### GEOGRAPHY COURSES

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### GEOLOGY COURSES

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GEOGRAPHY AND GEOLOGY MAJORS AND MINORS: Students are advised that compulsory field work and seminars in the Department of Geography and Geology is carried out on Saturdays and Sundays.
GEOG1131  HUMAN GEOGRAPHY 1: POPULATION, MIGRATION & HUMAN SETTLEMENT
(3 Credits) (Level 1) (Semester 1)

Pre-requisites:
Passes in at least two CAPE subjects AND Geography at CSEC or its equivalent.

Course Content:
Modern Approaches to the Study of Population Geography; The Human and Physical Factors determining Population Distribution and Dynamics; Theories of Population Change, including Malthus’ and Neo-Malthusian Thoughts; The Demographic Transition Theory; The Sources of, and Problems associated with, Population Statistics; How to Measure Fertility, Mortality and Migration; Population Projection Techniques; Family Planning and Population Control Efforts around the World; The Status of Women and its Crucial Role in Population Dynamics; Major Causes of Death around the World, including AIDS; The Role of Migration in Population Dynamics; Culture, Population and the Environment. Historical and Contemporary Perspectives on Urbanization in both the Industrialized World and the Developing World, and Theories on the Geographical Distribution of Human Settlement.

Evaluation:
- Final Written Examination (2 hours) 60%
- Course Work: 40%
  - Multiple-choice Review Test (1 hour) 10%
  - Tutorial Assignments 10%
  - 3 Practical Assignments 20%
GEOG1132  HUMAN GEOGRAPHY 2: WORLD ECONOMY, AGRICULTURE & FOOD
(3 Credits) (Level 1) (Semester 2)

Pre-requisites:
Passes in at least two CAPE subjects AND Geography at CSEC or its equivalent.

Course Content:
The processes of economic development and globalization, and the economic interdependence of countries in the modern world; Basic theories, concepts, and methods for describing, measuring and analyzing patterns of economic and social development; The main factors that have contributed to uneven patterns of economic development, such as the distribution and exploitation of natural resources, and the process of industrialization, technological change and globalization; The section on agriculture and the food industry illustrates in depth many issues related to economic development and globalization, including the role of agribusiness in food production and food consumption, and the impacts of traditional and modern agricultural production systems on the environment; The geographical dimensions of world hunger and malnutrition in relation to the structure of the world economy and world agriculture; Prospects for future agricultural development.

Evaluation:
- Final Written Examination (2 hours) 60%
- Course Work:
  - Multiple-choice Review Test (1 hour) 10%
  - Tutorial Assignments 10%
  - 3 Practical Assignments 20%

GEOG1231  EARTH ENVIRONMENTS 1: GEOMORPHOLOGY & SOILS
(3 Credits) (Level 1) (Semester 1)

Pre-requisites:
Passes in at least two CAPE subjects AND Geography at CSEC or its equivalent.

Course Content:
Modern approaches to geomorphology and soil science; The main geomorphic processes in the context of endogenic and exogenic systems from a global
perspective; The geomorphology section examines and describes endogenic systems and processes. The internal structure of the Earth and the geographic patterns of global relief of the solid surface in the context of plate tectonics. The relationship between global tectonics and the patterns and styles of volcanic activity; The passive control of rock type and geological structure in relation to landscape form and process; The soils section examines and describes the main exogenic systems and processes; The geographical patterns and types of rocks. Aspects of soil science from a geographical perspective through an examination of the main soil-forming factors, and analysis of physical and chemical soil-forming processes; Exogenic systems in relation to the main geomorphic agents of water, wind and ice in the context of fluvial, slope, aeolian, karst, glacial and periglacial systems.

Evaluation:
- Final Written Examination (2 hours) 60%
- Course Work: 40%
  - Multiple-choice Review Test (1 hour) 10%
  - Tutorial Assignments 10%
  - 3 Practical Assignments 20%

GEOG1232  EARTH ENVIRONMENTS 2: CLIMATE & THE BIOSPHERE
(3 Credits) (Level 1) (Semester 2)

Pre-requisites:
Passes in at least two CAPE subjects AND Geography at CSEC or its equivalent.

Course Content:
A modern holistic approach to the study of the earth system. Introduction to climate science: the processes operating within the atmosphere and biosphere, including general circulation of the atmosphere, ocean-atmosphere interactions, and global climate systems. Emphasis on the impacts and consequences of human-environment interactions. Spatial and temporal variability of these processes on local, regional and global scales. The primary causes, both natural and human, and consequences of climate change and the impact of a changing climate for communities both within and outside the Caribbean region. Particular emphasis on the impacts of climate change on the biosphere, as well as their implications for agricultural systems. Introduction to the study of biogeography, focussing on the geographical features of biodiversity at different geographical
scales, and reviewing ideas about ecosystem processes and vegetation disturbance and succession.

