**School of Geography, Earth and Environmental Sciences**

**Guide to Module Choices for Incoming Exchange Students**

**2020/21**

Introduction

Please find enclosed module information for the Academic Year 2020/2021. 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]](#footnote-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]](#footnote-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.

**Year 1 Modules (Certificate Level) - All Programmes**

**Banner Code Module Code/Title Credits Sem**

**Earth Science Modules**

03 29992 Earth Systems 20 credits Sem 1

03 33739 Atoms to Volcanoes 10 credits Sem 1

03 29202 Earth History and Life 20 credits Sem 2

03 29210 Structural Geology 20 credits Sem 2

03 33736 Minerals and Magmatism 20 credits Sem 1

03 33740 Earth Structures and Tectonics 10 credits Sem 2

**Geography and Environmental Science Modules**

03 33575 Contemporary Human Geography A 10 credits Sem 1

03 33562 Contemporary Human Geography B 10 credits Sem 2

03 33629 Global Environmental Issues A 10 credits Sem 1

03 33630 Global Environmental Issues B 10 credits Sem 2

03 30019 From Molecules to Materials:

Deconstructing the Environment 20 credits Sem 1

03 33631 Statistical Methods and Applied Geographical

Information Systems 20 credits Sem 2

**Planning Modules**

03 33935 Planning of the Built Environment A 10 credits Sem 1

03 33939 Planning of the Built Environment B 10 credits Sem 2

08 03434 Society, Space and Policy 10 credits Sem 1

08 03133 Economy, Space and Policy 10 credits Sem 2

08 27805 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 24064 Sedimentology 20 credits Sem 1

03 33762 Resources and Exploration 20 credits Sem 1

03 33758 Hydrogeology 10 credits Sem 1

03 33756 Resource Geology 10 credits Sem 1

03 33860 Geological Natural Hazards 20 credits Sem 2

03 33870 Oceans through Time 10 credits Sem 2

**Geography and Environmental Science Modules**

03 18180 Hydroclimatology: climate and water 20 credits Sem 1

03 18182 Ecological Systems 20 credits Sem 1

03 27827 Environmental Pollution 10 credits Sem 2

03 35199 Environmental Human Geography 20 credits Sem 2

03 34034 Cultural Geographies 20 credits Sem 2

03 34027 Social Geographies 20 credits Sem 1

03 34031 Political Geographies 20 credits Sem 2

**Planning Modules**

03 34084 City Challenges and Policy Responses 20 credits Sem 2

03 34071 Urban Policy Design and Planning Analysis 20 credits Sem 1

**Year 3 Modules (Honours Level) - All Programmes**

**Banner Code Module Code/Title Credits Sem**

**Earth Science Modules**

03 24058 Petroleum Geoscience 20 credits Sem 2

03 10820 Evolution of Vertebrates 20 credits Sem 2

03 29212 Engineering Geology And Hydrogeology 20 credits Sem 2

03 29214 Geological Natural Hazards 20 credits Sem 2

03 29231 Tectonic & Magmatic Processes 20 credits Sem 1

03 29996 Palaeoclimates 20 credits Sem 2

03 35203 Applied Micropalaeontology 20 credits Sem 1

**Geography and Environmental Science Modules**

03 25908 Wetlands Environment 20 credits Sem 1

03 27192 Biodiversity and Conservation Management 20 credits Sem 1

03 26374 Remote Sensing of the Cryosphere 20 credits Sem 2

03 28684 Carceral Geographies 20 credits Sem 2

03 27824 Geographies of Children and Young People 20 credits Sem 2

03 32050 Urban Environments in the Global South 20 credits Sem 1

03 32088 Extractive Politics 20 credits Sem 1

03 35202 Rural Geography 20 credits Sem 2

03 30022 Environmental Management: Theory,Policy,

Practice 20 credits Sem 1

03 30023 Pollution Impacts and Waste Management 20 credits Sem 2

**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 24060 Petroleum Geoscience 20 credits Sem 2

03 29213 Engineering Geology & Hydrogeology 20 credits Sem 2

03 33794 Inorganic Chemistry and Groundwater &

Borehole Design Construction and Maintenance 20 credits Sem 1

03 29215 Geological Natural Hazards 20 credits Sem 2

03 18108 Evolution of Vertebrates 20 credits Sem 2

03 29237 Tectonic and Magmatic Processes 20 credits Sem 1

03 30003 Palaeoclimates 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**

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| **03 29992** | **Earth Systems** | | **20 credits** |
| **Level: C** | **Semester: 1** | **Module Leader: Paul Anderson** | |
| **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, 5. Geomorphology and 6. 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 and geomorphological processes using evidence from 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:** | Assessment:  Multiple choice/short answer exam(s) covering all module content | | |

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| **03 33739** | **Atoms to Volcanoes** | | **10 credits** |
| **Level: C** | **Semester: 1** | **Module Leader: Alan Hastie** | |
| **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 building planetary bodies from scratch. The discussion begins with the atoms, 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 magmatic processes with an emphasis on the larger impacts of volcanological hazards. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * 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. | | |
| **Assessment:** | Examination (MCQ and short answer) – 1.5 hours (100%) | | |

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| **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%) | | |

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| **03 29210** | **Structural Geology** | | **20 credits** |
| **Level: C** | **Semester: 2** | **Module Leader: Marco Maffione** | |
| **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:** | Theory class test (mainly short answer and MCQ) – 1.5 hours (50%).  Examination 2.0 hours (50%) | | |

