2.2.1 Curriculum Content of the Compulsory Part

1. Opportunities and Risks — Is it rational to live in hazard-prone areas?

This module examines three major types of natural hazard — earthquakes, volcanic eruptions and tsunamis. In examining the spatial patterns of these natural hazards and why such patterns exist, students are led to explore the concepts of plate tectonics and to understand how plate movements resulting from internal earth processes create mountain systems, some large-scale landform features and tectonic hazards around the world. With this understanding, students examine how and why the impact of these tectonic hazards vary greatly from place to place, and consider the complex decision-making process that makes some people decide to remain in hazard-prone areas. Through this, students gain an appreciation and respect for the rationale behind the different choices made by people in the same situation.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What has happened to areas with active tectonic activities? 2. What areas have been frequently affected by earthquakes, volcanic eruptions and tsunamis? 3. What spatial patterns exist in these natural hazards? 4. Why are there such patterns? How is it related to the global distribution of plates and plate boundaries?	• Natural hazards commonly found in areas with active tectonic activities (including earthquakes, volcanic eruptions and tsunamis) • Global distribution patterns of these natural hazards • Relationship between the distribution pattern of these natural hazards and that of tectonic activities	Location and spatial distribution Place and region Natural hazard People-environment interrelationship	• Collect and study newspaper clippings about tectonic activities and summarise their impact on people's lives and their responses to them. • Search for updated information and statistics from the Internet and plot a map (paper or using GIS) to show the spatial distribution of earthquakes, volcanic eruptions and tsunamis in the world. • Identify the common distribution patterns of these natural hazards.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
5. What and where are the major plates and plate boundaries? 6. What are the related landform features found at plate boundaries? How are they formed? 7. How does plate movement create natural hazards that develop with these features? 8. Why are some earthquake and volcanic zones far away from plate boundaries?	• Brief description of the internal structure of the earth • The names and types of major plates and plate boundaries in the world, as well as their location • The major landform features at plate boundaries (fold mountain, island arc, ocean trench, volcano, mid-oceanic ridge and rift valley) and their formation • The relationship between plate movement and natural hazards • Earthquake and volcanic zones far away from plate boundaries, e.g. hot spots	Plate tectonics Natural hazard Location and spatial distribution	• Use a map overlay or GIS to show the relationship between plate boundaries and the global distribution of geological hazards. • Draw a concept map to show the relationships among the major endogenetic processes, plate movement, the formation and distribution of major tectonic landform features and the distribution of tectonic hazards. • Visit Ma Shi Chau to identify various geological features related to faulting and folding in Hong Kong. • Identify on a map some earthquake and volcanic zones which are far away from plate boundaries. • Explain their spatial locations with reference to information on the Internet or in books.
9. What are the effects of earthquakes, volcanic eruptions and tsunamis? 10. How do these natural hazards affect the lives of human beings? 11. What has been done to reduce the impact of these natural hazards?	• Effects of earthquakes (primary and secondary effects), volcanic eruptions and tsunamis on human beings and the environment • Measures used to reduce the effects of earthquakes, volcanic eruptions and tsunamis (e.g. monitoring, predicting and warning systems for natural hazards, various disaster mitigation and preparation strategies, land use zoning) • Effectiveness of the above measures	Natural hazards People-environment interrelationship Impact of technology Limitation of technology	• Discuss and present the effects of earthquakes, volcanic eruptions and tsunamis in groups. • Display and analyse the major measures which have been used to reduce the impact of natural hazards.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
12. Why are less developed areas more vulnerable to these natural hazards than more developed areas? 13. Should people move away from hazard-prone areas? 14. Why do some people still live in hazard-prone areas? 15. Is their choice rational?	• The reasons for less developed areas being more vulnerable to natural hazards than more developed areas (e.g. literacy level and awareness of the people, and socio-economic and technological gaps) • The advantages and disadvantages of people living in hazard-prone areas	Natural hazard Region Degree of damage and level of development People-environment interrelationship	• Select and study two contrasting case studies of earthquakes / volcanic eruptions / tsunamis from the Internet / newspapers, one from a less developed area and the other from a more developed area. • Compare and contrast the vulnerability of these two areas in facing hazards and explain their differences. • Summarise information about the advantages and disadvantages of living in hazard-prone areas. • Decide whether or not it is rational to live in hazard-prone areas with reference to a case study.