Evaluation:
- Final Written Examination (2 hours) 60%
- Course Work: 40%
  - Multiple-choice Review Test (1 hour) 10%
  - Tutorial Assignments 10%
  - 3 Practical Assignments 20%

GEOG2131 URBAN GEOGRAPHIES
(3 Credits) (Level 2) (Semester 1)

Pre-requisites:

Course Content:
An introduction to key concepts, theories and empirical studies in the field of urban geography; The course deals with a variety of contemporary and relevant issues pertaining to urban growth and development, including patterns and processes of global urbanization, urban housing challenges and solutions, global urban consumerism, neighbourhood dynamics and changes, urban governance and social justice, cities and climate change, migration, race and ethnicity, and the built environment; The course draws upon a variety of examples and case studies, especially from the developing world.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Tutorial Assignments 10%
  - In-course Test (1 hour) 20%
  - 2500 Word Project Report 20%
GEOG2132  GEOGRAPHIES OF DEVELOPMENT  
(3 Credits) (Level 2) (Semester 2)

Pre-requisites:

Course Content:
The course seeks to explain the dynamic nature of the development process and its impact on economies, societies and the environment in the context of an increasingly globalized world. It introduces relevant ideas, theories and concepts from social science disciplines, but focuses on how geographers bring spatial concepts and geographical models to bear on the theory and practice of development. It links theories and concepts with development policy through case studies. The spatial dynamics of the global economy are highlighted through the lens of economic globalization. Sections highlight world industrialization, international trade and trade liberalization, and rural development. Special emphasis is placed on the Caribbean region in relation to the problems of sustainable development in small island developing states; environmental issues such as environmental degradation and climate change; and tourism development models.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Tutorial Assignments 10%
  - In-course Test (1 hour) 20%
  - Internet-based Research Report 20%

GEOG2231  EARTH SURFACE PROCESSES  
(3 Credits) (Level 2) (Semester 1)

Pre-requisites:
GEOG1231- Earth Environments 1: Geomorphology & Soils AND GEOG1232 - Earth Environments 2: Climate & The Biosphere.

Course Content:
The course examines modern approaches to the analysis and interpretation of geomorphic processes and landforms in the context of coastal, fluvial and slope
systems, and provides an in-depth examination of geomorphology in tropical settings.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - 2, 1250 -Word Essays 10%
  - 2500-Word Field Report 10%
  - 2 Practical Assignments 10%
  - In-course Test (1 hour) 20%

GEOG2232  CLIMATE CHANGE
(3 Credits) (Level 2) (Semester 2)

Pre-requisites:
GEOG1231 - Earth Environments 1: Geomorphology & Soils AND GEOG1232 - Earth Environments 2: Climate & The Biosphere.

Course Content:
An interdisciplinary approach to the study of environmental change, looking at examples of the complex interactions between human activity and the different environmental spheres (geosphere, hydrosphere, atmosphere, and biosphere). Core components include global environmental change, sea-level change, natural climate variability, anthropogenic climate change, 21st-century climate projections, and tropical forest dynamics. The course examines the primary causes, both natural and human, and the consequences and impacts of environmental change both within and outside the Caribbean region.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - 2 Group PowerPoint Presentation 20%
  - 2, 1500-Word Essay 30%
GEOG2331 RESEARCH METHODS IN GEOGRAPHY

(3 Credits) (Level 2) (Semester 1)

Pre-requisites:

Course Content:
The course aims to provide some basic knowledge of the key aspects of the history and philosophy of geographical enquiry, and to provide the theoretical and practical skills required to develop and conduct a research project in geography. Training in the application of geographical research methods and techniques, data collection, data and statistical analysis, and the technical presentation of results. Training in how to define a research topic, how to identify relevant literature, how to prepare a research proposal, and how to present data.

Evaluation:
- Course Work: 100%
- In-course Test (1 hour): 25%
- 5 Research Skills Assignments: 75%

GGEO2332 INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS

(3 Credits) (Level 2) (Semester 2)

Pre-requisites:
Two of:

OR
Two of:
Course Content:
The course introduces students to the theory and general principles of GIS and to practical skills and hands-on experience in its use: the fundamental concepts and basic functions of a GIS; the properties of GIS maps; the structure of a GIS database; coordinate systems and map projections; methods of performing simple vector and raster spatial analysis. In lab exercises students will work with ArcMap to visualize geographic data, create maps, query a GIS database, perform spatial analysis using common analytical tools, and solve geographical problems using a systematic approach. The course introduces the core functionality of GIS software packages such as ArcMap, ArcCatalog, and ArcToolbox.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - In-course Tests 20%
  - 6 Laboratory Assignments 30%

G GEO3105  Applied GIS & Remote Sensing
(3 Credits) (Level 2) (Summer)

Pre-requisites:
G GEO2232 - Climate Change OR Head of Department approval.