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| **03 33736** | **Minerals and Magmatism** | | **20 credits** |
| **Level: C** | **Semester: 1** | **Module Leader: Alan Hastie** | |
| **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:** | Multiple choice question examination (January- 60%)  2 hr Practical in-class test (40%) | | |

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| **03 33740** | **Earth Structures and Tectonics** | | **10 credits** |
| **Level: C** | **Semester: 2** | **Module Leader: Paul Anderson** | |
| **Description:** | The evolution of the Earth’s crust and mantle over geological time involves a variety of tectonic processes that drive deformation and mountain building. This module provides essential level C introduction and grounding in tectonics and structual geology. Key skills include identifying and describing structures, tectonics and map interpretation. | | |
| **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 principles of plate tectonics. | | |
| **Assessment:** | Theory class test (MCQ) 1.5 hours (100%) | | |

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| **03 33575 GGM101** | | **Contemporary Human Geography A** | **10 credits** |
| **Level: C** | Semester: 1 | **Module Leader: Lloyd Jenkins** | |
| **Description:** | The course begins with an introduction to the big themes and academic nature of the discipline. Subsequent sections will consider the academic development, key concepts, current issues and debates central to sub-disciplines within Human Geography, drawn from the 9 key research areas in the school. | | |
| **Learning Outcomes:** | By the end of semester 1, students will:  • have achieved a basic understanding of the nature of human geography at degree level.  • Be able to identify some key themes and concepts within the human geographical sub-disciplines covered during the semester.  • understand human geography as a discipline rooted in real-world issues. | | |
| **Assessment:** | 2000 word essay (100%) | | |

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| **03 33562 GGM101** | | **Contemporary Human Geography B** | **10 credits** |
| **Level: C** | Semester: 2 | **Module Leader: Lloyd Jenkins** | |
| **Description:** | The module draws upon those key sub-disciplines within Human Geography considering their academic development, along with key concepts and debates. 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:** | By the end of semester 2, students will:  • Have achieved a broader understanding of the scope and changing nature of human geography at degree level be able to identify key themes and concepts within human geography’s sub-disciplines, with particular reference those taught in the semester.  • Build upon the theoretical understandings of Human Geography established in Contemporary Human Geography A  • 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 | | |
| **Assessment:** | Two-hour examination (100%). | | |

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| **03 33629** | | **Global Environmental Issues A** | **10 credits** |
| **Level: C** | Semester: 1 | **Module Leader: Chris Bradley** | |
| **Description:** | This 10-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 | | |
| **Assessment:** | 1.5hr unseen examination, essay style, 2 questions (100%) | | |

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| **03 33630** | | **Global Environmental Issues B** | **10 credits** |
| **Level: C** | Semester: 2 | **Module Leader: Chris Bradley** | |
| **Description:** | This 10-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 | | |
| **Assessment:** | 1.5hr unseen examination, essay style, 2 questions (100%) | | |

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| **03 30019** | | **From Molecules to Materials: deconstructing the environment** | **20 credits** |
| **Level: C** | Semester: 1 | **Module Leader: Iseult Lynch** | |
| **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.  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;  Biogeochemical cycles (e.g. nitrogen, phosphorus; mercury);  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;  Carbon chemistry including funtional groups, polymers, surfactants, pesticides;  Colloids and nanoparticles;  Further important examples of chemical reactions in the environment, such as redox reactions as applied in wastewater treatment | | |
| **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 %) | | |

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| **03 33631** | | **Statistical Methods and Applied Geographical Information Systems (GIS)** | **20 credits** |
| **Level: C** | Semester:2 | **Module Leader: Ian Phillips** | |
| **Description:** | This module will teach the essentials of statistical data analysis, GPS, GIS and Remote Sensing. The main aim is to enable the student to be proficient in the statistical analysis of research data sets and the creation of digital maps by the familiarisation of basic GIS techniques. This will include fundamental knowledge and understanding of the analysis of data sets through the application of descriptive statistics (measures of central tendency, variability and skewness), inferential statistics (Student’s *t* test, analysis of variance, Chi-Square test, correlation) and multi-variate statistics (e.g. linear regression). Simple spatial analysis is considered towards the end of the module to educate students to the potential analyses suitable for research projects. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * To understand the theory underpinning selected statistical methods and tests. * To conduct a selection of statistical tests by hand and by computer programme. * To interpret correctly the results of statistical analysis. * To explain the basic principles and theory of GPS, GIS and Remote Sensing. * To identify where and how to access spatial data sources. * To use ArcGIS package to create maps and perform simple spatial analyses. | | |
| **Assessment:** | Coursework:   * Statistics question booklet: 30% * Statistics question booklet: 20%   Applied Geographical Information Systems coursework (50%) | | |

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| **03 33935** | | **The Planning of the Built Environment A** | **10 credits** |
| **Level: C** | Semester: 1 | **Module Leader: Mike Beazley** | |
| **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.  A key objective of this module is the understanding of how cities and planning should be understood today. It will examine the roots and the development of planning from its origins up to the present day.  Key texts for this part of the module will be Hall, P (2014) Cities of Tomorrow, Blackwell Publishing (4th edition) and LeGates, R.T and Stout, F.(eds) (2016) The City Reader, Routledge (6th Edition) | | |
| **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. | | |
| **Assessment:** | Poster (20%)  2,000 word essay (80%) | | |

