	Provides advanced study of igneous and metamorphic rocks following on from delivery of the Petrology, Volcanology and Geochemistry/Dynamic Solid Earth modules in Year 1. This module focuses on how the use of petrology, geochemistry and geochronology can investigate the petrogenesis of common igneous and metamorphic rock types and suites in all tectonic environments. The module consists of several overall themes: Use of phase petrology and the phase rule to investigate magmatic evolution. Thermodynamics, solid solution, the lever rule and binary, ternary and quaternary phase diagrams are used to explain common igneous processes, for example, partial melting, crystallisation, absorption, zoning, immiscibility and exsolution. Understanding of physical mantle melting processes followed by the integration of petrological theory and mathematical expressions to define different partial melting processes from mass balance considerations. Review of magma chamber processes followed by the integration of petrology and mass balance expressions to investigate all of the differentiation processes that occur when a magma body ascends and is stored in the crust. Major and trace elements and radiogenic isotope systematics are used extensively to demonstrate how geochemistry can be used to investigate all magmatic processes alongside phase petrology. Investigating the formation of economic deposits from magmatic and metamorphic processes, which feeds into content within the optional Level M/H Ore deposits and Gemmology module (03 27944/03 27945). Review of metamorphic zones, facies and protoliths: developing understanding of how the mineralogy of metamorphic rocks corresponds to P-T conditions and protolith composition. The application of geochemistry in studying metamorphic processes is explored, focusing on phase equilibria, thermodynamics and the link between metamorphism and geochronology. These themes will be delivered via 20 lectures, as well as follow-on practicals. Each practical will involve both a period where advisors are available for teaching and assistance as well as several hours of self-study, during which students will have time to complete set exercises independently.
Learning Outcomes:	By the end of the module you should be able to: • Classify and identify the most common igneous and metamorphic rocks • Use phase petrology, the phase rule, mathematical expressions and geochemistry to understand different partial melting processes and the generation of primary magmatic liquids • Use combined phase petrology, the phase rule, mathematical expressions and geochemistry to understand the various differentiation processes that modify the composition of a magma during ascent and storage • Evaluate how the geochemistry of igneous rocks can be used to infer tectonic setting • Evaluate the evidence for the existence of constructive and destructive plate margins • Interpret textures of igneous minerals in thin section • Use petrographical study to assign Metamorphic Zones to samples • Assess how metamorphic processes relate to the formation of ore deposit • Apply principles of phase equilibria and thermodynamics to metamorphic reactions • Interpret tectonic setting and protolith characteristics of metamorphic rocks • Evaluate the uses and implications of metamorphism in geochronology
Assessment:	Igneous content:

	Examination (2 hours, 60%) composed of short answer/multiple choice questions (50%) and practical questions (50%). Metamorphic content: Report (8 sides, 40%) based on work completed during practical sessions

03 29998	ESCM265	Resources and Hydrogeology	20 credits
Level: I	**Semester: 1 & 2**	**Module Leader: Jason Hilton**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	The aim of this module is to provide a fundamental introductory understanding of the principles and practice of resource geology and hydrogeology. The module commences providing an understanding of the distribution of resources in a plate tectonic context, and then in Semester 1 develops the following themes: • Resources as bulk materials • Energy resources • Resource management and policy • Resource evaluation using Geographical Information Systems (GIS) • Remote Sensing • Geophysical Petroleum exploration Where appropriate topic will commence with background information on formation of the resource, and will elaborate extraction and processing methods as well as the major uses of each resource type. In Semester 2 the module will focus on hydrogeology including an introduction to groundwater flow, groundwater chemistry, and groundwater resource development and protection, with an emphasis on quantification. Lecture contents are assessed though a combination of open book multiple choice exam (15%) and written examination (40%). Coursework will comprise two practical exercises that are based on real-world examples and tie in directly to lecture contents, namely: Resource applications of GIS and Remote Sensing (30%), and Petroleum resource exploration (15%). Coursework will install training in professional standards of report construction as required by industry and will provide essential contents for accreditation by the Geological Society of London.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate an understanding of the principles regulating the distribution of natural resources in a plate tectonic context, and to understand the methods of formation for different natural resources. • Evaluate physical resources from hand specimens and geological maps and identify appropriate extraction and processing techniques for different resources. • Understand and apply the techniques used in geographical information systems (GIS) and remote sensing • Be able to understand and quantify the processes governing the occurrence and flow of groundwater in the geological subsurface • Be able to apply basic hydrogeological analysis to a real locality • Have acquired a foundational expertise to undertake advanced resource and hydrogeology-related courses • Produce reports on to professional standards expected in industry.		
Assessment:	GIS and Remote Sensing practical exercise (30%) Petroleum practical exercise (15%) 1 hour exam on hydrogeology content (40%) Open Book MCQ assessment on Semester on 1 lecture content (15%)		

03 30000	**ESCM266**	**Resources and the Environment**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Jason Hilton**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	The aim of this module is to provide a fundamental introductory understanding of the principles and practice of resource geology and hydrogeology. The module commences providing an understanding of the distribution of resources in a plate tectonic context, and then in Semester 1 develops the following themes: • Resources as bulk materials • Energy resources • Resource management and policy • Resource evaluation using Geographical Information Systems (GIS) • Remote Sensing • Geophysical Petroleum exploration Where appropriate topic will commence with background information on formation of the resource, and will elaborate extraction and processing methods as well as the major uses of each resource type. Assessment for the module is by an open book Multiple choice examination (15%) and coursework comprise two practical exercises (45%) and a report (40%) addressing the environmental implications of extraction and use of a named Earth resource. The practical exercises are based on real-world examples and tie in directly to lecture contents, namely: Resource applications of GIS and Remote Sensing (30%), and Geophysical petroleum resource exploration (15%). Coursework will install training in professional standards of report construction as required by industry and will provide essential contents for accreditation by the Geological Society of London.		
Learning Outcomes:	By the end of the module, students should be able to: • Demonstrate an understanding of the principles regulating the distribution of natural resources in a plate tectonic context, and to understand the methods of formation for different natural resources. • Evaluate physical resources from hand specimens and geological maps and identify appropriate extraction and processing techniques for different resources. • Understand and apply the techniques used in geographical information systems (GIS) and remote sensing • Understand the environmental implications of extraction processes and utilisation of Earth resources. • Produce reports on to professional standards expected in industry.		
Assessment:	GIS and Remote Sensing practical exercise (30%) Geophysical petroleum practical exercise (15%) 3,000 word report (40%) Open Book MCQ assessment on Semester on 1 lecture content (15%).		

03 19219	GGM203A	Statistical Methods for Geographers	10 credits
Level: I	**Semester: 1**	**Module Leader: Ian Phillips**	
Description:	The module aims to develop an appreciation of quantitative data analysis within both physical and human geography.		
Learning Outcomes:	1. To understand the rationale underpinning selected statistical methods and tests. 2. To use a calculator, a pen and a sheet of paper to calculate the following descriptive statistics and inferential tests: mid-range, mode, median and arithmetic mean; range, variation ratio, quartile deviation, mean absolute deviation, standard deviation and co-efficient of variation; area and hence probabilities under a normal curve; 95% confidence interval of the population mean from the sample mean; independent samples Student's *t* test; independent samples one-way analysis of variance; Chi-Square test; Pearson's product-moment correlation co-efficient. 3. To use the SPSS computer program to calculate the following statistics: mode, median and arithmetic mean; range, lower and upper quartiles and standard deviation; skewness; one sample, independent and paired samples Student's *t* tests; independent samples one-way analysis of variance (ANOVA); Chi-Square test; Pearson and Spearman correlation co-efficients. 4. To use the SPSS computer program to conduct simple and multiple linear regression analyses. 5. To interpret correctly the results of statistical analysis.		
Assessment:	Two question booklets Question Booklet 1: 60% = six weeks' work, Question Booklet 2: 40% = four weeks' work		

03 31535	GGM203B	Applied Geographical Information Systems	10 credits
Level: I	**Semester: 2**	**Module Leader: Simon Dixon**	
Description:	This course will teach the fundamentals of GPS, GIS and Remote Sensing. The main aim is to enable the student to be proficient in the creation of digital maps by the familiarisation of basic geomatic techniques. Simple spatial analysis is considered towards the end of the course to educate students to the potential analyses suitable for dissertation topics. Weekly Topics: Week 1: Vector and Raster Data Models Week 2: Practical Class 1: Using ArcGIS Week 3: Practical Class 2: Making Themed Maps Week 4: GPS and Remote Sensing Week 5: Practical Class 3: Collecting and Using GPS Data Week 6: Practical Class 4: Sources of Data Week 7: Digitising and Editing Data Week 8: Practical Class 5: Digitising Data from Basemaps Week 9: Practical Class 6: Data Analysis Week 10: Raster and Vector Analysis, and Distributed GIS		
Learning Outcomes:	By the end of the module students should be able to: 1. Explain the basic principles and theory of GPS, GIS and Remote Sensing. 2. Identify where and how to access spatial data sources 3. Use ArcGIS to create maps and perform simple spatial analyses		

Assessment:	Assignment based on computer practical sessions will include an opportunity to submit the first part of the work for peer reviewed formative assessment. Also feedback from demonstrators in practical classes One assignment (1000-word equivalent), started in computer practicals and completed in own time (50%) One project (1500-word equivalent) (50%)

03 23438	**GGM205**	**Environmental Assessment and Management**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Steve Emery**	
NB: A 10-credit version of this module (03 26502), that can be taken in either semester, is available. Please contact the School.			
Description:	This module delivers a broad understanding of the fields of environmental management and environmental human geography, demonstrating the value of a theoretically grounded social scientific approach for understanding and implementing contemporary approaches to environmental management. Semester 1 will start with some important principles and debates that frame environmental thinking and environmental management approaches, before going on to introduce a range of policies and management approaches that are commonly used in environmental management and decision making in various contexts - such as Environmental Impact Assessment, Agri-Environment Schemes, and Payments for Ecosystem Services. Semester 2 will broadly address rationales and mechanisms for the engagement of different parties, including the wider public, in decision-making about environmental matters. More specifically, it will explore issues such as climate change, EU environmental policy, and the role of different types of knowledge about the environment.		
Learning Outcomes:	By the end of the module the student should be able to: • Articulate, problematize and critique key concepts framing environmental management • Assess the policy and decision-making implications of sustainability at a range of scales • Describe and assess the role of various formal approaches to environmental assessment and decision-making, and their limitations • Apply different theoretical understandings of human-environment relations to analyse and interpret contemporary approaches to environmental management • Assess the role of science in decision-making and its limitations; • Identify key factors and concerns in the public understanding of environmental issues • Appreciate and demonstrate the importance of cultural, political and economic geography to contemporary environmental management.		
Assessment:	2,000 word essay (33%) Choose one from three possible questions set in Semester 1 Exam – 2 hours (67%) Answer two essay-style exam questions		