Course Content:
Review of GIS principles, concepts and components; Spatial Data Representation models; Remote Sensing principles, concepts and components; GNSS principles, concepts and components; GNSS Geodata acquisition; Spatial data generation and acquisition; Geodatabase creation and population; Data Automation; Geodatabase query; Geo-visualization techniques; GIS Web Mapping; (Geospatial Web Services); Mobile GIS Solutions ; GIS Programming & Application Development; Geospatial data analysis; Spatial Statistics; FOSS; SDI & Geospatial standards

Evaluation:
Coursework:
- 4 Lab assignments (10% each) 40%
- 1 Major Project 60%
GGE02233  WATER RESOURCES  
(3 Credits) (Level 2) (Semester 1)

Pre-requisites:

Course Content:
An in-depth study of the hydrological cycle, evaporation/transpiration, and rainfall-runoff relationships in hydrogeology. The factors affecting evaporation and evapotranspiration from free water surfaces and soils. Different estimates and measurements of evaporation and evapotranspiration and soil moisture storage and movement. The nature and origin of different types of aquifers, their geological properties, the various types of groundwater flows to wells, flows within aquifers under steady/nonsteady conditions. Techniques of hydrogeological investigation, including drilling and pump testing. The hydraulics of surface water systems and seasonal variability of the flow pattern in streams and rivers. Flooding and drought. Special emphasis on the water resources of Jamaica and other Caribbean islands.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - 2 In-course Test (1 hour) 20%
  - Practical Examination (2 hours) 30%

GEOG3131  TROPICAL AGRICULTURAL & DEVELOPMENT  
(3 Credits) (Level 3) (Semester 1)

Pre-requisite:
GEOG2132 - Geographies of Development.

Course Content:
1. Global Change: impacts of trade liberalization and climate change on export agriculture and domestic food production—includes case

2. **Economic and Behavioural Approaches to Decision Making among Small-Scale Farmers in Developing Countries** – includes approaches to risk reduction.

3. **The Role of Indigenous Knowledge in Traditional Agriculture** - includes case studies based on Jamaican research.

4. **Sustainable Rural Livelihoods and Sustainable Hillside Farming** - includes approaches to soil conservation and land management in hillside farming systems.

**Evaluation:**
- Final Written Examination (2 hours) 50%
- Course Work:
  - Field Project Report (2 hours) 25%
  - In-course Test (1 hour) 25%

**GEOG3132 TOURISM PLANNING & DEVELOPMENT**

(3 Credits) (Level 3) (Semester 2)

**Pre-requisite:**
GEOG2131 - Urban Geographies OR GEOG2132 - Geographies of Development.

**Course Content:**
An overview of recreation and leisure; The connections between globalisation, mobility and tourism. And the growth of mass tourism; The urban tourism system including a classification of the main elements and its role in urban renewal; The goals, principles and practice of sustainable tourism including its emergence from the concept sustainable development; The characteristics of ecotourism and a critical assessment of selected case studies; A critical analysis an analytical framework for analysing the balance between resource use and sustainability in the Caribbean tourism; The changing approaches to tourism planning as well the main aspects on the planning process, including local community participation; An advanced insight into the contested nature of tourism developments and the ways that socio-political factors render some tourist spaces as zones of exclusion and marginalisation; Introduction to the components, goals and challenges associated with conducting an Environmental
Impact Assessment. The role of certification programmes as measures of sustainability in tourist development practices; The nature and outcomes of connections between the agriculture and tourism sector with specific emphasis on the experiences of Jamaica; The role sex tourism plays in shaping social and economic landscapes and, by extension, the identity of places; The concept of vulnerability from multiple perspectives including the vulnerability of the tourism industry to external shocks, natural hazards, the impact of crime and health related challenges.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Tutorial Essay 5%
  - Multimedia Presentation 5%
  - Tourism Development Plan 20%
  - In-course Test (1 hour) 20%

GEOG3331 GEOGRAPHY OF THE CARIBBEAN
(3 Credits) (Level 3) (Semester 2)

Pre-requisites:
Any three of:
GEOG2131 - Urban Geographies, GEOG2132 - Geographies of Development, GEOG2232 - Climate Change OR GEOG2231 - Earth Surface Processes.

Course Content:

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - In-course Test (1 hour) 20%
  - Project 30%
GEOG3333  URBAN & REGIONAL PLANNING
(3 Credits) (Level 3) (Semester 2)

Pre-requisite:
GEOG2131 - Urban Geographies.

Course Content:
Introduction to Urban & Regional Planning; History and Evolution of Planning in Britain; The Seers Planning in the Americas; Theories of Planning; Water and Sanitation; Strategies for Housing the Urban Poor; The Global Urban Energy Crisis; Urban Safety and Security; Adapting Cities to Climate Change.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - Tutorial Multimedia Presentation 10%
  - In-course Test (1 hour) 15%
  - Written Tutorial Assignment 25%

GEOG3334 TROPICAL LAND MANAGEMENT
(3 Credits) (Level 3) (Semester 1)

Pre-requisites:
GEOG2231 - Earth Surface Processes, GEOG2232 - Climate Change AND GEOG2131 - Urban Geographies.