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| **03 33939** | | **The Planning of the Built Environment B** | **10 credits** |
| **Level: C** | Semester: 2 | **Module Leader: Mike Beazley** | |
| **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.  This module explores the contemporary operation of the planning system and examines 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; * Identify the key contemporary issues in the urban and regional environment; | | |
| **Assessment:** | 2-hour Examination (100%) | | |

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| **08 03434** | | **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 | | |

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| **08 03133** | | **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. | | |

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| **08 27805** | | **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%). | | |

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| Year 2: all Programmes |

**Module Information**

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| **03 24064** | | **Sedimentology** | **20 credits** |
| **Level: I** | Semester: 1 | **Module Leader: James Wheeley** | |
| **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. | | |
| **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 for a range of sedimentary systems 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 hour examination (30%)  1,000 word core logging exercise (20%)  Assessed thin section exercise and 2500 word write-up (70%) | | |

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| **03 33762** | | **Resources and Exploration** | **20 credits** |
| **Level: I** | Semester: 1 | **Module Leader: Jason Hilton** | |
| **Description:** | Aims: To provide a fundamental introductory understanding of the principles and practice of resource geology and the geophysical and geological techniques used in their exploration.  Description:  The broad, introductory module in resource and exploration geology aims to develop themes that underpin exploitation of the Earth’s physical resources, and that are central to many graduate careers in geoscience. These themes comprise:   * Resources as bulk materials, aggregates: exploration and evaluation using Geographical Information Systems (GIS). * Shallow geophysics (seismic refraction, resistivity, ground penetrating radar during aggregate evaluation and for construction). * Hydrocarbon systems and application of seismic reflection and well-logging methods for their exploration. * Igneous ore deposits: formation, exploration using gravity, magnetics and remote sensing. * Surface and hydrothermal ore deposits. * Earth’s energy resources: formation and extraction of oil, gas, coal, ground source, nuclear resources. * Resource management.   The module also included training in the production of concise, structured reports developed to professional standards as expected in industry and employment. Practical components are based on real-world scenarios and where possible link to fieldwork modules. Topics covered are developed in subsequent years in the areas of applied and resource geology (e.g. engineering geology, petroleum geosciences). | | |
| **Learning Outcomes:** | By the end of the module the student 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 geological maps, satellite and geophysical data and identify appropriate extraction and processing techniques for different resources. * Describe the principals of acquiring remotely measurable geophysical information. * Understand and apply the techniques used in Geographical Information Systems (GIS) and Remote Sensing. * Outline the applications of the principal geophysical exploration techniques. * Carry out basic geophysical calculations and analyses. * Interpret and integrate geophysical data. * Produce reports on to professional standards expected in industry. | | |
| **Assessment:** | 3 pieces of coursework :  Geophysics exercise (~ 500 words + diagrams/tables/calculations; 20%)  GIS practical exercise and report (15% ~ 500 words, 1 figure from software used, and data tables)  Remote sensing practical exercise and report (15% ~ 500 words, 6 figures from software used)  Exam: 2 hour short answer format covering entire module: (50%). | | |

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| **03 33758** | | **Hydrogeology** | **10 credits** |
| **Level: I** | **Semester: 1** | **Module Leader: John Tellam** | |
| **Description:** | The aim of this module is to provide a fundamental introductory understanding of hydrogeology , covering an introduction to groundwater flow, groundwater chemistry, and groundwater resource development and protection, with an emphasis on quantification. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Understand and quantify basic processes governing the occurrence and flow of groundwater in the geological subsurface. * Apply basic hydrogeological analysis to a real locality. * Have acquired a foundational expertise to undertake advanced resource and hydrogeology-related courses | | |
| **Assessment:** | 1.5 hour exam on hydrogeology content (100%) | | |

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| **03 33756** | | **Resource Geology** | **10 credits** |
| **Level: I** | **Semester: 1** | **Module Leader: Jason Hilton** | |
| **Description:** | Aims: To provide a fundamental introductory understanding of the principles and practice of resource geology and the geophysical interpretation.  Description:  The broad, introductory module in resource geology aims to develop themes that underpin exploitation of the Earth’s physical resources, and that are central to many graduate careers in geoscience. These themes comprise:   * Resources as bulk materials, aggregates: exploration and evaluation using Geographical Information Systems (GIS). * Hydrocarbon systems and application of seismic reflection and well-logging methods for their exploration. * Igneous ore deposits: formation, exploration using gravity, magnetics and remote sensing. * Surface and hydrothermal ore deposits. * Earth’s energy resources: formation and extraction of oil, gas, coal, ground source, nuclear resources. * Resource management.   The module also included training in the production of concise, structured reports developed to professional standards as expected in industry and employment. Practical components are based on real-world scenarios and where possible link to fieldwork modules. | | |
| **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 geological maps, satellite and geophysical data and identify appropriate extraction and processing techniques for different resources. * Understand and apply the techniques used in geographical information systems (GIS) and remote sensing * Interpret and integrate geophysical data. * Produce reports on to professional standards expected in industry. | | |
| **Assessment:** | Assessments:  3 pieces of coursework  Geophysics exercise (~ 500 words + diagrams/tables/calculations; 40%)  GIS practical exercise and report (30% ~ 500 words, 1 figure from software used, and data tables)  Remote sensing practical exercise and report (30% ~ 500 words, 6 figures from software used) | | |