Values and attitudes	• Appreciate the interdependence between human beings and the natural environment • Appreciate the beauty of nature • Show concern for those affected by natural hazards

Time allocation: 24 hours

Case / Specific Examples: No specific case is required but teachers are requested to quote appropriate examples from around the world, in particular the Asia-Pacific region.

2. Managing River and Coastal Environments: A continuing challenge

This module aims at introducing how the work of fresh and sea water creates a variety of fluvial and coastal environments. Through the study of the work of water and the resulting landform features, students should be equipped with the basic understanding of the interaction of various physical factors in shaping the surface of our Earth, and the management issues that arise from increasing human interference in fluvial and coastal environments. Teachers should also aim at ensuring that students have a thorough understanding of the geographical concepts related to erosion, transportation and deposition, such that they can transfer and apply these concepts to the study of landforms in other environments.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Where does water come from and go?	• A brief introduction of hydrological cycle: characteristics, stores and transfers	Hydrological cycle	• Draw a diagram of hydrological cycle to highlight the key components, including inputs, outputs, flows and stores.
2. How does water shape the landform in a drainage basin? 3. What are the major landform features created by the work of running water?	• Features of a drainage basin, including watershed, source, mouth, channel network • Major erosional, transportation and depositional processes • Factors influencing the above processes • Major landform features, including gorges, waterfalls and rapids, meanders and associated landform features, flood plains, levees, braids and deltas (using appropriate examples of the Mainland, e.g. Chang Jiang)	Drainage basin Fluvial process and landform	• Delimit the boundary of a river basin on a map. • Annotate photographs to describe the characteristics of the different parts of a river. • Draw cross-sections to illustrate the features of rivers.
4. How does water operate along coasts? 5. What are the major landform features created by the work of wave?	• Wave generation and characteristics (constructive and destructive waves) • Major erosion, transportation and deposition processes • Factors influencing the above processes • Major landform features, including sea cliff, sea cave, sea arch and stack, wave-cut platform, beach, spit and bar, tombolo	Coastal process and landform	• Identify coastal features shown in maps. • Construct annotated diagrams to illustrate the formation of coastal features. • Use appropriate forms of presentation (e.g. tables, diagrams, statistical charts) to explain how coastal processes of erosion and deposition are influenced by various marine, atmospheric and geological factors.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
6. How do human activities influence river and coastal environments and what are the resulting consequences? 7. How does the management of river and coastal systems pose a continuing challenge for people?	• Human activities on river and coastal environments: e.g. drainage, reclamation and recreation • Impact and consequences: e.g. flooding, erosion and mass wasting, pollution, and disturbance / damage to the ecosystem • "Hard" and "soft" management strategies e.g. channelization, building breakwaters, land use zoning, beach nourishment. • Management issues, including evaluation of methods and strategies used, and their possible impact	People-environment interaction Conflict Management	• Use GIS, aerial photographs and/or satellite images to analyse the change of fluvial and coastal environments over time owing to human activities. • Conduct a field visit to a river or a coastal area in Hong Kong to observe and identify the various management strategies implemented. • Survey people's views on the management of river / coast in Hong Kong.