Course Content:
Soil Formation, Weathering Processes and Products in the Humid Tropics; Humid Tropical Soils and Land-Use Problems Semi-Arid Tropical Soils and Land-Use Problems; Desertification (Slope Failure and Tropical Land Management. Soil Erosion and Tropical Land Management); Land Degradation (Land Classification and Land Capability); Land Management and Environmental Change.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - Practical Exercises 15%
  - Tutorial Essay Assignment 15%
  - Field Report 20%
GEOG3430  GEOGRAPHY RESEARCH PROJECT  
(6 Credits) (Level 3) (Year-Long)

Pre-requisites:
GEOG2331- Research Methods in Geography AND GGEO2332 - Introduction Geographical Information System, AND at least two of:
GEOG2131 - Urban Geographies, GEOG2132 - Geographies of Development, GEOG2231 - Earth Surface Processes AND GEOG2232 - Climate Change.

Course Content:
The course involves a series of steps in which the student progress through the various stages of the formulation of a research project, the execution of the Project and presentation of results. At the first stage, students must complete a research proposal based on a literature search. The proposal involves the formulation of a research question, a statement of research design and methodology and includes details of any sampling methods, laboratory techniques and methods of analysis to be used. The proposal is assessed and the proposal must satisfy the assessors before the student can proceed to the next stage. At the second stage, the student is assigned to a supervisor who assists with the fine-tuning of the research design and methodology, before students proceeds to the field data collection stage. A third stage involves the submission of progress report to the supervisor, and the report includes an indication of a work plan to complete the data analysis and write up. The final stages of the course are the formal graded assessment of the project, and involve a multimedia presentation of the research results, and the submission of a dissertation.

Evaluation:
- Project Report (dissertation) 80%
- Course Work: 20%
  - Project Proposal: 0% (necessary to continue but zero-rated)
  - Progress Report: 0% (necessary to continue but zero-rated)
  - Oral Presentation 20%

GGEO3231  KARST & COASTAL GEOMORPHOLOGY  
(3 Credits) (Level 3) (Semester 2)

Pre-requisites:
GEOG2231- Earth Surface Processes OR GEOL2202 - Sedimentary Geology.
Course Content:
Karst Rocks and Material Properties (Karst Processes and Controls, Karst Landform Systems, Applied Karst Geomorphology); The Geomorphic Legacy of Sea-level Change and Paleo-Coastal Environments; Coastal Forces and Processes; Coastal Landform Systems; Applied Coastal Geomorphology.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Tutorial Essay Assignment 10%
  - Field Project Report 20%
  - In-course Tests (1 hour) 20%

GGE03232  CLIMATE CHANGE IN THE TROPICS
(3 Credits) (Level 3) (Semester 1)

Pre-requisites:
GEOG2232 - Climate Change OR any one of GEOL2201- Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 -Petrology of Igneous & Metamorphic Rocks, GEOL2204 - Field Techniques for Geology, GEOL2205 - Plate Tectonics & Geological Structures or Permission of Head of Department.

Course Content:
A theoretical and practical basis for understanding present-day tropical environments and the causes of global environmental change, as well as for assessing the scale of human interference in natural environmental processes.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - 1 Oral Presentation 10%
  - 1 Laboratory Reports 10%
  - 1 Critical Review (about 2500 words) 20%
GGEO3233 HYDROLOGY & HYDROLOGICAL MODELLING
(3 Credits) (Level 3) (Semester 2)

Pre-requisites:
GGEO2233 - Water Resources.

Course Content:
2. Statistical methods for calculating return periods for rainfall and flood data.
3. Hydrograph separation using computational methods and calculation of baseflow, inter and overland flow. Types of flooding and flood hazards in Jamaica. Climate change and hydrological hazards.
4. Hydrologic Simulation models, steps in watershed modelling, description of models principles, mainly HEC HMS models Flood plain hydraulics - principles and concepts of HEC RAS (1D) model including case studies.
5. Hydraulic properties of aquifers and their methods of determination. Groundwater flow calculations and flow variation under different climatic and non-climatic conditions.
7. Water resources of the Caribbean, with special emphasis on Jamaica. Climate change and challenges in the water sector: Jamaica and the Caribbean.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Field Trip Report 10%
  - 1 Laboratory Report 40%
GGE03332  DISASTER MANAGEMENT  
(3 Credits) (Level 3) (Semester 2)  

Pre-requisites:  
GEOG2231 - Earth Surface Processes AND GEOG2232 - Climate Change AND any three of:  
GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field Methods for Geology, GEOL2205 - Plate Tectonics & Geological Structures or Permission of Head of Department.

Course Content:  
An introduction to the basic principles and techniques in disaster management; A study of theory, hazards, vulnerability, response capability, risk Evaluation, disaster scenarios, disaster management, preparedness, prevention, emergency response, and simulation; Basic concepts of geology, geomorphology, tectonics and geophysics in the study of natural hazards, with special reference to the Caribbean; Hazards and risks related to volcanic activity, earthquakes, landslides, hydrometeorological processes; flooding and hurricanes; Hazard mapping. Approaches to natural hazard loss-reduction.