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| **03 33860** | | **Geological Natural Hazards** | **20 credits** |
| **Level: I** | **Semester: 2** | **Module Leader: Seb Watt** | |
| **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:** | By the end of the module students should be able to:   * Understand the nature, principal causes and the effects of a range of geological hazards. * Understand how geological and human factors determine hazards and risks associated with natural geological processes * Understand monitoring and communication approaches for mitigating the impacts of a range of geological natural hazards, and how these vary between hazard types * Evaluate mitigation strategies for geological natural hazards based on an understanding of potential impacts and vunerability. | | |
| **Assessment:** | Two assessed practical exercises (40% in total).  End of module examination comprising both short-answer and longer-format questions (60%). | | |

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| **03 33870** | | **Oceans Through Time** | **10 credits** |
| **Level: I** | **Semester: 2** | **Module Leader: Sarah Green** | |
| **Description:** | How does the ocean ‘work’? And how has this changed over time? This module will introduce the basics of physical, chemical, and biological oceanography (e.g., thermohaline circulation, currents/gyres, residence times, marine food webs, the biological pump). Building on the Yr 1 ‘Earth History’ module, this module will cover the evolution of the biogeochemical ocean system, from early Earth at the dawn of life through to the human impacts on oceans in the Anthropocene. Building on the Yr 1 ‘Earth Systems’ module, this module will also cover the interactions between the ocean and other parts of the Earth system (atmosphere, ice, marine sediments, and the solid earth). This course will be taught via a mixture of lectures and inquiry-based practicals. This course is strongly recommended for any students considering the Yr 3 ‘Palaeoclimates’ or ‘Climate Change and the Earth System’ modules. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Be able to formulate the main patterns and drivers of ocean circulation and global biogeochemical cycles * Demonstrate understanding of the timescales over which the various ocean processes occur including performing simple calculations (e.g., residence times) * Show a detailed understanding of the key changes the ocean has undergone from the early Earth through to the Anthropocene | | |
| **Assessment:** | Examination (100%) based on lecture and practical content | | |

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| **03 18180** | | **Hydroclimatology: climate and water** | **20 credits** |
| **Level: I** | Semester: 1 | **Module Leader: Martin Widmann** | |
| **Description:** | The module introduces the Earth’s climate, weather and water system, represented by hydroclimatological variables such as precipitation, wind, atmosphericpressure, temperature, evaporation, snow and ice, (sub)surface water, and rivers. We will discuss how to measure these variables with in-situ and remote sensing methods  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 hours to centuries. We will investigate the meteorological and hydrological processes affecting these variables and the way they are linked through the water balance. This will include discussing the impact of human-induced climate change on hydroclimatic variables. | | |
| **Learning Outcomes:** | By the end of the module the student should be able to:   * 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, soil moisture, groundwater, snow and ice lakes and wetlands, and stream flow. * Explain the spatial and temporal variation in hydroclimatological variables for the globe and the UK; * Discuss the challenges in hydroclimatology resulting from increasing human impact upon natural processes, including anthropogenic climate change. | | |
| **Assessment:** | Assessments: 1.5 hour unseen examination (50%)  Coursework: poster presentation (50%) | | |

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| **03 18182** | | **Ecological Systems** | **20 credits** |
| **Level: I** | Semester: 1 | **Module Leader: Mark Ledger** | |
| **Description:** | 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 and food web dynamics will be described.  The second part of the module applies ecological theory acquired in the first part of the module to focus on the structure and function of freshwater ecosystems, including both lakes and rivers and investigates the adaptations of freshwater organisms to their habitat. Some of the unifying concepts of rivers, including the River Continuum Concept and nutrient spiralling, will be summarised. Anthropogenic influences on freshwaters will also be discussed including river regulation, urbanisation, organic pollutants, acidification, mining and forestry. | | |
| **Learning Outcomes:** | By the end of this module students should be able to:   * 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. * 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:** | Five 15-minute multiple choice class tests in  semester 1 (50%);  1.5 hr Unseen Examination (50%) | | |

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| **03 27827** | | **Environmental Pollution** | **20 credits** |
| **Level: I** | Semester: 1 | **Module Leader: Zongbo Shi** | |
| **Description:** | Pollution in the environment is one of major threats facing society whether in the form of gases (e.g air pollution, climate change), dissolved substances (e.g. mine drainage), liquids (e.g. water) or particles (e.g. nanoparticles,microplastics and airborne particles). This module will introduce the main environmental pollutants, their causes and effects aswell as 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.  Lectures will be supported by workshops and laboratory and computer practicals to allow students to put in practice theoretical concepts. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Have an in-depth knowledge of sources and processes of the air pollutants. * Have a knowledge of the causes and effects of climate change. * Have knowledge of the causes and effects of novel pollutants such as nanomaterials and POPs * 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:** | 1500 word lab reports (excluding figures and tables (30%)  3 min video (group - 2 to 3 - assessment) (70%) | | |

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| **03 35199** | | **Environmental Human Geography** | **20 credits** |
| **Level: I** | Semester: 2 | **Module Leader: Steven Emery** | |
| **Description:** | This module provides a foundation in environmental human geography. It encourages critical reflection on the relationship between humans and ‘nature’ as well as the tensions inherent in the various social relations and interests that underlie engagement with the environment.  This critical perspective is extended to problematize prominent principles (such as sustainable development, ecosystem services and resilience) and to examine them in relation to environmental policy and management practices from national and international case studies. In sum, the module demonstrates the value of a theoretically grounded social scientific approach for understanding and implementing contemporary approaches to managing human interaction with the environment. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Articulate, problematize and critique key concepts framing environmental management. * Apply different theoretical understandings of human-environment relations to analyse and interpret contemporary approaches to environmental governance. * Identify key factors and concerns in the public understanding of environmental issues. * Appreciate the relevance of social, cultural and political dimensions in evaluating approaches to environmental governance and engagement | | |
| **Assessment:** | 2,000 word essay (50%)  1.5 hour exam (50%) | | |