Values and attitudes	• Appreciate the beauty of nature • Be aware of the changing nature of our physical environment and its possible impact on human activities • Recognise the need for sustainable management of our physical environment

Time allocation: 24 hours

Case / Specific Examples: River and coastal environment in Hong Kong

3. Changing Industrial Location – How and why does it change over space and time?

Location change is a characteristic of industry in the 21st century. The study of various factors influencing industrial location, and particularly those leading to changing location, remains an important topic in Geography. This module aims to study the factors affecting industrial location using the iron and steel industry and the information technology industry as examples. The iron and steel industry serves as a typical example for studying the location of an industry through time. The location of this industry has experienced several major changes as a result of technological breakthroughs. These changes in location have mainly been due to the replacement of one dominating factor by another, although the production is still being concentrated on a particular site (single-point production). Location changes have brought new industries to some areas and "rust belts" to others. The study of the location of the information technology industry introduces another group of location factors, in particular human resources, and research and development, in addition to the traditional ones such as power, raw materials and market. In general, the location of the information technology industry is not dominated by any particular location factor and its production site is not confined to a particular city or region (multi-point production). This industry has been developing towards a transnational enterprise model characterised by cross-regional or cross-national production.

Guiding questions	Explanatory notes	Concepts	Skills and Suggested Learning Activities
1. Where was the manufacturing industry of Hong Kong located in the past? Where is it now? 2. Is the same phenomenon happening in other industrial regions?	• Location of Hong Kong manufacturing industry in the past decades (1950s–1970s) • Relocation of the Hong Kong manufacturing industries to the Zhujiang (Pearl River) Delta Region – name and locate the major manufacturing centres in the region	Location and distribution Industrial relocation	• Use map overlays, GIS or other representations to show the changing location pattern of the manufacturing industry in Hong Kong and the Zhujiang (Pearl River) Delta Region.

Guiding questions	Explanatory notes	Concepts	Skills and Suggested Learning Activities
3. Where are the major iron and steel industrial centres in China? 4. Why are they there?	• Distribution pattern of the iron and steel industry in China • Major factors affecting the location of industry, e.g. raw materials, power, market, labour, technology, transport, government policy and land • Factors affecting the location of the iron and steel industry in China, with a specific focus on government policy	Location and distribution Industrial system Location factor Spatial association	• Collect information on the iron and steel industry in China. • Draw maps to illustrate the location of the iron and steel industry. • Overlay transparencies of the location of the iron and steel industry and the location of power and raw materials (or using GIS) to identify the location factors for this industry. • Interpret information from maps, graphs, data or diagrams to derive the location factors of the iron and steel industry.
5. How has the location of China's iron and steel industry changed over time? 6. Why do some plants still stick to their original locations?	• Changing location of the iron and steel industry in China, including the shift from the coast to the interior and the tendency to be located near large urban centres • Role of technology and other factors, especially government policy in leading to such changes • Reasons for industrial inertia in the iron and steel industry	Change over time Impact of technology Government policy Industrial inertia	• Locate the new iron and steel plants on the map and describe the changes in location pattern. • Group discussion: Causes of industrial inertia.
7. Why does the same group of factors not influence the location of the US IT industry? 8. What determines its location there?	• Location of the US IT industry • Factors affecting the location of the US IT industry, especially research and development, labour quality and agglomeration economies	Location and distribution Location factor	• Collect information on the IT industry in the US • Draw maps to illustrate the location of this industry. • Contrast the main location factors of iron and steel industry and information technology industry using various appropriate presentation modes (such as tables, graphs and computer presentations). • Field trip to Cyberport / Hong Kong Science Park to look at the factors which favour the development of the IT industry in these areas.