03 18180	**GGM207**	**Hydroclimatology: climate and water**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Anne van Loon**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	The module introduces the Earth's climate, weather and water system, represented by hydroclimatological variables such as precipitation, wind, air pressure, evaporation, snow and ice, (sub)surface water, and rivers. We will study the spatial and temporal variability of these variables, covering local (for example Birmingham), regional (for example UK) and global scales and timescales from minutes to centuries. We will discuss the meteorological and hydrological processes underlying these variables and the way they are linked through the water balance. We will investigate how to measure these variables, discussing both established techniques and exciting new approaches (for example satellite measurement). We will then introduce some important applications of this understanding, by focussing on the impacts of human-induced changes such as climate change on the water system and how water management can help alleviate extremes like floods and drought.		
Learning Outcomes:	By the end of the module the student will: • Understand fundamental concepts and methods in both the atmospheric and hydrological sciences on different scales (e.g. point scale, catchment scale, global scale); • Describe the water balance, represented by interactions between: precipitation, evaporation, interception, soil moisture, groundwater, snow and ice lakes and wetlands, and stream flow. • Explain the current spatial and temporal variation in hydroclimatological variables for the globe and the UK; • Discuss the 'new' challenges in hydroclimatology resulting from increasing human impact upon natural processes, including anthropogenic climate change; • Apply the knowledge and skills gained in the analysis of atmospheric and water resource management problems.		
Assessment:	Assessments: 1.5 hour unseen examination (50%), coursework (50%) The coursework consists of a report combining elements related to the module topics.		

03 18182	GGM214	Ecological Systems	20 credits
Level: I	**Semester: 1 & 2**	**Module Leader: Mark Ledger**	

NB: A 10-credit version of this module (03 27623), that can be taken in either semester, is available. Please contact the School.

Description:	**Semester 1:** The first part of the module provides a thorough grounding in basic ecology at the species, population and community levels. We will explore how factors including dispersal, habitat and species interactions affect the distribution of species in marine, freshwater and terrestrial communities, study the demographics and regulation of populations, and investigate regulation of communities by competition, predation and physical disturbance. Major ecological concepts including succession, food web dynamics and ecosystem engineers will be described. **Semester 2:** The second part of the module applies ecological theory acquired in semester 1 to focus on the structure and function of freshwater ecosystems, focusing mainly on rivers, and investigates the adaptations of freshwater organisms to their habitat. Some of the unifying concepts of rivers, including the River Continuum Concept, nutrient spiralling, and patch dynamics will be summarised. Anthropogenic influences on freshwaters will be reviewed, including river regulation, urbanisation, organic pollutants, acidification, mining and forestry.
Learning Outcomes:	By the end of this module students should be able to: **Semester 1:** • Demonstrate knowledge of key concepts of ecology with reference to species distribution populations, communities and ecosystems. • Integrate and evaluate information acquired through lectures and directed reading to demonstrate understanding of specific ecological concepts or issues. **Semester 2:** • Demonstrate an understanding both of ecological patterns and processes within rivers and lakes, and of the variables driving these processes. • Combine detailed knowledge of some key concepts in ecology to diagnose anthropogenic impacts on freshwater environments
Assessment:	Semester 1: Three 15 minute multiple choice class tests (totalling 25%) Semester 2. Three 15 minute multiple choice class tests (totalling 25%) Semester 3: 1.5 hour exam totalling 50% of the module mark

03 27798	**GGM225**	**Cultural and Development Geographies**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Lloyd Jenkins**	
NB: A 10-credit version of this module (Banner Code 26663), that can be taken in either semester, will be available. Please contact the School.			
Description:	In the first semester the focus will be on concepts and practices of development geography. This section will set out a contested history of development theories, and it will conceptualise the roles of key development agents and the negotiation of key development spatialities (the global, the national, the household, the rural and the urban). These concepts and spatialities will then be focused through aspects of the lived experience of children and young people in the Global South. In the second semester the focus will be on cultural and historical geographies of the city. Key theoretical frames will be outlined and these will be applied to the examination of key issues in the development of cities from the mid-19th century (the birth of the modern city) through to the contemporary with a focus primarily on Europe and North America. This will cover issues around identity, cultural landscapes, geographies of memory, binaries, feminism, architecture and modernity.		
Learning Outcomes:	By the end of the module the student should be able to: • Engage with key histories, theories and concepts in development geography. • Critically apply development theories and concepts to consider the lived experience of children and young people in the Global South. • Understand the diversity of theoretical approaches to understanding the city. • Critically deconstruct the cultural geography of the contemporary city using a variety of theoretical approaches.		
Assessment:	2 x 1500 word essay (50%) 1 x 1.5 hour exam (50%)		

03 23142	**GGM226**	**Social and Political Geography**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Julian Clark**	
NB: A 10-credit version of this module (03 26661), that can be taken in either semester, is available. Please contact the School.			
Prohibited combination with: EVS229 Environmental Pollution			
Description:	This module uses a range of contemporary social and political geographical approaches to understand how, why and in what ways individuals and organisations act in an increasingly globalised world. In semester 1 the module will elaborate a critical geography approach with regard to current socio-economic developments at the global scale, paying particular attention to questions of social equity, demographic change, household coping strategies, and the spaces of energy production and consumption. A geographical critique of neoliberalism and its discontents will form the conceptual core of the module, utilising the wide body of scholarship in this field. Building on human geography concepts introduced in year 1, the module will aim to take the students beyond a mere descriptive understanding of the basic themes and issues in contemporary social geography by giving them the skills – mainly through EBL methods – to actively question taken-for-granted assumptions regarding the relationship between society, economy and the everyday. Complementing the social geography approaches considered in semester 1, in semester 2 our focus moves to key concepts in political geography, and to contemporary political geographical forms of organization. Specifically, drawing on historic and contemporary examples (including case studies of the world's largest trading bloc, the European Union), semester 2 provides an in-depth analysis from political geographical perspectives of the following issues: what are the key concepts in political geographical thought and the critical drivers of political geography for actors and organizations, and how are these manifested at a variety of spatial scales? To what extent can different theoretical approaches enable us to better understand these drivers? And what are the likely future patterns and processes of political integration and geopolitical development across Europe?	
Learning Outcomes:	By the end of the module the student will be able to: • Recognise the social implications, elements and functioning of neoliberal policies at a global scale. • Understand the core components of critical geographic thought with regard to contemporary social geography issues. • Relate critical geography approaches to questions of social equity and justice, energy liberalisation, household coping strategies and contemporary socio-demographic change. • Understand the key concepts in contemporary political geographical and geopolitical thought. • Understand key events and processes underpinning the changing political geographies of Europe.		
Assessment:	Coursework (50%): Essay, 3000 words on social geography topics Examination (50%):1 hour 30 minute examination on the political geographies of Europe		

03 27827	**EVS229**	**Environmental Pollution**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Zongbo Shi**	
NB: A 10-credit version of this module (Banner Code 29461), that can be taken in either semester, will be available. Please contact the School.			
Description:	Pollution in the environment is one of major threats facing society whether in the form of gases (e.g climate change), dissolved substances (e.g. mine drainage), liquids (e.g. oils) or particles (e.g. nanoparticles). This module will introduce the main environmental pollutants and consider how they are transferred within and between various media and how they interact with biota to constitute an environmental risk. We will use the source pathway receptor model to explore how the form and transport of pollutants contributes to their importance in an environmental context. We will also consider how the extent of pollution can be assessed within different environmental media. These key concepts will be considered in relation to current environmental issues including climate change, nanoparticle and chemical use and oil spills.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate a knowledge and understanding of the basic principles underpinning biogeochemical cycles of major elements. • Show understanding and application of the key concepts of reservoirs, residence times, fluxes, including the calculation of their numerical values. • Have knowledge of the key contaminants that constitute a major environmental risk. • Understand how pH and redox are important controls in the behaviour of pollutants within the environment. • Explain how surface interactions control the behaviour of pollutants within environmental media. • Understand how physical characteristics of soil and sediment affect the movement of pollutants. • Have knowledge of how modelling can be used to characterise the aquatic environment. • Explain how characteristics of pollutants, media and biota affect toxicity. • Be able to perform a toxicity test in the laboratory. • Be able to apply extraction techniques to evaluate soil characteristics. • Describe and appraise the different methods of measuring elements within environmental media.		
Assessment:	3000 word lab report (50%); 1.5 hour exam (50%)		

03 27800	GGM231	Economic Geographies: cities and regions	20 credits
Level: I	**Semester: 1 & 2**	**Module Leader: John Round**	
NB: A 10-credit version of this module (Banner Code 28665), that can be taken in either semester, will be available. Please contact the School.			
Description:	This module examines the spatial economic underpinnings of the behaviour of urban and regional economies. Highlighting the differences and connections between the two types of economy, it explores a diverse range of basic analytical techniques, as well as the most current, state-of-the-art thinking in the field of local economic development and policy. The course is divided into two teaching "blocks", each of 10 weeks and runs over two terms: 1. Cities and the Urban Economy examines various aspects of spatial economic analysis, explaining why groups of firms and activities are often located together in cities, urban agglomerations, and industrial clusters. It highlights increased competition between Europe's cities for mobile investment through the development of public - private partnerships, property development and urban regeneration strategies. This block of lectures also considers the broader historical themes relating to the changing context in which cities and regions nowadays find themselves. 2. Local and Regional Development: The local and regional development section of the module explores contemporary urban economic issues and discusses the implications of these for policy development in the current period of austerity. It examines the outcomes of current economic regional policy in the UK and elsewhere at the city, local and household level and explores the nature of resilience to these issues. The lectures challenge dominant notions of globalisation theories by demonstrating the continuing importance of the local/region. The lectures are research driven and include case study examples from the UK, Russia, Japan and China and there will be student led formative activity in Birmingham. The lectures are supported by five seminars during which students will discuss key readings and the Birmingham activity. The lectures also feed into the Berlin field trip where comparative discussions will be undertaken in the field.		
Learning Outcomes:	By the end of the module the students will be able to: • Identify and explain the spatial economic underpinnings of the behaviour of urban and regional economies; • Compare and contrast different theoretical models of urban and regional economic development; • Explain disparities in economic performance between different cities and regions; • Reflect upon the potential contribution to urban and regional economic development of a variety of policy initiatives and interventions; • Recognise the advantages, disadvantages and welfare implications of specific policy instruments; • Formulate and justify criteria (efficiency, equity, sustainability) for selecting policy priorities in different urban and regional economic development contexts.		
Assessment:	2x 2,000-word essays (50% each)		