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| **03 34034** | | **Culutral Geographies** | **20 credits** |
| **Level: I** | Semester: 2 | **Module Leader: Phil Jones** | |
| **Description:** | The module focus will be on cultural geographies, with particular emphasis on landscapes, embodiment and cities. Material covered will move from the birth of the modern city in the mid-nineteenth century through to the present day. The module will raise questions around how spaces are embodied and lived, alongside the creation of identities and landscapes. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Understand the diversity of theoretical approaches to examining cities, bodies and landscapes. * Critically deconstruct the explanatory power of different theoretical frames from cultural geography. * Apply a range of theoretical concepts to analyse the world around us. | | |
| **Assessment:** | 4,000 word essay (100%) | | |

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| **03 34027** | | **Social Geographies** | **20 credits** |
| **Level: I** | Semester: 1 | **Module Leader: Natasha Cornea** | |
| **Description:** | This module uses a range of contemporary social geographical approaches to understand how, why and in what ways individuals and organizations act in an increasingly globalized world.  The module will elaborate a critical geography approach with regard to current socio-economic developments at a range of scales including the global, national, local environments, cities, neighbourhoods, and individual bodies, paying particular attention to social differences and axes of power. 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 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. | | |
| **Learning Outcomes:** | By the end of the module the student will be able to:   * Be able to recognise the social implications, elements and functioning of neoliberal policies at a global scale, and understand the core components of critical geographic thought with regard to contemporary social geography issues as these affect different social groups. * Relate critical geography approaches to questions of social equity and justice, migration, citizenship, urban change, and contemporary socio-demographic change, connecting the global scale with everyday life. | | |
| **Assessment:** | 4,000 word essay | | |

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| **03 34031** | | **Political Geographies (Sovereignties in a Changing World)** | **20 credits** |
| **Level: I** | Semester: 2 | **Module Leader: Julian Clark** | |
| **Description:** | This module uses a range of contemporary key concepts and methods in political geography and geopolitics to understand how, why and in what ways current and emergent forms of sovereignty, statehood and territory are mobilised by states, cities, organizations and individuals in an increasingly globalized world. Specifically, drawing on historic and contemporary examples (including case studies of inter alia Lebanon, Russia, the European Union), the module examines (1) how sovereignty emerged and been sustained as one of the critical drivers of political geography by actors and organizations, and how is it manifested at a variety of spatial scales; and (2) how sovereignty is implicated in current and likely future patterns and processes of political contestation, (dis)integration and geopolitical developments locally, nationally and globally in the 21st century. | | |
| **Learning Outcomes:** | By the end of the module the student will be able to:   * Be able to recognise the political implications, elements and functioning of sovereignty at a variety of scales, and understand the core components of critical geographic thought with regard to contemporary sovereigntyscapes * Relate critical geography approaches to questions of sovereignty, states, borders, territories, equity and justice, migration, citizenship, urban change, and contemporary geopolitics. * Understand some of the key concepts in contemporary political geographical and geopolitical thought and the key events and processes underpinning changing political geographies of sovereignty. | | |
| **Assessment:** | 2 hour examination | | |

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| **03 34038** | **City Challenges and Policy Responses** | | **20 credits** |
| **Level: I** | **Semester: 2** | **Module Leader: David Adams** | |
| Description: | This module applies the knowledge and skills from the Urban Policy Design and Planning Analysis through surveying specific planning challenges and opportunities in cities, using Birmingham and the West Midlands as a ‘living laboratory’ and case study. The following issues are explored: evaluating the spatial and non-spatial contexts underpinning planning interventions; the kind of social, economic and environmental challenges relating to the local scale; and how local planning responses can guide different stakeholders as to what sorts of policies and action are required.  The module will be assessed through one semester-end portfolio, equivalent to 5,000 words. This involves producing a professionally-produced neighbourhood strategy that provides the sense of direction needed to guide investment and development decisions at a neighbourhood scale. The strategy should identify and address a full range of social, economic and environmental issues and opportunities of the area in the context of an understanding of the wider policy framework. It should give a clear indication to residents, potential developers and investors, and other key interests, as to what sorts of implementation are needed, where, when and why.  Students will attend a combination of lectures, small-group computer workshops. The workshops focus on developing practical skills in statistics, GIS, and other data presentation/visualisation techniques for policy design. Students will use these sessions to develop knowledge and skills relating to mapping urban form, stakeholder analysis, exploring the spatial and non-spatial context, and identifying sites and opportunities for development. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Assess official area measurements of deprivation using computer and non-computer-based techniques, policy designs, and place-based interventions. * Evaluate different perspectives and the consequences for the spatial analysis of urban policy. * Appraise the advantages and limitations of data analysis and visualisation techniques in policy design and planning studies. * Develop analytical skills in GIS for planning and development for policies on social cohesion, economic development, urban infrastructure, and environmental sustainability. | | |
| **Assessment:** | 5,000 word coursework portfolio | | |