Evaluation:  
- Final Written Examination (2 hours) 50%  
- Course Work: 50%  
  - Multimedia Presentation 10%  
  - Project Report 10%  
  - 3 Practical Exercises 15%  
  - Fieldwork 15%  

GGE03401  RESEARCH PROJECT IN GEOSCIENCES  
(6 Credits) (Level 3) (Year-long)  

Pre-requisites:  
GEOL2204 - Field Techniques for Geology AND GGE02332 - Introduction to Geographical Information Systems and any Three of:  
GEOG2231 - Earth Surface Processes, GEOG2232 - Climate Change, GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2205 - Plate Tectonics & Geological Structures, GGE02233 - Water Resources. Students must be registered for the Geosciences Major.
Course Content:
An approved research project in the field of Geosciences is undertaken in the summer preceding the final year of the programme. The course involves the formulation of a research project, the execution of the project and presentation of results. The final outcome involves a multi-media presentation of the research results, and the submission of a dissertation in Semester 2.

Evaluation:
- Project Report: (dissertation) 80%
- Course Work: 20%
  - Project Proposal: 0% (necessary to continue but zero-rated)
  - Progress Report: 0% (necessary to continue but zero-rated)
  - Oral Presentation: 20%

GEOLOGY
GEOL1101 EARTH SCIENCE 1: EARTH MATERIALS & PLATE TECTONICS
(3 Credits) (Level 1) (Semester 1)

Pre-requisites:
Passes in at least two science subjects at CAPE OR equivalent.

Course Content:
An introduction to the study of earth materials and earth systems, giving an overview of how basic earth processes work and how rocks and minerals are formed; Introduces topics such as the structure of the Earth, its internal processes, and basic earth materials, minerals and rocks; A central focus is on plate tectonics, now seen as the unifying concept linking earth processes and materials in the rock cycle; Practical instruction will provide the basic skills of mineral and rock identification, and will also cover volcanic and seismic processes on broader regional and global scales.

Evaluation:
- Final Written Examination (2 hours) 50%
- Coursework: 50%
  - Field Trip 5%
  - 2 Tutorial Assignments 5%
  - In-course Test (1 hour) 10%
  - Practical Examination 30%
GEOL1102  EARTH SCIENCE 2: EARTH PROCESSES & EARTH HISTORY

(3 Credits) (Level 1) (Semester 1)

Pre-requisites:
Passes in at least two science subjects at CAPE OR equivalent.

Course Content:
An introduction to the physical and chemical processes that operate within different environments and produce a range of geomorphological features on the Earth; Introductory aspects of physical geology, including: weathering and erosion; landforms (rivers, slopes, coastlines, arid lands, glaciated environments); and the use of topographic maps; An appreciation of the processes acting on the Earth’s surface and how they can be used to interpret Earth history as critical guide to understanding the global distribution of rocks, geological features and earth resources; An introduction to historical geology - origin of the Earth, origin of life on Earth, the geological timescale - with an emphasis on using present geological processes to interpret the past.

Evaluation:
• Final Written Examination (2 hours) 50%
• Course Work: 50%
  • Field Trip 5%
  • 2 Tutorial Assignments 5%
  • In-course Test (1 hour) 10%
  • Practical Examination 30%

GEOL1103  EARTH SCIENCE 3: MINERALS & MINERAL DEPOSITS

(3 Credits) (Level 1) (Semester 2)

Pre-requisites:
Passes in at least two science subjects at CAPE OR equivalent.

Course Content:
An introduction to crystal chemistry, crystallography, optical mineralogy and the geology of mineral deposits. The course is designed to develop the theoretical knowledge and critical practical expertise in observing, analyzing, describing and classifying minerals and rocks, using a hand lens to investigate hand specimens and a petrographic microscope to investigate thin sections. These basic skills are
essential for the identification of ore and industrial minerals, as well as in the investigation of sedimentary, igneous and metamorphic rocks that will be introduced in advanced level courses.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - 2 Tutorial Assignments 9%
  - In-course Test (1 hour) 11%
  - Practical Examination 30%

GEOL1104  EARTH SCIENCE 4: GEOLOGICAL MAPS & ENVIRONMENTAL GEOLOGY
(3 Credits) (Level 1) (Semester 2)

Pre-requisites:
Passes in at least two science subjects at CAPE OR equivalent.

Course Content:
An introduction to structural geology, geological maps and environmental geology. In structural geology, the student will learn how to describe measure and analyze planar and linear features in rocks, including folds, faults and fabrics. Geological map interpretation will allow the recognition of how rock relationships are depicted on maps, and practical classes will concentrate on the construction of geological cross-sections and the interpretation of geological histories. In environmental geology, the student will be introduced to the natural and anthropogenic physical and chemical factors that affect the environment, with topics including climatic change and the combustion of fossil fuels; ocean pollution; toxic and radioactive waste disposal; land use management; geological hazards; water resources; and energy resources.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - 2 Tutorial Assignments 5%
  - Field Trip 9%
  - 6 Laboratory Exercises 36%
GEOL2201 PALAEONTOLOGY & THE HISTORY OF LIFE
(3 Credits) (Level 1) (Semester 2)

Pre-requisites:
GEOL1101 - Earth Science 1: Earth Materials & Plate Tectonics and GEOL1102 - Earth Science 2: Earth Processes & Earth History OR BIOL1262 - Living Organism I and BIOL1263 - Living Organism II.