03 30971	**GGM232**	**Geomorphology and Palaeoenvironments**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Warren Eastwood**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	In semester 1 (Palaeoenvironments/Palaeoecology) the module examines and guides students through the theoretical and practical concepts on how we reconstruct past environmental change over the last 25,000 years or so. The emphasis is on reconstructing past environments using science-based techniques of palaeoecology, including sub-fossil botanical (e.g. pollen) and zoological (e.g. invertebrate) data. These will be studied with reference to natural and human-induced environmental processes that cause environments to change through time. Specific topics to be covered include: lake and peat deposits as archives of environmental change, palaeoecological theory, late glacial and Holocene environmental changes, chironomid palaeoecology, radiocarbon dating and age-depth modelling. Most of the topics have practical exercises linked to them. In Semester 2 the module examines the nature of, and controls on, geomorphological processes at different time and space scales. Geomorphology is the study of landforms, their processes, form and sediments at the surface of the Earth. Technology for measuring processes and our resultant understanding is improving substantially and the module aims to communicate the excitement of these novel developments. It reviews fundamental controls on landscape systems and processes, using new and 'classic' research. These concepts are discussed in both simple qualitative frameworks, but also using quantitative modelling approaches where numerical expressions are introduced. These are applied to a wide range of geomorphic environments based on the current research interests of staff delivering the module.		
Learning Outcomes:	By the end of the module you should be able to: • Critically evaluate and analyse pollen and chironomid data sets to reconstruct environmental change • Critically evaluate the 'indicator approach' to palaeoenvironmental reconstruction and the palaeoecological fidelity of pollen and chironomids as indicators of environmental change • Apply geomorphological principles to understand how processes are linked to resultant landforms in different geomorphological systems • Collect and analyse data to test geomorphological theories		
Assessment:	One 2,500 word assessed essay (50%); Group poster presentation (10%) 1.5 hour exam (40%)		

03 30814	**GGM233**	**Catchment Water Management**	**20 credits**
Level: I	**Semester: 1 & 2**	**Module Leader: Sami Ullah**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	The module provides in-depth coverage of water management at catchment level with a focus on integrating catchment-scale physical hydrology, water quality and management. The three integrated components of the module will enable students to understand and critically evaluate the science behind catchment-scale water quantity and quality problems under land use, flood, drought and climate change; and to equip students with critical analytical skills in devising sustainable water management plans. The module will cover a) the physical basis of water cycle at catchment scale including water input, storage and outputs, b) land use, particularly agricultural and its implications for water quality (from soil water to rivers and groundwater water pollution), and c) contemporary global issues in catchment management affecting water resources including emerging tools for sustainable water management.		
Learning Outcomes:	By the end of the module students should be able to: • Critically evaluate fundamentals of catchment water management under land use and climate change and its implications for water quantity and quality • Evaluate the water balance of mixed-land use catchments based on the stores (soil moisture, groundwater, glaciers, ice, lakes & wetlands) and fluxes of water (precipitation, interception, run-off, infiltration and stream flow) • Elucidate the linkages between land management and water quality at catchment scale • Assess water quality (chemical and physical) as influenced by land management • Appreciate and apply a range of techniques and skills relevant for sustainable water management at catchment scale		
Assessment:	2000-word assessed coursework (50%) 2-hour unseen examination (50%) A pre-field work questionnaire covering field and laboratory assessments and protocols will provide a framework for formative assessment. Opportunities exist during question and answer sessions during lectures and during the practical sessions in the field and in the laboratory		

Year 3: all Programmes

Module Information

03 24059	**ESCM308**	**Petroleum Geoscience**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Steve Jones**	
NB: This course assumes prior knowledge of seismic reflection data acquisition and processing, and sedimentary basin formation mechanisms. Students without this knowledge will need to do additional study in their own time. Please speak to the Module Leader at the start of term for advice.			
Prohibited combination with: ▪ **ESCM319 Evolution of Vertebrates** ▪ **GGM348 Remote Sensing of the Cryosphere**			
Description:	This course provides a theoretical and practical understanding of petroleum geology and seismic reflection imaging. The main topics covered are: the petroleum system; economics of exploring for and producing hydrocarbons; seismic reflection data acquisition, processing and interpretation; drilling methods, well design & borehole logging; seismic-well correlation; source rock accumulation and maturation; and hydrocarbon migration. These subjects are introduced in 10 lectures. Most of the course time is devoted to over 12 extended practical exercises that give students grounding in industry-standard analysis techniques and software.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate understanding of the formation of a petroleum system. • Use typical industry interpretation techniques to assess a petroleum system. • Interpret 2D & 3D seismic datasets using typical oil-industry software, and understand the principles of seismic reflection data acquisition and processing. • Design a hydrocarbon well and interpret wireline logging data.		
Assessment:	1.5 hour exam, main summer exam period: 50% Portfolio of practical exercises: 50%		

03 10820	ESCM319	Evolution of Vertebrates	20 credits
Level: H	**Semester: 2**	**Module Leader: Ivan Sansom**	
Prohibited combination with: ESCM308 Petroleum Geoscience			
Description:	The module will examine the evolution and palaeobiology of vertebrate groups with emphasis on the evolutionary origins of distinct types of skeletal architecture. The practicals will involve the examination and comparison of fossil and recent vertebrates and employ cladistic methods to analyse relationships.		
Learning Outcomes:	By the end of the module you should be able to: • Describe, in detail, the evolutionary history and palaeobiology of extant and extinct vertebrate groups • Evaluate the techniques used to analyse their phylogenetic relationships.		
Assessment:	2 hour written exam (60%) Coursework: multi-authored review article and presentations (40%)		

0329212	ESCM323	Engineering Geology and Hydrogeology	20 credits
Level: H	**Semester: 2**	**Module Leader: Paul Anderson**	
Description:	The module is concerned with engineering geology and pollution hydrogeology, focussing on developing skills that would be required in site investigation. These skills are largely quantitative, requiring a fundamental understanding of maths. Ultimately students will learn how geological theory can be used in solving practical problems. The module mainly focusses on: (1) the engineering properties of rocks and soils; (2) geological and environmental considerations involved in ground investigation; (3) the transportation of contaminants in groundwater. Practical sessions focus on two assessed exercises: (1) completion of a site investigation for an area of proposed construction; (2) investigation of a groundwater pollution problem using professional groundwater pollution transport software (latter available on University computers but also available free for installation on own computers).		
Learning Outcomes:	By the end of the module students should be able to: • Apply the essential theories covering rock strength and soil consolidation to geotechnical investigation of a site; • Differentiate the processes of soil formation; • Apply appropriate calculations to rock/soil engineering problems; • Design and evaluate methods to predict the subsurface geology at a site; • Apply the essential theories covering solute transport to groundwater pollution problems; • Develop solutions to groundwater pollution issues using industry standard modelling techniques; • Analyse results of groundwater pollution investigation through a technical report		
Assessment:	Site Investigation (35%) Pollution Hydrogeology study (15%) Examination (50%)		

03 29214	ESCM329	Geological Natural Hazards	20 credits
Level: H	**Semester: 1 & 2**	**Module Leader: Sebastian Watt**	
NB: This module is only available to those students who will be in attendance for the full academic year.			
Description:	This module examines the major geological natural hazards (earthquakes, volcanic eruptions, ground stability and landslide hazards, tsunamis, bolide impacts) in terms of driving geological processes and human impacts. The theoretical background behind each hazard is addressed, placing processes in a wider geological context, examining the key physical principles driving each process, and considering frequency and magnitude relationships. Concepts of risk and vulnerability are introduced via a range of case studies, examining factors that have led to natural disasters. Methods of hazard assessment and monitoring are investigated, with case-study examples, to consider the forecasting and mitigation of geological natural hazards.		
Learning Outcomes:	• Understand the nature, principal causes and the effects of a range of geological hazards • Evaluate hazards and risk through the synthesis of geological information and human factors • Develop mitigation strategies for geological natural hazards based on an understanding of potential impacts and vulnerability		
Assessment:	Group poster (20%) and group presentation (20%) (max. group size of 3, and to include statements of contribution); 2-hour written examination (60%). Exam includes short-answer questions across all course material, and long-answer essay questions.		

03 29231	ESCM341	Tectonic and Magmatic Processes	20 credits
Level: H	**Semester: 1 & 2**	**Module Leader: Tim Reston**	
This module is only available to those students who will be in attendance for the full academic year.			
Pre-requisites: ***NB: This course assumes prior knowledge of igneous petrology and tectonic processes. Students without this knowledge will need to do additional study in their own time. Please speak to the Module Leader at the start of term for advice***			
Description:	This course provides a theoretical and practical understanding, extensively informed by research being carried out in Birmingham, of the latest understanding of the processes of plate motion, continental extension and break-up, plate-boundary deformation, mantle melting, magma transport from mantle to crust and magma emplacement within the crust. These processes are illustrated with case studies based on UoB research of tectonics and/or magmatic processes from mid-ocean ridges, subduction zones, continental margins and sedimentary basins, providing students with hands on experience of active research methods. Emphasis is placed on the latest developments in joint interpretation of geophysical, geochemical and modelling datasets and in the understanding of the limitations of these data.		
Learning Outcomes:	By the end of the module students should be able to: • Describe current hypotheses for continental extensional and mid-ocean ridge processes • Describe current hypotheses for subduction zone processes • Discuss the range of geophysical and geochemical data on which the current hypotheses are built. • Recognize uncertainties in the interpretation of limited and complex datasets. • Discuss case studies presented in the course.		
Assessment:	2 hour exam, main summer exam period (60%); Practical exercises (40% total)		