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| **03 34071** | **Urban Policy Design and Planning Analysis** | | **20 credits** |
| **Level: I** | **Semester: 1** | **Module Leader: David Adams** | |
| **Description:** | This module offers a comparative perspective on urban policy design and planning analysis. Four key issues are explored: evaluating policy contexts, designing policy/planning processes, analysing and evaluating policy outcomes, and surveying different policy/planning instruments.  The module will be assessed through one semester-end portfolio, equivalent to 5,000 words. This includes a reflective piece on planning theory and policy analysis exercise. Formative assessments will take place throughout the semester. At the end of the semester, students will gain a more comprehensive understanding of the political, social, and economic processes behind urban policies and plans, the different instruments and drivers of planning and implementation in local contexts, as well as the equity, sustainability, and inclusiveness implications of particular policy designs and planning interventions.  Students will attend a combination of lectures, small-group discussion seminars. Seminars facilitate discussion, student interaction, and collective reflections on specific policy interventions, socioeconomic assumptions, and their procedural/distributive implications. Students will be grouped to present facilitate a discussion on particular planning challenges, such as transportation/mobility, open/green space, economic (re)development, housing, social welfare, environmental sustainability, and critical infrastructure, as well as the methods and data required to explore these theme. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Compare and contrast theories and models of poverty urban policy design, implementation, and evaluate how planners and other actors involved in the built and natural environment use these instruments. * Explore the causes and consequences of urban poverty political, economic, and social foundations of policy and planning interventions in cities. * Analyse the methodological strengths and weaknesses main models of institutional design, participatory decision-making, project/plan implementation, and monitoring and evaluation. * Reflect on the extent to which different policy mechanisms might help address issues of equity, sustainability and inclusiveness. | | |
| **Assessment:** | 5,000 word coursework portfolio | | |

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| Year 3: all Programmes |

**Module Information**

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| **03 10820** | | **Evolution of Vertebrates** | **20 credits** |
| **Level: H** | Semester: 2 | **Module Leader: Ivan Sansom** | |
| **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%) | | |

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| **03 29212** | | **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%) | | |

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| **03 29214** | | **Geological Natural Hazards** | **20 credits** |
| **Level: H** | Semester:2 | **Module Leader: Sebastian Watt** | |
| **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. | | |

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| **03 29231** | | **Tectonic and Magmatic Processes** | **20 credits** |
| **Level: H** | Semester: 1 | **Module Leader: Tim Reston** | |
| **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) | | |

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| **03 29996** | | **Paleoclimates** | **20 credits** |
| **Level: H** | Semester: 2 | **Module Leader: James Bendle** | |
| **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). | | |

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| **03 35203** | | **Applied Micropalaentology** | **20 credits** |
| **Level: H** | Semester: 1 | **Module Leader: Kirsty Edgar** | |
| **Description:** | This module aims to develop your understanding and ability to utilise the major microfossil groups in their principal applications. We will investigate via case studies how microfossils (and their living relatives) can be used in: industry (e.g., engineering and sub-surface exploration), palaeoenvironmental reconstructions (e.g., sea level and temperature changes), forensics, archaeology, and environmental monitoring. This module will provide students with an opportunity to develop key practical skills in microscopy as well as various toolkits for collecting, analysing and interpreting different types of data. | | |
| **Learning Outcomes:** | By the end of the module you should be able to:   * Identify the major microfossil groups and the time intervals in which they occur * Show a detailed understanding of the controls on microfossil distributions in time and space * Undertake independent data collection and analysis of calcareous microfossil assemblages * Analyse and interpret datasets from different microfossil groups utilizing a range of different approaches * Apply understanding of microfossil communities to solve real-world issues | | |
| **Assessment:** | 2 hr written unseen examination (50%)  2000 word data report (50%) | | |

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| **03 25908** | | **Wetland Environments** | **20 credits** |
| **Level: H** | Semester: 1 | **Module Leader: Nick Kettridge** | |
| **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%). | | |

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| **03 27192** | | **Biodiversity and Conservation Management** | **20 credits** |
| **Level: H Semester 1** | | **Module Leader: Lesley Batty** | |
| **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%) | | |

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| **03 26374** | | | **Remote Sensing of the Cryosphere** | **20 credits** |
| **Level: H** | Semester: 2 | | **Module Leader: Nick Barrand** | |
| **Prohibited combination with:** | | | | |
| **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%) | | |

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| **03 28684** | | **Carceral Geographies** | **20 credits** |
| **Level: H** | Semester: 2 | **Module Leader: Dominique Moran** | |
| **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%). | | |

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| **03 27824** | | **Geographies of Children and Young People** | **20 credits** |
| **Level: H** | Semester: 2 | **Module Leader: Sophie Hadfield-Hill** | |
| **Description:** | This module addresses the theoretical and methodological underpinnings of understanding children and young people’s everyday lives in the context of urban, social, cultural and environmental change. The sub-discipline of Children’s Geographies has bought increased academic and policy attention to the importance of understanding children and young people’s everyday lives. The module will draw on contemporary research projects, literature and academic and policy debates about the socio-spatial lives of children. Importantly the module will address the diversity of childhood experiences, offering distinctions between and within majority and minority worlds. Thinking geographically about children and young people’s use of environment, positionality, culture, participation, agency and citizenship is key to exploring the social constructions of childhood.  The content will be delivered over ten, two hour lectures, five two hour workshops and a local half-day Midlands based external visit. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Discuss the significance of geography for understanding the everyday lives of children and young people. * Evaluate and narrate the changing conceptualisations of children and childhood * Demonstrate a clear understanding of the diversity of childhood experiences across and within environments. * Apply theoretical and methodological understandings of Children’s Geographies in their analysis of space and place | | |
| **Assessment:** | 1x 2000 word reflective narrative (50%)  1x 2000 report (50%) | | |