Course Content:
An overview of the most important fossil groups, and an introduction to modern palaeontological methods and research. The practical part of the course covers the fundamentals of fossilization and taphonomy and the morphology of common fossil groups within the major phyla. The lecture portion introduces the most important topics in palaeobiology, evolution, the species concept in palaeontology, phylogenetics, speciation and extinction. There will also be an overview of the major patterns in life history, covering large-scale biotic radiations and crises and their linkages to global environmental change.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - Practical Examination (2 hours) 10%
  - 1200-1500 Word Tutorial Essay 20%
  - In-course Test (1 hour) 20%

GEOL2202 SEDIMENTARY GEOLOGY
(3 Credits) (Level 1) (Semester 1)

Pre-requisites:

Course Content:
The course provides the basic skills necessary to understand sedimentary rocks. Classification schemes for clastic and carbonate sedimentary rocks based on grain size, grain type and grain fabric, and their use in the field, in hand specimens and under the microscope. Sedimentary structures (erosional,
depositional, post-depositional). Diagenetic features of rocks, and diagenetic pathways using sedimentary fabrics, stable isotopes and petrography.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Field Projects 10%
  - 4 Practical Assignments 40%

GEOL2203 PETROLOGY OF IGNEOUS & METAMORPHIC ROCKS
(3 Credits) (Level 2) (Semester 2)

Pre-requisites:

Course Content:
The course builds on the two major rock types (igneous and metamorphic) and rock-forming mineral identification introduced in GEOL1101 and GEOL1103, in the context of the mineralogy, chemical composition, petrology, field geology, tectonics (at the macro- and micro-scale), structure, and historical genesis of these rocks.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Field Projects 10%
  - 4 Practical Assignments 40%

GEOL2204 FIELD TECHNIQUES FOR GEOLOGY
(3 Credits) (Level 2) (Semester 1 & 2*)

Pre-requisites:
Course Content:
Various techniques for collecting field data in geology, including geological mapping, collection of structural data, collection of data in a field notebook, and sedimentary logging. The course will distinguish between data (observation and recording of information) and interpretation of data. It will involve a 5-day MANDATORY residential field course and one-day field trips. One-day field trips are held on Saturdays and/or Sundays. Field trips are MANDATORY. The course begins in week 7 of Semester 1 and ends in week 6 of Semester 2.

Evaluation:
- 2 Field Notebook Reports 20%
- Geological Field Map, Cross-sections, etc. 40%
- 8 Laboratory Exercises 40%

GEOL2205 PLATE TECTONICS & GEOLOGICAL STRUCTURES
(3 Credits) (Level 2) (Semester 1)

Pre-requisites:

Course Content:
The course builds on the Level 1 course in plate tectonics and sets igneous, metamorphic and sedimentary rocks within their geological context. It will look at igneous suites and their geochemical characterization, and how this can be used to identify their plate tectonic setting. Metamorphic rocks will be used to infer geological indicators. The course will also build on the student’s understanding of structural geology from GEOL1104, and explore the different tectonic styles found in different parts of the Caribbean and their importance to geological resources.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - 2500-word Field Report 10%
  - 8 Laboratory Exercises 40%
GEO2332  INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS  
(3 Credits) (Level 2) (Semester 2)

Pre-requisites:
Two of:
GEOG1131 - Human Geography 1: Population, Migration and Human Settlement, 
GEOG1132 - Human Geography 2: World Economy, Agriculture & Food, 
GEOG1231 - Earth Environments 2: Geomorphology & Soil and GEOG1232 - Earth Environments I: Climate & the Biosphere.
OR
Two of:

Course Content:
The course introduces students to the theory and general principles of GIS and to practical skills and hands-on experience in its use: the fundamental concepts and basic functions of a GIS; the properties of GIS maps; the structure of a GIS database; coordinate systems and map projections; methods of performing simple vector and raster spatial analysis. In lab exercises students will work with ArcMap to visualize geographic data, create maps, query a GIS database, perform spatial analysis using common analytical tools, and solve geographical problems using a systematic approach. The course introduces the core functionality of GIS software packages such as ArcMap, ArcCatalog, and ArcToolbox.

Evaluation:
- Final Written Examination (2 hours)  
  50%
- Course Work:  
  50%
  - In-course Test  
    20%
  - 6 Laboratory Exercises  
    30%
GGEO3105  APPLIED GIS & REMOTE SENSING  
(3 Credits) (Level 2) (Summer)

Pre-requisites:  
GGEO2232 - Climate Change OR Head of Department approval.