03 29299	**ESCM343**	**Evolutionary Palaeobiology**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Stephan Lautenschlager**	
Pre-requisites: ESCM250 Palaeobiology, Micropaleaontology and Palaeoenvironments			
Prohibited combination with: GGM308 Wetland Environments			
Description:	Content will focus on the long-term patterns of speciation, diversity, morphology change and extinction. These will be discussed in the context of environmental, climate and biotic controls. Content will span terrestrial and marine realms, and plant, invertebrate and microfossil groups.		
Learning Outcomes:	By the end of the module students should be able to: • Show a detailed understanding of key patterns in the long-term records of speciation, extinction and trends in morphological evolution and adaptation across multiple marine and terrestrial, invertebrate, and micro- fossil groups. • Be able to formulate the potential abiotic (climate, environment, palaeogeography) and biotic (competition, predation, co-evolution) drivers of large-scale patterns of evolution. • Be able to manage and examine palaeontological datasets in the context of macroevolutionary studies. • Be able to use palaeontological data and palaeobiological theory to question and debate issues of modern global change biology.		
Assessment:	2 hr exam (60%) Individual seminar presentation (20%) Data practical exercise (20%)		

03 29996	**ESCM345**	**Palaeoclimates**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: James Bendle**	
Prohibited combination with: **GGM314 Applied Micrometeorology**			
Description:	There has never been a more critical time for students to understand the causes and potential consequences of Earth's changing climate. The context for understanding the global warming of today lies in the records of the Earth's past. This module will put key data and published case studies of past climate change at students' fingertips, so you can experience the nature of paleoclimate reconstruction. Students will evaluate data, practice developing and testing hypotheses and infer the broader implications of the scientific results. ***How*** we know is as important as ***what*** we know about past climate. This module is ***inquiry based*** and departs from the traditional lecture based format.		
Learning Outcomes:	By the end of this module, you should be able to: • Frame climate change appropriately within geological time-scales, with a focus on the Cenozoic. • Synthesize palaeoclimate data, formulate hypotheses and articulate evidence based arguments. • Apply quantitative and problem solving skills to palaeoclimate data. • Recognise and deal with complexity and uncertainty in geological/ environmental data-sets. • Work in groups and communicate (written and oral) effectively with others. • Be able to evaluate the magnitude, pattern and rates of climate change during time-periods of focus (e.g. the Cenozoic).		
Assessment:	The module assessment is 100% by practical assessment. There is no exam. Assessment: Each week will have three sessions. The 1st session (2 hours) is typically designed to introduce a topic and gauge prior knowledge and give formative tasks (building on a Panopto or in-class lecture, where appropriate). Some formative exercises may be set as guided independent study. Both group / independent work and discussion is facilitated. The 2nd and 3rd sessions (2 hours each) are a more in-depth exploration of the topic, culminating in another practical task. Of these sessions, 4 will form the summative assessment (ca. every other week over 10 weeks).		

03 32166	ESCM352	Sustainable Resource Geology	20 credits
Level: H	**Semester: 1 & 2**	**Module Leader: Paul Anderson**	
This module is only available to those students who will be in attendance for the full academic year.			
Description:	This module examines energy and mineral resources. The primary focus is on sustainable energy resources and mineral extraction, which are explored from geological, economic and environmental perspectives. The first half of the module consists of classes and practical exercises, covering the following key areas: (1) energy conversion, (2) sustainable energy development, (3) exploration and mining techniques, (4) Specific ore forming processes (5) economics, environmental and social factors in mineral extraction and energy supply. The second half of the module consists of two practical exercises: (1) A mock Inquiry, which includes in-depth research into the feasibility of mineral extraction within a particular area. Students are divided into four main groups: Level H students represent mining company directors, geological specialists, and environmental specialists from competing companies. Students on the accompanying Level M module represent a board of decision makers. Group research will lead towards a final inquiry, in which several mining proposals are considered. One or more external contacts with experience in the mining sector may be available to assist in this process. (2) A quantitatively-based analysis of the volume and value of a mineral resource, using computer software designed for professional use.		
Learning Outcomes:	By the end of the module students should be able to: • Evaluate effective use of sustainable energy systems from a geological and environmental perspective. • Evaluate the effect and relevance that mineral and energy resources have in the context of world economy and society. • Understand and be able to interpret the formation of key mineral deposit types. • Understand and be able to interpret the geological settings relevant to key energy resources. • Gain a detailed understanding of the techniques used in mineral exploration and mining. • Quantitatively determine the volume and value of a mineral resource using computer software. • Evaluate the environmental impacts of mineral extraction. • Evaluate the ethical considerations surrounding mineral exploration and exploitation including environmental and human. • Develop an understanding of the complex and interrelated arguments surrounding extraction of mineral deposits.		
Assessment:	Coursework: inquiry preparation and presentation (30%) Quantitative assessment of mineral resource volume/value, using computer software (40%) 1 hour exam (30%) A variety of question types linked to the taught component of the course		

03 23395	GGM305	Environment and Landscape Change	20 credits
Level: H	**Semester: 1**	**Module Leader: Warren Eastwood**	
Prohibited combination with: **GGM339 Environmental Justice** **GGM358 Geographies of the Body**			
Description:	A greater understanding of natural and human-induced environment and landscape changes is crucial in order for informed management practices to be applied. In this respect the module adopts a palaeoecological approach and a range of case studies will be examined over the last 20 thousand years or so in order to get a handle on how environments and landscapes have changed in the past. The module therefore adopts a 'palaeo approach' to examine human-environment interactions and the processes causing environment and landscape change at a variety of spatial and temporal scales. The module is prefaced by introductory lectures that provide a general introduction to the triggers and forcing mechanisms – both natural and human-induced – that effect environmental and landscape change as well as some of the techniques and 'palaeo' indicators that are used for its study. The rest of the module will follow a thematic approach consisting of lectures dealing with topics relevant to specific types of environment and landscape change. Typical topics include catastrophic environmental and landscape changes including flooding associated with the Mediterranean-Ponto-Caspian sea corridors and connections, catastrophic volcanism, late glacial-Holocene climate change, the origin of agriculture in Southwest Asia and the Neolithic transition, the early Holocene Forest (Re-) advance and refugia debate, Holocene climate variability and civilization/societal collapse, and sub-recent and catchment-scale environmental changes. The module will include short assignment workshop sessions designed to assist students with choosing an extended essay topic and appropriate means of searching for literature. Students will be encouraged to attend further individual meetings to clarify and focus the organization of their chosen extended essay.		
Learning Outcomes:	By the end of this module, you should be able to: • Demonstrate familiarity with the factors that cause environmental and landscape change and a familiarity of some of the palaeo indicators that can be used to reconstruct past environmental changes. • Develop cogent, coherent and sustained arguments about significant issues related to natural and human-induced environmental change from a range of case studies. • Demonstrate an in-depth understanding of one key subject area related to the themes of the course and in relation to relevant literature.		
Assessment:	1000-word essay (25%) 3000-word essay (75%)		

03 25908	**GGM308**	**Wetland Environments**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Nick Kettridge**	
Prohibited combination with: **GGM332 Cultural Geographies of Development** **GGM339 Environmental Justice**			
Description:	Wetlands are an essential global carbon store and water resource, storing five times more carbon than the Amazonia rainforest and providing an important source of the UK's drinking water. This module studies the hydrological processes that control these critical ecosystems. The module examines how wetland hydrology is characterised, investigating evapotranspiration, ground water and unsaturated moisture dynamics within these environments. It shows how these processes impact wetland carbon dynamics and the wider catchment hydrology. Further, interactions between wetlands ecological and hydrological processes are explored and the vulnerability of these environments to increasing wildfire activity under a changing climate is assessed. This is a hands-on module, with 50% of contact time spent within practicals. These practicals provide the foundation of the module assessments (100% coursework) where you document the findings from the practical work and write short research articles linking this research to different processes within wetland environments.		
Learning Outcomes:	By the end of the module the student will be able to: • Demonstrate a good understanding of fundamental concepts and methods used within hydrological sciences. • Apply these concepts and methods to represent the hydrological system and project its response to changing environmental conditions. • Articulate how models represent the environment and be familiar with some of the limitations of model simulations. • Perform laboratory/field techniques • Be aware of interconnections between hydrological, thermal and ecological processes and the impact of wildfire disturbance on wetland development.		
Assessment:	2000 word-equivalent research paper (50%) 2000 word equivalent laboratory book (50%).		

03 19216	**GGM310**	**Weather Climate and Society**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Gregor Leckebusch**	
Pre-requisites: GGM207 Hydroclimatology			
Prohibited combination with: **GGM353 Welfare, Work & Wealth** **GGM354 Network Geographies** **GGM359 Russia in a Global Context**			
Description	The module is designed to make students familiar with basic aspects of mid-latitude weather (incl. different aspects of observations, analysis, and forecasts), climate (e.g. natural variability, anthropogenic climate change), and the way operational information will be used for benefit for society. This will include interfaces between scientific knowledge and end users in economy and society on climate scales. Specific applications will be highlighted: the potential of wind and solar power; the cost/benefit of the use of weather information by industry; understanding of climate variability; the two way relationship between climate and society and the methods of climate impact assessment.		
Learning Outcomes:	By the end of the module students should be able to: • analyse a synoptic weather chart and roughly recognise the actual large scale weather situation • understand the nature of climatic variability and change • review state-of-the-art downscaling techniques • describe basic applications of meteorological / climatological information from end-user and scientific perspective • understand basic concepts of atmospheric hazards risk assessment		
Assessment:	Student group presentations (including 1 page fact sheets) 10% Essay (2500 words) 40% 1.5 hour written examination 50%		

03 19134	**GGM312**	**Landscape and Urban Ecology**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Jon Sadler**	
Pre-requisites: GGM214 Ecological Systems			
Prohibited combination with: **GGM351 Carceral Geographies** **GGM361 The Political Economy of Agrarian Change in the Global South**			
Description:	The module will consider the sustainability of urban biodiversity in the UK. Emphasis will be placed upon the potential importance of urban habitats, their uniqueness and the application of appropriate ecological theories to urban areas. It will be argued that to understand fully the complexities of urban environments one needs to utilise results from both the natural and social sciences. Topics addressed will include the following: green corridors; metapopulations and gradient theory; system disturbance, monitoring and recovery; sampling; habitat restoration; sustainability.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate knowledge of key ecological processes and their application to urban environments. • Identify key strategies used to design, protect, and manage urban habitats. • Demonstrate competence in project / sample design. • Undertake and complete a field project in the local environment.		
Assessment:	One 3000-word field project in semester 2 (50%). The project involves the creation of a research paper based on the results of an ecology study of a local (urban) environment. One x 1.5 hr written examination (50%)		