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| **03 32050** | | **Urban environments in the global south** | **20 credits** |
| **Level: H** | **Semester: 1** | **Module Leader: Natasha Cornea** | |
| **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%) | | |

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| **03 32088** | | **Extractive Politics** | **20 credits** |
| **Level: H** | **Semester: 1** | **Module Leader: Kärg Kama** | |
| **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%) | | |

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| **03 35202** | | **Rural Geography** | **20 credits** |
| **Level H** | **Semester: 2** | **Module Leader: Steve Emery** | |
| **Description:** | The module explores critical themes in contemporary rural geography by putting them into historical and theoretical context. With primary focus on the UK it will explore agricultural landscapes, imagined countrysides, conservation, rural community resilience, rural development and rural futures. It will combine lectures, seminars, fieldwork and practical exercises to introduce and interrogate key issues affecting contemporary rural space and community. It will allow an understanding of rural governance and the development of policy recommendations. | | |
| **Learning Outcomes:** | By the end of the module the student will be able to:   * Chart key trends in the history of rural Britain and the use of rural space, and apply this to understanding contemporary challenges * Understand the contemporary political, social and environmental challenges and conflicts affecting rural areas * Explain and critique the governance of rural space * Develop and propose policy-oriented solutions to contemporary rural issues | | |
| **Assessment:** | Policy and Practice Brief (1000 words) 30%  Group Presentation (10 minutes) 20%  Exam (1.5 hours) 50% | | |

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| **03 30022** | | **Evironmental Management: Theory, Policy, Practice** | **20 credits** |
| **Level H** | **Semester: 1** | **Module Leader: Iseult Lynch** | |
| **Description:** | This module provides an overview of some of the key principles and approaches available in environmental management, 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), the EU 2020 Biodiversity Strategy and Agri-environment policies such as CAP. Building on the theory of these frameworks, the module will introduce approaches to their application in practice, monitoring their effectiveness and assessing their impact on environmental quality. The module will conclude with an overview of the legal basis of environmental management, including the legal interventions available to regulators in preventing breaches or other violations  Case studies will be used extensively to illustrate examples; including, environmental impact assessment of human activity such as the high-speed rail, and a worked example of an LCA using real research data. | | |
| **Learning Outcomes:** | By the end of the module the student will be able to:   * Demonstrate a knowledge and understanding of key concepts in environmental management and the major EU environmental protection directives applicable to air, water, soil, plants, food/agriculture, energy and the built environment * Demonstrate understanding and application of some simple mathematical modelling approaches and be able to apply these to a range of environmental problems. * Demonstrate an ability to critically evaluate the relative strengths and weaknesses of the principal approaches available for environmental management and the key policies in place to achieve this * Explain how to rank sources of pollution in order of significance, and pollutants in order of priority (for regulation and restriction) * Explain what an environmental quality standard is and describe the basic principles used to set them. * Show understanding of how key environmental protection concepts, principles and models are integrated into environmental protection strategies, policies, programmes and legislation. * Demonstrate ability to apply the various management approaches to real case studies, and to reflect on the relative merits and limitations of the different environmental management tools | | |
| **Assessment:** | One x 1.5 hour examination paper (50%)  Reflective diary (25%)  Life Cycle assessment exercise (25%) | | |

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| **03 30023** | | **Pollution Impacts and Waste Management** | **20 credits** |
| **Level H** | **Semester: 2** | **Module Leader: Mohamed Abdallah** | |
| **Description:** | This module will provide an overview of the impacts of pollution on the terrestrial and marine environment, as well as potential risk to human health and well-being. Current concerns over emerging classes of pollutants (e.g. microplastics, nanoparticles, pharmaceuticals and personal care products) will be explained. The module will focus on management options to control the risk of pollution from hazardous waste. This includes detailed discussion of the current practices and regulations of e-waste recycling, waste-water treatment and nanoparticles recovery. The module will also explore state-of-the art solutions towards a more sustainable, less polluted environment including: bioremediation and chemical recovery. | | |
| **Learning Outcomes:** | By the end of the module the student will be able to:   * Critically assess the current impacts of pollution on the environment and human. * Present and synthesize information on the fate and behaviour of emerging contaminants (e.g. microplastics, nanoparticles, pharmaceuticals and personal care products). * Explore the possible implications of climate change on the global levels and distribution of various contaminants. * Develop a conceptual understanding of waste treatment/management options for hazardous waste. * Critically appraise current bioremediation techniques. * Evaluate the role of legislation to control the risk of emerging contaminants and identify the need for further control measurements. | | |
| **Assessment:** | Coursework 1 (25%): 1500 word essay  Coursework 2 (25%): A poster (A1 size)  Written exam (50%): essay style questions- 1.5 hours. | | |