Course Content:  
Review of GIS principles, concepts and components; Spatial Data Representation models; Remote Sensing principles, concepts and components; GNSS principles, concepts and components; GNSS Geodata acquisition; Spatial data generation and acquisition; Geodatabase creation and population; Data Automation; Geodatabase query; Geo-visualization techniques; GIS Web Mapping; (Geospatial Web Services); Mobile GIS Solutions ; GIS Programming & Application Development; Geospatial data analysis; Spatial Statistics; FOSS; SDI & Geospatial standards

Evaluation:  
Coursework:  
- 4 Lab assignments (10% each) 40%  
- 1 Major Project 60%

GGEO2233  WATER RESOURCES  
(3 Credits) (Level 2) (Semester 1)

Pre-requisites:  
GEOG1231 - Earth Environments 2: Geomorphology & Soil and GEOG1232 - Earth Environments I: Climate & the Biosphere OR GEOL1102 - Earth Science 2: Earth Processes and Earth History and GEOL1104 - Earth Science 4: Geological Maps and Environmental Geology.

Course Content:  
An in-depth study of the hydrological cycle, evaporation/transpiration, and rainfall-runoff relationships in hydrogeology; The factors affecting evaporation and evapotranspiration from free water surfaces and soils; Different estimates and measurements of evaporation and evapotranspiration and soil moisture storage and movement; The nature and origin of different types of aquifers, their geological properties, the various types of groundwater flows to wells, flows within aquifers under steady/non-steady conditions; Techniques of hydrogeological investigation, including drilling and pump testing. The hydraulics
of surface water systems and seasonal variability of the flow pattern in streams and rivers; Flooding and drought. Special emphasis on the water resources of Jamaica and other Caribbean islands.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - Practical Examination (2 hours) 20%
  - In-course Test (1 hour) 30%

GEOL3100 RESEARCH PROJECT IN FIELD GEOLOGY
(6 Credits) (Level 3) (Year-long)

Pre-requisites:
GEOL2204 - Field Technique for Geology AND any three of:
GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field Methods for Geology, GEOL2205 - Plate Tectonics & Geological structures and GGEOL2233 - Introduction to Geographical Information Systems.

Course Content:
A field-based research project to be undertaken in the summer preceding the final year of the programme, followed by laboratory analyses and report writing. The completed project report and an oral presentation will be required in Semester 2 of the final year.

Evaluation:
- Field and Laboratory Notes 10%
- Multimedia Presentation 10%
- Technical Report 80%

GEOL3102 CAPSTONE: CARIBBEAN GEOLOGY
(3 Credits) (Level 3) (Semester 1)

Pre-requisites:
GEOL2205 - Plate Tectonics & Geological Structures AND any one of:
GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field
Methods for Geology and G GEO2233 - Introduction to Geographical Information Systems.

**Course Content:**
Geological evolution of the Caribbean; Geology of Caribbean mainland and island countries, and the Caribbean seafloor.

**Evaluation:**
- Final Written Examination (2 hours) 70%
- Course Work:
  - Seminar Presentation (2 hours) 30%

**GEOL3104 SEDIMENTOLOGY & FACIES ANALYSIS**
(3 Credits) (Level 3) (Semester 2)

**Pre-requisite:**
GEOL2202 - Sedimentary Geology AND any one of:
GEOL2201 - Palaeontology & the History of Life, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field Methods for Geology, GEOL2205 - Plate Tectonics & Geological Structures and G GEO2233 - Introduction to Geographical Information Systems.

**Course Content:**
Advanced sedimentology; Facies analysis.

**Evaluation:**
- Final Written Examination (2 hours) 50%
- Course Work:
  - Field Notebook 10%
  - 4 Laboratory Practicals 40%

**GEOL3105 PETROLEUM GEOLOGY**
(3 Credits) (Level 3) (Semester 2)

**Pre-requisites:**
GEOL2202 - Sedimentary Geology AND any one of:
GEOL2201 - Palaeontology & the History of Life, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field Methods for Geology, GEOL2205 -
Plate Tectonics & Geological Structures and G GEO2233 - Introduction to Geographical Information Systems.

Course Content:

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work:
  - Field Notebook 10%
  - 4 Laboratory Practicals 40%

GEOL3107 GEOPHYSICS & SEISMICITY
(3 Credits) (Level 3) (Semester 1)

Pre-requisites:
GEOL2204 - Field Methods for Geology AND any one of:
GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2205 - Plate Tectonics & Geological Structures and G GEO2233 - Water Resources.

Course Content:
Introduction to Geophysics; Gravity Methods; Geomagnetics; Applied Seismology; Electrical Resistivity Methods. Electromagnetic Methods. Ground-Penetrating Radar. Case studies: Overview of geophysical techniques in engineering, environmental geology, oil exploration, archaeological studies and forensic applications; A field trip in which students will use Electrical Resistivity, Ground Penetrating Radar and Seismic Refraction survey techniques to identify subsurface geology, aquifers, lithological boundaries, and other engineering and environmental issues.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
GEOL3108 METALLIC ORES & INDUSTRIAL MINERALS  
(3 Credits) (Level 3) (Semester 1)

Pre-requisites:
GEOL2203 - Igneous & Metamorphic Petrology AND any one of: 
GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary 
Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field 
Methods for Geology, GEOL2205 - Plate Tectonics & Geological Structures and 
GGEO2233 - Introduction to Geographical Information Systems.