03 19136	**GGM314**	**Applied Micrometeorology**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Xiaoming Cai**	
Pre-requisites: GGM207 Hydroclimatology			
Prohibited combination with: **GGM360 Cities and Conflict** **ESCM345 Palaeoclimates**			
Description:	This module will provide students with an understanding of: (1) the principles of meteorology at small scales (metres to kilometres), (2) the meteorological processes near the earth's surface (e.g., over a range of different surfaces/environments) associated with the exchange of heat, mass and momentum, and (3) transport and dispersion of pollutants in the atmospheric boundary layer.		
Learning Outcomes:	By the end of the module students should be able to: • demonstrate a knowledge of meteorological processes near the earth's surface and the exchange of heat, mass and momentum between the earth's surface and the atmosphere; • transfer this knowledge to applied micrometeorological problems in different environments e.g., urban/rural climate and air quality; • become familiar with methods for analysing near-surface meteorological data: (a) to derive quantities such as heat and moisture fluxes; (b) to estimate energy budgets for a range of natural and human-made surfaces and to predict local climate; and (c) to assess the effects of micrometeorological processes upon air quality		
Assessment:	2,500-word practical project (50%) 2 hour examination (50%)		

0327192	**GGM317**	**Biodiversity and Conservation Management**	**20 credits**
Level: H	**Semester 1**	**Module Leader: Lesley Batty**	
NB: A 10-credit version of this module (03 27621), that is also taken in Semester 1, is available. Please contact the School			
Prohibited combination with: **GGM353 Welfare, Work & Wealth**			
Description:	The module applies ecological theory to focus on the issues around global and local biodiversity and its management. The module covers major theoretical concepts including conservation theory, the importance of small populations and 'measuring' biodiversity. These will be discussed in the context of practical conservation. The concept of conservation and the how prioritisation is undertaken will be introduced and these will be considered within the framework of legislation. The module will use a variety of current issues and case studies from the terrestrial, aquatic and marine environments to illustrate key ecological concepts within the context of conservation.		
Learning Outcomes:	By the end of the module students should be able to: • Present and synthesise information related to the key threats to biodiversity • Critically assess how biodiversity is measured for conservation purposes • Appreciate the range and complexity of legislation associated with conservation • Understand how prioritisation of conservation is undertaken • Identify key strategies used to design, protect and manage habitats • Use case studies to appraise how strategies are used to conserve and restore habitats and species • Integrate and evaluate information acquired through lectures, directed reading and site visits to formulate an ecological management plan for a local nature reserve.		
Assessment:	Assessments: 5000 word management plan (100%)		

03 27193	**GGM332**	**Cultural Geographies of Development**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Pat Noxolo**	
Pre-requisites: Either GGM225 Cultural Geographies or GGM226 Social & Political Geography			
Prohibited combination with: **GGM308 Wetland Environments**			
Description:	There was a time in development theory and practice when 'culture' was seen as a collection of inconvenient local traditions that would be swept away by modernisation. But culture has proved remarkably adaptable, so that globalisation has only increased cultural diversity and the awareness of difference. This module explores what is meant by culture and its changing relationships with the spaces and places of development. How is culture changing and adapting in relation to a range of development practices, and what are the challenges of living and working with cultural difference in an increasingly mediated and interconnected world? What roles can cultural practices, skills and knowledges play in social, political and economic development? And what are the implications for development of the increasingly diverse cultures of development practitioners, organisations and institutions?		
Learning Outcomes:	By the end of the module students should be able to: • Discuss some of the major theories and critical issues surrounding the cultural geographies of development, including questions of inequality, voice, and participation • Critically assess the roles of culture in a range of practices and experiences of development. • Analyse and evaluate a range of cultural representations in terms of what they convey about changing cultural geographies of development.		
Assessment:	1 x 3000 word essay (50%) This assessment tests your ability to undertake independent work, and to apply critical theory to cultural representations. It will involve you drawing on reading from the reading list and beyond to analyse and evaluate relevant cultural representations in relation to the cultural geographies of development. 1 x 1.5 hour exam (50%) This assessment tests your understanding of the theories and critical issues raised in the lectures, and your own critical ability to compare, contrast and evaluate the lecture material, using relevant examples and concepts from your independent reading.		

03 25907	**GGM337**	**War and Peace in the Middle East**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Adam Ramadan**	
Pre-requisites: Either GGM225 Cultural Geographies or GGM226 Social & Political Geography			
Prohibited combination with: **GGM317 Biodiversity & Conservation Management** **GGM348 Remote Sensing of the Cryosphere** **ESCM345 Palaeoclimates**			
Description:	This course aims to give students a critical understanding of the political geography of the contemporary Middle East. It will introduce students to a series of key approaches in postcolonial and political geography, through which conventional images and stereotypes of the region might be unsettled and problematised. The course explores colonial legacies, geopolitical imaginaries and contemporary realities through a series of in-depth case studies. These case studies are inserted within a broad overview of regional geopolitical relations, from the First World War to the 'War on Terror'. Topics will be explored through critical theoretical approaches to geopolitics, power, sovereignty and territory. This will include work by Edward Said, Geroid Ó Tuathail, Giorgio Agamben, Derek Gregory and Stuart Elden. Students will be expected to gain a working knowledge of these theoretical approaches, and be able to use them in analysing events in today's Middle East.		
Learning Outcomes:	By the end of the module the students will be able to: • Demonstrate a critical understanding of the complex geographies, colonial legacies and postcolonial realities of the Middle East. • Critically analyse religious, national and political identities, and their roles in conflict • Understand and utilize approaches from postcolonial theory and political geography in their work. • Think critically about their own relationship(s) with the Middle East, and the forms of power/knowledge that enable such relationships.		
Assessment:	1 x 2,200 word essay (33%) 1 x 2 hour exam (67%)		

03 27196	**GGM338**	**Understanding Nature-Society Relations: the Ecological Century**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Jon Oldfield**	
Pre-requisites: Either GGM205 Environmental Assessment and Management or GGM226 Social & Political Geography			
Prohibited combination with: **EVS341 Environmental Protection**			
Description:	The 20th century has been referred to as the ecological century, a period in which humankind became aware of its overwhelming influence on the wider environment and environmental agendas began to influence policy decisions at the very highest levels. It witnessed the emergence of large-scale, international scientific initiatives (e.g. 1957-8 International Geophysical Year), popular environmental protest, and global environmental policy agendas underpinned by concepts such as sustainable development. The course explores these issues and associated understandings of the relationship between humankind and the wider environment. It pays particular attention to the experience of the Soviet Union and the West.		
Learning Outcomes:	• Demonstrate an understanding of dominant socio-environmental concepts and thinking during the 20th century • Appreciate the ways in which the Cold War and Big Science contributed to our understanding of the physical natural environment • Critically evaluate the effectiveness of sustainable development and related concepts • Show an appreciation of the differences and similarities between Soviet/Russian and Western engagements with the natural environment • Present ideas and arguments related to the key features of the course in a clear and concise manner both orally and in written form		
Assessment:	1 x 3000 word essay (50%) 1 x 1.5 hour exam, essay style (50%)		

03 26337	**GGM339**	**Environmental Justice**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Rosie Day**	
Pre-requisites: GGM 205 Environmental Assessment and Management or GGM 226 Social and Political Geographies			
Prohibited combination with: **GGM305 Environment and Landscape Change** **GGM308 Wetland Environments** **GGM358 Geographies of the Body**			
Description:	Through this module, students will explore the intersections of environmental issues and social justice, conceptual territory often termed environmental justice or environmental inequality. They will be introduced to various notions of social justice, including distributional theories, procedural theories and those concerning 'recognition'. These theories will be applied to understand various cases studies from the UK and form other parts of the world, in order to understand and analyse how various environmental issues such as pollution and climate change have different impacts on different sectors of the population. We will also consider how and why different people might experience the environment differently, and how their ability to derive benefits might not be equal. As well as analysing problems, students will consider policy perspectives: both how best to avoid engendering injustice in environmental policy making, and what kinds of policies might be needed to address existing inequalities. Substantive topics considered in the course of the module might include the distribution of air pollution and its effects; vulnerability to natural hazards; inclusive environmental design; fuel poverty. The module will complement other areas of study in the environmental, social and planning pathways of the geography undergraduate programme. It will develop key skills in critical conceptual thinking, problem solving and policy analysis and should be highly relevant to students considering careers in environmental, social and energy policy; planning and urban design; natural resource management; and social work as well as those more generally needing strong analytical and independent thinking skills for graduate level employment.		
Learning Outcomes:	By the end of the module students should be able to: • understand and explain how different sectors of the population such as older people, children and different racial groups may be differentially affected by environmental problems and environmental change • articulate different theories of social justice including theories of distribution, procedure and recognition; and apply these to understand the effects of environmental problems and environmental change on people • analyse complex situations to understand people-environment relations from competing and complementary conceptual perspectives • show an awareness of how environmental inequalities and injustices may operate across different scales, from the local to the global • consider the justice implications of policies that have positive or negative environmental impacts.		
Assessment:	34% 2,500 word essay 66% 2 hr exam		

03 21780	GGM342	Environmental Governance	20 credits
Level: H	**Semester: 2**	**Module Leader: Julian Clarke**	
Prohibited combination with: GGM348 Remote Sensing of the Cryosphere			
Description:	This module examines the ways in which uses of the natural environment are regulated, from policy and law to market-based approaches, through the lens of governance. Based around this concept the module will consider how relationships between societies and the natural resources and environments on which they depend are currently organised (through policies, law/regulation, discourses of sustainability and ecological modernisation etc.), and what alternatives might be considered. Themes to be explored include: theories of environmental governance; environmental policy – local, regional, national, global case studies; environment and capitalism; the interrelations between governance and sustainable development; trading the environment; key concepts in environmental law; international environmental politics; and seminars and key texts in environmental governance.		
Learning Outcomes:	By the end of the module the student will be able to: • understand the evolution and contemporary manifestations of environmental governance, its underlying theories and methods. • appreciate its practical application through examination of specific case studies. • critically assess the effectiveness of current governance frameworks in policy settings including climate change, agriculture, water governance, nature conservation and landscape protection. • acquire transferable skills including presentational techniques, critical thinking and application of group work activities, debate and discussion of complex issues, and individual research.		
Assessment:	1x 2500 word essay (33%); 1x 2hr exam (67%)		