Year 4 (MSci): **all Programmes**

**Module Information**

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

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| **03 29213** | | **Engineering Geology and Hydrogeology** | **20 credits** |
| **Level: M** | **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 some fundamental (GSCE) 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:1. Apply and examine the essential theories covering rock strength and soil consolidation to geotechnical investigation of a site; 2. Differentiate the processes of soil formation and evaluate the engineering implications of these processes**;** 3. Apply appropriate calculations to rock/soil engineering problems and develop calculations to solve non-unique problems**;** 4. Design and evaluate methods to predict the subsurface geology at a site**;** 5. Apply and examine the essential theories covering solute transport to groundwater pollution problems**;** 6. Develop solutions to groundwater pollution issues using industry standard modelling techniques**;** 7. Analyse and evaluate results of groundwater pollution investigation through a technical report | | |
| **Assessment:** | Site Investigation (35%): completion of a site investigation report (max 2000 words), comprising preliminary desk research, analysis of data and calculations based on rock/soil properties  Pollution Hydrogeology study (15%): Groundwater pollution impact report (1000 words) on data analysed through use of professional groundwater pollution transport software  Examination (50%): 1.5 hour exam. Broken down into: One seen question on engineering geology (30%) and 2 questions from 6 on pollution hydrogeology (70%) – latter are mixtures of essay-style and calculations, often multi-part and closely focussed. | | |

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| **03 33794** | | **Inorganic Chemistry and Groundwater & Borehole Design, Construction and Maintenance** | **20 credits** |
| **Level: M** | Semester: 1 | **Module Leader: John Tellam** | |
| **Description:** | Quantitative aqueous inorganic chemistry theory, concentrating on aspects relevant to groundwater systems, including dissolution/precipitation, acid/base, oxidation/reduction, and sorption/desorption reactions, and an introduction to the application of thermodynamic calculations. Application of theory to problem solving in natural and polluted groundwater settings. Lectures, practical exercises on both invented and real datasets, and a computer session using a geochemical modelling code.  An introduction to the theory and practice of the design, construction and maintenance of boreholes covering: methods of groundwater abstraction; drilling, logging, and sampling; borehole geophysics; pump technology and design; well design and construction; well maintenance and rehabilitation. | | |
| **Learning Outcomes:** | By the end of the module, students should be able to:   * Apply aqueous inorganic chemistry principles to solving groundwater quality problems * Design construction, completion, and maintenance of a range of borehole types * Design and interpret results from borehole logging programmes | | |
| **Assessment:** | 3 hour examination (100%) | | |

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| **03 29215** | | **Geological Natural Hazards** | **20 credits** |
| **Level: M** | **Semester: 2** | **Module Leader: Sebastian Watt** | |
| **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:** | * Critically examine and contrast the principle causes and effects of a range of geological natural hazards * Apply appropriate calculations to evaluate the theoretical background of processes controlling volcanic, seismic and tsunamigenic processes * Evaluate the factors that contribute to natural disasters through the synthesis of geological information and human factors * Develop mitigation strategies for geological natural hazards based on critical analysis of factors affecting vulnerability and potential impacts | | |
| **Assessment:** | Group poster (20%) and group presentation (20%) 2-hour written examination (60%). Exam includes short-answer questions across all course material, and long-answer essay questions (short-answer choice is more restrictive than Level H exam, and long-answer questions require more critical analysis). | | |

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| **03 18108** | | **Evolution of Vertebrates** | **20 credits** |
| **Level: M** | **Semester: 2** | **Module Leader: Ivan Sansom** | |
| **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 the student should be able to:   * Describe, in detail, the evolutionary history and palaeobiology of extant and extinct vertebrate groups; * Evaluate and assess the data on which current understanding is based; * Evaluate the techniques used in phylogenetic analysis.   Taught content is shared with ESCM319 (03 10820). As a Level M option, this module requires students to build on their greater geological knowledge and skills in demonstrating a higher degree of creativity, initiative and independence in learning, and a greater awareness of the issues underpinning advances in the relevant areas of the Earth sciences. | | |
| **Assessment:** | 2 hour written exam (60%)  Coursework: multi-authored review article and presentations (40%). | | |

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| **03 29237** | | **Tectonic and Magmatic Processes** | **20 credits** |
| **Level: M** | **Semester:** 1 | **Module Leader: Tim Reston** | |
| **Description:** | This course provides a theoretical and practical 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 from mid-ocean ridges, subduction zones, continental margins and sedimentary basins. Emphasis is placed on joint interpretation of geophysical, geochemical and modelling datasets. | | |
| **Learning Outcomes:** | By the end of the module students should be able to:   * Describe and criticize current hypotheses for continental extensional and mid-ocean ridge processes. * Describe and criticize current hypotheses for subduction zone processes. * Discuss and appraise the range of geophysical and geochemical data n which the current hypotheses are built. * Evaluate uncertainties in the interpretation of limited and complex datasets. * Discuss case studies presented in the course and compare them with case studies from wider reading. * Distinguish subject areas with widely accepted hypotheses from areas of cutting edge research. | | |
| **Assessment:** | 2 hour exam, main summer exam period (60%)  Extended essay on cutting edge research topic (40%) | | |

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| **03 30003** | | **Palaeoclimates** | **20 credits** |
| **Level: M** | **Semester: 2** | **Module Leader: James Bendle** | |
| **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% coursework. There is no exam.  Assessment: Four pieces of coursework each worth 25% of the module mark.  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). | | |

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| **Disclaimer:**  **The information contained in this document provides general guidance only. While every care has been taken to provide correct information at the date of authoring, information may be subject to revision from time to time.** |

1. Exceptions to this need to be agreed with the student’s Home University. [↑](#footnote-ref-1)
2. 20 Birmingham Credits = 10 ECTS Credits [↑](#footnote-ref-2)