Course Content:
Definitions for resources and reserves; Abundances of metals in the Earth’s 
crust; Overview of the natural processes that produce metallic mineral deposits; 
The metallic mineral potential of Jamaica and the Caribbean; How a geologist 
contributes to the development of metallic mineral occurrences: field mapping, 
sampling, core logging, data/information interpretation from field and laboratory, report writing; Rare Earth Elements; Construction materials (building 
stones, aggregates, cement); Industrial minerals. Resource assessments for 
metallic and industrial minerals.

Evaluation:
• Final Written Examination (2 hours) 50%
• Course Work: 50%
  • Laboratory Exercises on mineral identification 10%
  • Laboratory Exercises on Resource Assessment 10%
  • Seminar and Class Discussion 30%
GGE03231  KARST & COASTAL GEOMORPHOLOGY  
(3 Credits) (Level 3) (Semester 2)

Pre-requisites:  
GEOL2202 - Sedimentary Geology AND GEOG2231 - Earth Surface Processes.

Course Content:  
Karst Rocks and Material Properties; Karst Processes and Controls; Karst Landform Systems; Applied Karst Geomorphology; The Geomorphic Legacy of Sea-level Change and Paleo-Coastal Environments; Coastal Forces and Processes; Coastal Landform Systems; Applied Coastal Geomorphology.

Evaluation:  
- Final Written Examination (2 hours) 50%  
- Course Work: 50%  
  - Essay Assignments 10%  
  - In-course Tests 20%  
  - Field Project Report 20%

GGE03232  CLIMATE CHANGE IN THE TROPICS  
(3 Credits) (Level 3) (Semester 1)

Pre-requisites:  
GEOG2232 - Climate Change AND any one of:  
GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field Methods for Geology, GEOL2205 - Plate Tectonics & Geological Structures or Permission of Head of Department.

Course Content:  
A theoretical and practical basis for understanding present-day tropical environments and the causes of global environmental change, as well as for assessing the scale of human interference in natural environmental processes.

Evaluation:  
- Final Written Examination (2 hours) 50%  
- Course Work: 50%  
  - Oral Presentation 10%
• Laboratory Report (about 2500 words) 20%
• Critical Review (about 2500 words) 20%

GGE03233 HYDROLOGY & HYDROLOGICAL MODELLING

(3 Credits) (Level 3) (Semester 2)

Pre-requisites:
GGE02233 - Water Resources.

Course Content:
2. Types of flooding and flood hazards in Jamaica.
3. Climate change and hydrological hazards. Hydrologic Simulation models, steps in watershed modelling, description of models, principles, mainly HEC HMS models. Floodplain hydraulics - principles and concepts of HEC RAS (1D) model including case studies.

Evaluation:
• Final Written Examination (2 hours) 50%
• Course Work:
  • Field Trip Report 10%
  • Laboratory Reports 40%
GGE03332 DISASTER MANAGEMENT
(3 Credits) (Level 3) (Semester 2)

Pre-requisites:
GEOG2231 - Earth Surface Processes AND GEOG2232 - Climate Change AND any three of: GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2203 - Igneous & Metamorphic Petrology, GEOL2204 - Field Methods for Geology, GEOL2205 - Plate Tectonics & Geological Structures or Permission of Head of Department.

Course Content:
1. An introduction to the basic principles and techniques in disaster management.
3. Basic concepts of geology, geomorphology, tectonics and geophysics in the study of natural hazards, with special reference to the Caribbean.
4. Hazards and risks related to volcanic activity, earthquakes, landslides, hydrometeorological processes; flooding and hurricanes.

Evaluation:
- Final Written Examination (2 hours) 50%
- Course Work: 50%
  - Multimedia Presentation 10%
  - Project Report 10%
  - 3 Practical Exercise 15%
  - Fieldwork 15%

GGE03401 RESEARCH PROJECT IN GEOSCIENCES
(6 Credits) (Level 3) (Year-long)

Pre-requisites:
GEOL2204 - Field Methods for Geology AND GGE02332 - Introduction to Geographical Information Systems AND any three of: GEOG2231- Earth Surface Processes, GEOG2232 - Climate Change, GEOL2201 - Palaeontology & the History of Life, GEOL2202 - Sedimentary Geology, GEOL2205 - Plate Tectonics &
Geological and G GEO 2233 - Water Resources. Students must be registered for the Geosciences major.

Course Content:
An approved research project in the field of Geosciences is undertaken in the summer preceding the final year of the programme. The course involves the formulation of a research project, the execution of the project and presentation of results. The final outcome involves a multi-media presentation of the research results, and the submission of a dissertation in Semester 2.

Evaluation:
- Project Report (dissertation) 80%
- Coursework: 20%
  - Project Proposal: 0% (necessary to continue but zero-rated)
  - Progress Report: 0% (necessary to continue but zero-rated)
  - Oral Presentation: 20%