03 27374	GGM348	Remote Sensing of the Cryosphere	20 credits
Level: H	**Semester: 2**	**Module Leader: Nick Barrand**	
Prohibited combination with: **GGM337 War and Peace in the Middle East** **GGM342 Environmental Governance**			
Description:	In the module 'Remote Sensing of the Cryosphere', students will be introduced to the physical principles of remote sensing, standard remotely sensed image processing techniques, and a range of applied examples in the cryospheric sciences. The syllabus will contain an introduction to electromagnetic radiation theory, sensor types, and a variety of digital image processing techniques including: image acquisition, geometric and radiometric correction, image enhancement, vegetation, snow and ice indices, image classification, change detection and accuracy assessment. In addition to this theoretical background, students will learn specific technical skills through targeted practical sessions and classroom assessments and critically engage with the key debates in the cryospheric sciences, including: monitoring snow cover and snow-water equivalent; glacier and ice cap change; ice sheet mass balance; iceberg tracking; sea ice extent and thickness monitoring; assessing glacier hazards; and monitoring change of freshwater (lake) ice and permafrost. Practical sessions will be conducted to develop critical thinking and problem solving skills. The module will develop key technical, analytical and critical skills for applying emergent earth observation and geospatial technologies to problems in the cryospheric sciences.	
Learning Outcomes:	By the end of the module, students should be able to: • Demonstrate a strong understanding of the basic radiative processes that influence observed radiance. • Demonstrate a strong understanding of the electromagnetic spectrum and it's unique relationships to remote targets. • Confidently identify, extract and analyse quantitative information from remotely sensed imagery using numerous approaches. • Apply emergent remote sensing technologies to key questions in the cryospheric sciences.		
Assessment:	5 computer practicals (each, 10%) 1.5 hour exam (50%)		

03 24061	GGM349	River Processes, Deposits and Environments	20 credits
Level: H	**Semester: 1**	**Module Leader: Greg Sambrook Smith**	
Pre-requisites: GGM208 Geomorphological Processes			
Prohibited combination with: **GGM358 Geographies of the Body** **GGM359 Russia in a Global Context**			
Description:	This module develops approaches to help understand the fundamental controls on river processes, channel change and depositional systems. The module draws on latest research as well as classic ideas. The module evaluates the different innovative ways in which fluvial scientists tackle key questions in river research. A key theme is the interaction between fluvial processes, erosion and deposition. The module initially focuses on the smaller bedform and bar scale, before considering larger channel scale issues and deposits over a range of timescales. These topics are addressed across a broad range of river systems and scales varying from single grains to whole catchments, and turbulent events to Quaternary changes. Topics to be covered will include: • Techniques for measurement, Turbulent Boundary Layer (TBL) structure, methods of shear stress determination. • Flow separation, types of secondary flows, confluence dynamics, shear layers. • TBL structure, coarse sediment entrainment, and the initiation of bedforms. • Types of bedforms and bar forms in rivers: generative mechanisms, self-organization, dynamics and stability, deposits. • Sedimentology of bedforms, bars and channels; alluvial architecture of braided and meandering systems; preservation potential of sediments.		
Learning Outcomes:	By the end of the module the student will be able to: • Develop coherent and sustained arguments on the controls of fluvial erosion, sediment transport and depositional process events, rates and mechanisms. • Demonstrate an in-depth familiarity with key concepts, models and datasets appropriate to the quantification and interpretation of river geomorphological and sedimentological dynamics, through a critical engagement with published analyses in the international scientific literature. • Articulate a sound understanding of a range of monitoring and analytical strategies in the fluvial sciences.		
Assessment:	One x 3000 word research project (50%) One x 1.5 hour exam (50%)		

03 28684	GGM351	Carceral Geographies	20 credits
Level: H	**Semester: 2**	**Module Leader: Dominique Moran**	
Prohibited combination with: **GGM312 Landscape & Urban Ecology** **GGM361 The Political Economy of Agrarian Change in the Global South** **EVS342 Climate Change in the Earth System**			
Description:	The so-called 'punitive turn' has brought about new ways of thinking about geography and the state, and has highlighted spaces of incarceration as a new terrain for exploration by geographers. This module introduces 'carceral geography' as a geographical perspective on incarceration, tracking the ideas, practices and engagements that have shaped its development, informed by and extending theoretical developments in geography, but also interfacing with contemporary debates over hyperincarceration, recidivism and the advance of the punitive state. The module will convey a sense of the debates, directions, and threads within carceral geography, tracing the origins of this sub-discipline of human geography, its synergies with criminology and prison sociology, and its likely future trajectories. The module will cover three main themes; the nature of carceral spaces and experiences within them; spatial or distributional geographies of carceral systems; and the relationship between a notion of the 'carceral' and an increasingly punitive state. By synthesizing existing work in carceral geography, and by exploring the future directions it might take, the module will develop a notion of the 'carceral' as spatial, emplaced, mobile, embodied and affective.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate a critical understanding of the theoretical underpinnings of carceral geography, and its relationship to theory-building within contemporary human geography. • Demonstrate a critical understanding of the transdisciplinary nature of carceral geography and its relationship to the cognate disciplines of criminology and prison sociology. • Show an awareness of the relationship between the debates and discourses within carceral geography and contemporary criminal justice policy in the UK and elsewhere. • Critically analyse and evaluate scholarship around three themes: (the nature of carceral spaces and experiences within and between them; spatial or distributional geographies of carceral systems; and the relationship between the carceral and an increasingly punitive state) drawing on appropriate literatures and case studies.		
Assessment:	One 1.5hr essay-style examination with unseen questions. (50%) One 3000 word essay based on set reading materials (50%).		

03 24969	**GGM353**	**Welfare, Work & Wealth**	**20 credits**
Level H	**Semester 1**	**Staff Responsible: Jessica Pykett**	
Pre-requisite: GGM226 Social & Political Geography and/or , URS202 Understanding Neighbourhood Poverty			
Prohibited Combination with: **GGM310 Weather, Climate & Society** **GGM317 Biodiversity & Conservation Management**			
Description:	This course introduces students to three key aspects of social policy (welfare, work and wealth) in order to develop understandings of the relationship between the state, markets and personal life. There will be a particular emphasis on the post-war welfare settlement in the UK and the shift towards a 'workfare state' in contemporary neoliberal democracies. The course focuses on the political underpinnings and social and geographical outcomes of social policies, examining debates concerning territorial justice, fairness and inequality. Trends in benefits, housing, health and education policies will be covered in their modern historical and geographical contexts. The course will be essential to students considering a career in policy-making, non-governmental/voluntary organisations or the public sector. Topics will include: the changing state of welfare since 1945; the cultural production of so-called 'welfare dependents'; new orthodoxies of welfare conditionality, personalised responsibility and paternalism; the changing nature of work, worker identities and labour geographies; living wage campaigns in the global city, migrant labour and the casualisation of the 'precariat' workforce; the relationship between economic policy and the wealthy; strategies used by the middle classes to secure social goods. The course will examine how such topics are gendered, classed and racialised, and will explore the policy implications of current research in the geographies of welfare, work and wealth. The course will outline the relative merits of political economy and cultural economy approaches to understanding such issues. Students will also consider the theoretical and empirical contributions of scholars from sociology, social policy, politics and education.		
Learning Outcomes:	By the end of the module students should be able to: • Critically analyse political and social debates around welfare, work and wealth; • Deliberate the effects of gendered, classed and racialised power on contemporary experiences of social inequality using appropriate evidence • Demonstrate a clear understanding of human geography and social science literature on welfare and labour • Discuss and present contemporary social and political issues using the techniques of critical policy analysis and problem-based enquiry.		
Assessment:	2 hour exam (55%) 2,500 word essay (35%) Presentation and class participation (10%)		

03 30050	**GGM358**	**Geographies of the Body**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Phil Jones**	
Pre-requisites: GGM225 Cultural Geographies or GGM226 Social and Political Geographies			
Prohibited combination with: **GGM305 Environment and Landscape Change** **GGM339 Environmental Justice** **GGM349 River Processes, Deposits and Environments**			
Description:	Our knowledge of the world is entirely dependent on our bodies. This intertwining of bodies and worlds led Robyn Longhurst (1994) to describe the body as "the geography closest in". A range of technologies have become available that allow us to investigate embodiment in novel ways: smartphone health monitoring and wearables; body-worn cameras; analysis of social media and other sources of open data. The module will combine intensive cultural geography theory with practical field-based experiments. The lectures will be accompanied by workshop sessions: initially learning and deploying different field methods; followed by sessions on project design. These sessions will include non-assessed presentations about the module fieldwork to provide ongoing formative feedback. The final assessment will be a report based on an original project investigating a topical issue in urban embodiment. Students will design their own projects responding to the theories and techniques taught on the module.		
Learning Outcomes:	By the end of the module students should be able to: • Understand and apply a range of theories and methods to everyday embodied interactions with space. • Identify a key topic in everyday embodiment and design an appropriate analytical framework • Critically evaluate a key topic in everyday embodiment deploying novel methods and cultural geography theory.		
Assessment:	1 x 5000 word project (100%)		

03 30051	**GGM359**	**Russia in a Global Context**	**20 credits**
Level: H	**Semester: 1**	**Module Leader: Paul Richardson**	
Pre-requisites: GGM225 Cultural Geographies or GGM226 Social and Political Geographies			
Prohibited combination with: **GGM310 Weather, Climate & Society** **GGM349 River Processes, Deposits and Environments**			
Description:	This module is intended to introduce students to the political, economic, and social geography of Russia. The course develops key pathways from Year 1 and 2, and will consolidate theoretical concepts by giving students opportunities to apply them to an exciting and engaging case study. Students will enhance their understanding of Russia, and its regional and global significance. In terms of assessment, students will be encouraged to think critically and creatively to pursue a policy paper on an area of their interest. They will be offered guidance in combining academic rigour and theoretical analysis with a requirement to persuade, influence, and shape a policy audience. The policy report will foster students' independent learning skills and reflective ability, as they will be encouraged to critically engage with some of the enduring stereotypes of Russia. These reports will be accessible and informative, but research-led, theoretically informed, and empirically grounded. The module will also include an end of year exam, and peer-to-peer feedback will be encouraged through formative assessment of a group presentation. The module will cover aspects of the: - historical geography of Russia, - socio-economic and political transition from Soviet Union to Russian Federation, - significance of identity discourses, - Russia's relationship with its neighbouring states and beyond. The course will put a significant emphasis on 'live' sources, such as material from exhibitions, film, media, news sources, and contemporary literature. This is designed to make students engage with Russia as a country shaping the contemporary world, and to foster out of lecture learning.	
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate an in-depth knowledge of the politics, economy, and society of contemporary Russia • Use key conceptual and theoretical approaches in the geographical literature to explain the significance of space in cultural, political, and social processes in Russia and the Soviet Union • Identify and critically evaluate some of the most creative and provocative politicians, cultural figures, and public intellectuals in Russia • Appreciate how globalization, regionalism, and geopolitics have shaped understandings of Russia in the world • Develop applied analytical skills to understand complex issues and be able to write in order to influence a range of target audiences	
Assessment:	Policy Paper – 2,000 word essay: 50% Exam (2 hrs): 50%		

03 30810	**GGM360**	**Cities and Conflict**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Sara Fregonese**	
Pre-requisites: GGM226 Social and Political Geographies			
Prohibited combination with: **GGM314 Applied Micrometeorology** **ESCM345 Palaeoclimates**			
Description:	As the majority of the planet population lives in cities, conflict is becoming predominantly an urban challenge. What does an urban lens reveal about the actors, geopolitical discourses, and practices of sovereignty underpinning conflict? How does conflict impact on the space and life of cities and how do cities, in turn, shape the way conflict develops? This course explores the urban geographies of a range of conflicts in Europe and the Middle East, with particular emphasis on: geography, politics, and planning approaches to understanding urban space and conflict; the geographies of different stages and aspects of conflict in contemporary cities, including polarisation and escalation, division, uprising, protracted conflict, terrorism and post-conflict geographies. The course draws on concepts from political geography and cognate disciplines, to explore some of the present and historical geographies of urban conflict in the Middle East and Europe. The course adopts a deliberately wide notion of conflict that encompasses situations of simmering tension, open combat through to the phases after the cessation of hostilities. It provides a conceptual vocabulary, research techniques, and a repertoire of examples to explore different instances, degrees and dynamics of conflict, including: geographies of polarisation, tension and escalation, geographies of protest and uprising, divided cities, life at home in protracted conflict and siege, terrorism, and post-conflict geographies. The course proceeds thematically and chronologically, from some of the major conflicts and urban divisions of the twentieth century (Belfast to Nicosia, from Beirut to Sarajevo) and their challenging post-conflict phases, through to the urban complexities of the Arab Spring and more recent instances of terrorism targeting urban locations. It includes traditional lecture delivery and interactive seminar discussion, where students will deepen their knowledge of and engage in comparative debate about a range of specific paradigmatic city-based case studies.	
Learning Outcomes:	By the end of the module students should be able to: • **Identify and critically evaluate** the socio-spatial and material implications of urban conflicts in Europe and the Middle East across the 20th and 21st century, as well as historically. • **Master a conceptual and policy vocabulary** to address and communicate different specific aspects, stages and dynamics of urban conflict in cities (including, but not only, urban frontiers, urbicide, urban geopolitics, urban partition, infrastructure duplication, escalation/polarisation, post-conflict reconstruction). • **Demonstrate an in-depth understanding of empirical and policy-relevant knowledges** around a portfolio of case studies of conflict and post-conflict situations across a number of cities in Europe and the Middle East. • **Develop applied analytical skills** to understand complex issues and be able to write about, discuss, and communicate conflict and post-conflict issues for a range of target audiences.	
Assessment:	Case study report (2500 words essay): 50% Written exam (90mins): 50%		

03 30812	**GGM361**	**The Political Economy of Agrarian Change in the Global South**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Fraser Sugden**	
Pre-requisites: GGM225 Cultural Geographies			
Prohibited combination with: **GGM312 Landscape and Urban Ecology** **GGM351 Carceral Geographies** **EVS342 Climate Change in the Earth System**			
Description:	The Global South is in the process of an agricultural transformation. This is driven by the expansion of markets, globalisation, and the shift towards capitalist and commercial forms of agriculture. At the same time, high labour migration means that peripheral regions are more connected with the global economy than ever before. However, in spite of this, the pattern of change has been selective and can lead to complex outcomes, with new patterns of inequality and growth both between and within regions. This module will seek to look at the historical and present day processes of agrarian change in rural communities in Asia and Africa in a global economy. Through the lens of agrarian political economy, it will seek to understand (i) the changing nature of the 'peasantry' in the 21st century; (ii) changing 'modes of production' in agriculture from the colonial to contemporary era (iii) the role of climate change and its convergence with non-economic stress (iv) the migration economy, 'feminisation' of agriculture, and what it means for rural development. The module will build directly from the themes students engaged in for module 03 27798 Cultural and Development Geographies by applying some of these larger theories at a grassroots level.		
Learning Outcomes:	By the end of the module students should be able to: • Have the ability to apply an agrarian political economy approach to analyse rural economic formations in the Global South and their interaction with global capitalism, with sensitivity to the diverse theoretical frameworks in this field and how they relate to broader debates in human geography and development studies. • Have the ability to understand the diversity in agrarian systems in the Global South including the difference between 'peasant', 'feudal' and capitalist farming systems. Understand the implications for longer term agrarian development, and how these formations have been transformed or undermined by globalisation. • Understand the role of climate change in shaping the trajectory of agrarian change in the Global South, moving beyond simplistic models of vulnerability and taking an interdisciplinary approach which recognises the fusion of biophysical, economic, political and social processes. • An ability to understand the significance of labour migration for development in rural regions of the Global South, and what it means for livelihoods. • An ability to look beyond the household as a unit of analysis and understand the significance of internal divisions such as gender and age, particularly in the context of economic change due to migration, shifting youth aspirations and changed gender roles.		
Assessment:	4000 words coursework project (100%)		

03 30813	**GGM362**	**Urban Analytics and Geospatial Analysis**	**20 credits**
Level: H	**Semester: 2**	**Module Leader: Zhaoya Gong**	
Pre-requisites: None			
Prohibited combination with: **EVS342 Climate Change in the Earth System** **EVS343 Enterprise Consultancy Challenge**			
Description:	Urban Analytics offers a field-defining look at the challenges and opportunities of using new and emerging data to study contemporary and future cities through methods including GIS, Remote Sensing and Big Data.		
Learning Outcomes:	By the end of the module students should be able to: • Have a deep understanding of urban science and digital cities • Grasp knowledge about urban analytics as an emerging and fast evolving domain of study representing a methodological toolkit for studying and managing data-rich cities • Understand and employ empirical research design approach to work with secondary spatial data and quantitative spatial analysis methods • Possess practical and analytical skills to explore, visualise and make sense of city-scale geospatial data • Gain the capability of applying analytic frameworks that allow fruitful engagement with new forms of data (e.g. social media and trajectory) applied to investigate substantive urban research problems • Develop interdisciplinary methodological skills to design practical solutions to the world's urban challenges - capitalising on emerging developments in geospatial technologies and big data analytics		
Assessment:	4,000 words for individual project on empirical urban research questions involving spatial data analysis (100%)		

03 32050	GGM363	Urban environments in the global south	20 credits
Level: H	**Semester: 1**	**Module Leader: Natasha Cornea**	
Pre-requisites: None			
Prohibited combination with: None			
Description:	Is garbage always "bad"? Are parks "good"? Are sewers political? This course will explore the social, political, and economic dimensions – processes, structures, and actors – that shape urban environments in the global South. To do this, we will draw on urban political ecology as a conceptual approach, and engage with the scholarship in South Asian and African urbanism, and post-colonial studies. Urban political ecologists understand cities to be (re)produced through a dialectical relationship between society and the biophysical environment, resulting in "hybrids" transformed through technologies and urban metabolism. These processes often result in highly unequitable urban environments. In this module, we will explore socio-natural dynamics across resource and environmental service domains, as well as examining key actors and contemporary policy debates. We will conclude by critically examining the idea and policy impetus of sustainable cities and exploring the presence of 'Southern' socio-natures in cities of the global North.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate an intermediate level of understanding of emerging themes in urban political ecology and social-natural dynamics of cities in the global South. • Engage critically with and evaluate demanding readings drawn from diverse intellectual traditions. • Identify and evaluate relevant grey literature and media sources. • Engage critically with environmental policy documents, recognising that these are both political and technical/managerial statements. • Introduce intermediate level ideas in analysis of selected topic through the assignments. • Effectively communicate complex ideas in writing.		
Assessment:	4000 word Essay (100%)		

03 32088	GGM364	Extractive Politics	20 credits
Level: H	**Semester: 2**	**Module Leader: Kärg Kama**	
Pre-requisites: None			
Prohibited combination with: None			
Description:	This module offers students a critical understanding of recent changes in the political geographies of resource extraction in response to growing concerns over the scarcity, security and social desirability of fossil fuels and key mineral resources. Using a variety of social science perspectives, the course examines key scientific and political controversies around the ideas of 'peak oil' and 'resource curse', and the associated development of new kinds of extractive resources, technologies and infrastructures, such as unconventional fossil fuels and deep-sea mining. We will explore how these controversies not just reconfigure the political economies of the producing states, but also operate as catalysts for wider social changes and public resistance. In this context, we will also examine a range of case studies of very recent grassroots protests across the world: from 'anti-fracking' campaigns to pipeline protests such as #NODAPL, to the fossil fuel divestment movement and other forms of post-carbon democracy. Through lectures, seminars and independent work, students will thus acquire a critical perspective on some of the most topical and challenging issues faced by the contemporary world.	
Learning Outcomes:	By the end of the module students should be able to: • Think critically about recent developments in resource-based economies and politics • Debate complex and contentious issues based on both academic and grey literature • Critically examine and contextualize social science perspectives to real-world problems • Develop individual research and writing skills		
Assessment:	4000 words written project (extended essay) on a chosen case study of contemporary extractive politics (100%)		

03 23433	**EVS341**	**Environmental Protection**	**20 credits**
Level: H	**Semester: 1 & 2**	**Module Leader: Iseult Lynch**	
NB: A 10-credit version of this module (03 26490), that can be taken in either Semester, is available. Please contact the School.			
Pre-requisites: EVS229 Environmental Pollution			
Prohibited combination with: **GGM338 Understanding Nature-Society Relations: The Ecological Century**			
Description:	This module provides an overview of some of the key principles and approaches to environmental protection, including the precautionary principle, ecosystems services and environmental impact assessment, and key regulatory frameworks such as REACH, the Water Directive Framework (including the pesticide and wastewater directives), and the EU 2020 Biodiversity Strategy. Building on these frameworks, the module will introduce approaches to monitoring and quantifying current exposure to, and hazard from, pollutants as the basis of risk assessment, using examples from air, water and soil pollution and exposure via food. The second semester will use fundamental concepts from semester 1 and apply them via mathematical models of environmental processes in order to predict to future exposure (and hazard) in a range of scenarios. The module will conclude with an overview of the legal basis of environmental protection, including the legal interventions available to regulators in preventing and resolving environmental pollution incidents. Case studies will be used extensively to illustrate examples; including remediation of contaminated land, environmental impact assessment of human activity such as the high-speed rail, and environmental impacts of nano-enabled products.		
Learning Outcomes:	By the end of the module students should be able to: • Demonstrate understanding of key concepts in environmental protection and the major EU environmental protection directives applicable to air, water, soil, plants and food • Show understanding and application of the principles of human exposure & health impacts assessment, including advantages & limitations of various sampling techniques • Demonstrate understanding and application of some simple mathematical modelling approaches and be able to apply these to a range of environmental problems. • Show understanding of how key environmental protection concepts, principles and models are integrated into environmental protection strategies, policies, programmes and legislation.		
Assessment:	1.5 hour examination paper (50%). 1500-word essay per semester (25% each)		

03 30021	EVS342	Climate change in the Earth System	20 credits
Level: H	**Semester: 2**	**Module Leader: Tom Pugh**	

Prohibited combination with:
GGM351 Carceral Geographies
GGM361 The Political Economy of Agrarian Change in the Global South

Description:	Climate change is more than just an atmospheric phenomenon. The atmosphere is closely coupled with the land and ocean surface, exchanging fluxes of carbon, energy, water and trace substances. Climate change profoundly affects these fluxes, and these fluxes in turn can profoundly affect climate change. Further, human actions have, and continue to, greatly modify how the land surface interacts with the atmosphere, and thus climate. However, human actions are always taken in the context of the environment in which they live. To understand the response of any part of this system to a particular forcing, it is necessary to consider the interactions and feedbacks between all the other parts. This module will introduce the key aspects of this system, building an appreciation of the uncertainties and complexities in the projections of global climate and climate impacts. Students will directly analyse state-of-the-art environmental data such as that underling the latest IPCC assessment report. They will thus develop an appreciation of current modelling and measurement techniques used in research, along with the ability to manipulate and interpret environmental big data. The basis for analysis in this module will be the R programming language. Students will be introduced to all necessary R techniques in the first weeks of the module, so no prior experience is necessary.
Learning Outcomes:	By the end of the module students should be able to: • Understand the main elements of the Earth system, and how they interact and feedback on each other through cycles of carbon, nutrients, water and energy. • Appraise the current state of scientific knowledge of Earth system processes, including identifying uncertainties and knowledge gaps. • Formulate hypotheses describing the response of Earth system components and design methods to test them. • Investigate the effects of climate policy options in terms of both their efficacy and their wider consequences within the Earth system. • Manipulate and interpret large environmental datasets using appropriate computational techniques.
Assessment:	2000 word report with appendix detailing data analysis (60%). 700 word popular science article (20%) 700 word project pitch (20%)

08 10698 **URS305**		**Contemporary Issues in Urban Development and Planning** **20 credits**
Level: H	**Semester: 1 & 2**	**Module Leader: Austin Barber**
NB: For students who are only here for Semester 1, this module can be taken but remains at 20 credits. Please contact the School. Students will be required to have sufficient evidence of a planning focus in their studies to take this module.		
Description:	This module explores contemporary aspects of the urban development process and the role of planning in mediating diverse interests in complex city environments. It is designed to enable you to develop knowledge and skills that will provide a foundation for pursuing careers in planning, property, urban design and related professional fields. It begins by examining the development process, including property market dynamics and the roles of key actors. It considers the tensions and trade-offs between developers, residential and business communities, and public sector interests, and how these are played out through the planning system. Using case studies we look at how these trade-offs shape the development of the built environment in terms of mixed uses, urban design, public space and other respects. The module takes a practical and applied approach to the topic. Students engage in hands-on work on development sites in Birmingham and the programme includes contributions from planning, property and urban design practitioners from the private and public sectors in the city. In the second half of the module students undertake group project work in conjunction with planning and regeneration organisations in Birmingham. These projects are based around real-life development and place-making processes in the city and the student work feeds directly into policy making activity in these areas.	
Assessment:	• An individual report of up to 3,000 words on planning challenges and the mediation of contested interests in the urban development process (50%); this draws upon work undertaken for group site appraisal presentations in the autumn semester. • A Planning Project (50% total); this comprises a group presentation to professional practitioners (10%) and an associated individual project report (40%)	

08 22865	**URS306**	**Regenerating Urban Communities**	**20 credits**
Level: H	**Semester: 1 & 2**	**Module Leader: Mike Beazley**	
NB: For students who are only here for one Semester, this module can be taken in either semester 1 or 2 but remains at 20 credits. Please contact the School.			
Prohibited combination with: **GGM353 Welfare, Work & Wealth**			
Description:	This module is designed to explore the experience of communities engaged in urban regeneration by means of drawing on specific experience in the field. Regeneration is multi-faceted and complex and is also primarily about people's lives. The module is a good opportunity to build a framework within which that story can be heard. There is an explicit focus on community involvement and the role it plays in relation to the regeneration of urban neighbourhoods. There is a focus on exploring the experience of community-based solutions and activities in relation to urban regeneration. It combines teaching, class discussion, visits and project work to enable students to experience at first hand the regeneration process at work from a community perspective. The programme of study comprises of a 20 credit module delivered over two semesters. The classes in Semester 2 will explicitly focus on the Castle Vale case study via a student-centred learning project that will explore the notion of what makes Castle Vale work as an example of involving local communities in the process of urban regeneration. The intention is to identify what potential lessons we can learn from this experience that will help inform contemporary urban regeneration activities elsewhere.		
Learning Outcomes:	By the end of the module you are expected to: • Understand what we mean by "community" in particular contexts • Identify and analyse of the value and purpose of community involvement in the regeneration process • Have an understanding of the context of urban regeneration and how it has changed • Have a practical understanding of actual examples of community involvement in action • Identify key lessons from the case study for the future of regeneration activity		
Assessment:	Assessment: 3,000 word Essay (50%) Group Project Presentation / Compendium (10%) Individual Project Report (40%).		

Year 4 (MSci): all Programmes

Module Information

PLEASE NOTE THAT THE PASS MARK FOR ALL 4TH YEAR MODULES IS 50%

03 24681	**ESCM424**	**Inorganic Chemistry and Groundwater**	**10 credits**
Level: M	**Semester: 1**	**Module Leader: John Tellam**	
Description:	The inorganic aqueous chemistry principles relevant to understanding groundwater quality and how it evolves. Application of these principles to quantitative and qualitative problem solving in groundwater systems. Lectures, frequent practical exercises on both invented and real datasets, and a computer session using a geochemical modelling code.		
Learning Outcomes:	By the end of the module, students should be able to: • understand the main inorganic chemical processes relevant in groundwater systems; • quantify some of these processes; • use their understanding to tackle some specific types of groundwater quality –related problem; • use their understanding to see how other types of problem may be tackled in principle.		
Assessment:	1.5 hour examination		

03 24680	**ESCM426**	**Environmental Geophysics**	**10 credits**
Level: M	**Semester: 1**	**Module Leader: Stefan Krause**	
Description:	Students will be taught the principles of examining the shallow subsurface using a variety of geophysical techniques, but with the emphasis on electrical and electromagnetic surveys, together with applications of environmental geophysics. Students will be taught in practical sessions the principles and applications of spatial data analysis with Geographical Information Systems (GIS) and remote sensing.		
Learning Outcomes:	By the end of the module, students should be able to: • understand how geophysics can be applied in environmental investigations; • design shallow subsurface surveys; • interpret quantitatively certain types of geophysical data		
Assessment:	Class Test (40%) & 1.5 hour examination (60%).		

03 24881	**ESCM428**	**Groundwater Organic Contaminant Pollution & Remediation**	**20 credits**
Level: M	**Semester: 2**	**Module Leader: John Tellam**	
NB: This module is only available to those students who will be in attendance for the full academic year			
Description:	**Aim:** To provide the organic contaminant hydrogeological knowledge base that will underpin potential future professional activity in the field of groundwater organic contaminant remediation. **Description:** Pollution of groundwater by organic contaminants remains a key driver of exceedingly expensive contaminated land and groundwater investigation and remediation efforts. This module seeks to provide the organic contaminant hydrogeological knowledge base that will underpin a student's potential future professional activity in this field. The module will cover contaminant source terms, contextual toxicology and environmental standards and legislation; organic contaminant phase partitioning to air, water, solids; conceptual models of contaminant migration; processes of sorption, chemical reaction, biodegradation; and, NAPL multi-phase flow. These will be illustrated by contaminant case studies throughout. Student learning will be underpinned by set calculation problem sheets. These theoretical aspects will underpin more industry applied / research-based subsequent learning on contaminated land / groundwater legislative frameworks, groundwater; groundwater risk assessment (industry-led ConSim workshop), site investigation and groundwater monitoring practice and groundwater remediation options. Remediation will predominantly focus on organic contaminants, but also include some discussion of related fields of metals - hydrochemistry, radiological and microbiological contaminant. Remediation will cover a range of representative modern technologies as well as groundwater protection initiatives and relevant waste disposal practice.	
Learning Outcomes:	By the end of the module, students should be able to: • Show advanced understanding of processes controlling organic contaminant fate and transport in groundwater systems – this understanding should be from both organic/physical chemistry and hydrogeology standpoints • Demonstrate quantified understanding of topics and undertake appropriate hand calculations • Demonstrate theoretical and applied understanding of groundwater – contaminated land remediation implementation including accompanying aspects of site investigation/monitoring, risk assessment and regulatory contexts. • Demonstrate research-level literature awareness of the specialised topics selected for the coursework projects.		
Assessment:	1.5 hour written examination (65%) and coursework project (35%)		