Guiding questions	Explanatory notes	Concepts	Skills and Suggested Learning Activities
9. What impacts have globalisation and technological advances had on the location of manufacturing industry and its mode of production?	• Location of manufacturing industry and headquarters of the US IT industry • Multi-point and transnational production in the IT industry • Definition of globalisation • The effect of globalisation and technological advances on its location and mode of production	Location and distribution Globalisation Change over time	• Browse through the Internet to search for examples of the multi-point location of the IT industry. • Using an example of an IT industry collected from different sources of data, summarise the reasons for its changing location and mode of production, and present these reasons to the class.
10. What are the likely social, economic and environmental impact of changes in industrial location and modes of production? 11. What can be done to alleviate the problems caused by this changing mode of production and changes in industrial location?	• Impact of changes in industrial location and mode of production, e.g. flow of technology, changes in employment structure, impact on economy, etc. • Measures taken to alleviate the problems caused by this changing mode of production and changes in industrial location, e.g. retraining of labour, an improved social security system, and the development of other industrial / economic sectors • Possibility of carrying out these measures • Effectiveness of these measures and problems encountered when carrying them out.	Socio-economic impact	• Organise the first- and second-hand materials collected in order to analyse the impact of industrial relocation on workers and society. • Group discussion: Discuss the types of measures that can be adopted and evaluate the possibility and effectiveness of carrying them out.

Values and attitudes	• Recognise the efforts human beings have made in the development of modern industry • Appreciate the far-reaching impact of technological development • Recognise the trend of globalisation • Understand and show concern for problems caused by the changes in industrial location

Time allocation: 24 hours

Case / Specific Examples: China's iron and steel industry and the US information technology industry.

4. Building a Sustainable City — Are environmental conservation and urban development mutually exclusive?

Like many cities in the Asia-Pacific region, Hong Kong has grown rapidly with a high urban population density. It is also a city with serious environmental problems. This module examines the reasons why a city like Hong Kong keeps on growing and the problems which result from such growth. It also focuses on how the economic prosperity and vitality of a city can be maintained without sacrificing its environmental quality based on the concept of "sustainable development". This module will equip students with a basic understanding of the concept of sustainable development and the possible ways of developing Hong Kong into a sustainable city. They will also learn about the price for developing Hong Kong into a sustainable city.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What is wrong with our growing city? 2. Why do cities keep growing?	• Brief description of urban problems in Hong Kong (e.g. housing problems, transport problems and pollution) • Definition of urban growth and urbanisation • Causes of urban growth and urbanisation (e.g. natural increase of urban population, rural-urban migration, reclassification of areas previously defined as rural, changing employment opportunities, and economic and transport development)	Urban problem Change over time Location Place Urban growth Urbanisation	• Collect photographs showing the environmental conditions of a growing city, identify the urban problems shown in them, and evaluate their impact on the people living in the city. • Analyse the census data and a map showing the urban area of Hong Kong in different time periods. • Investigate with secondary data in the library and explain why there was rapid urban growth and urbanisation in Hong Kong over the past few decades (i.e. causes of change).

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
3. How does the internal structure of a city change as it grows? 4. What are the processes involved in such a change?	• Urban growth, urbanisation and the related change in the internal structure of a city • Cycle of urbanisation, suburbanisation, counter-urbanisation and reurbanisation • Processes involved in urban growth and development, including urban decay, urban sprawl and encroachment, urban redevelopment and renewal	Location Place Change over time Internal structure of a city Competition and succession Urban encroachment Urban renewal	• Identify on a map of Hong Kong one old urban / inner city district (e.g. Wan Chai) and one rural area in the New Territories several decades ago (e.g. Tsuen Wan). Conduct questionnaire surveys to investigate how these two places evolved with urban development. • Conduct a survey on the land use and urban problems of the area near the school.
5. What problems does a growing city bring? 6. What solutions are there for these problems? 7. What kinds of conflict will be created when solving the above problems? 8. In what ways and with what success are these conflicts being dealt with? 9. Why is the concept of "sustainable development" helpful in dealing with these conflicts?	• Problems arising from a growing city: – Housing: insufficiency, substandard conditions – Movement: traffic congestion – Environment: waste, pollution, and the environmental health of the inhabitants • Measures to alleviate or solve the urban problems, including: – Provision of public housing and building of new towns – Urban planning – Environmental conservation measures • Conflicts arising from solving urban problems • Sustainable development and methods to solve the conflicts arising from urban problems	People-environment interrelationship Urban problem Conflict Sustainable development	• Visit the two areas mentioned above and identify the urban problems in these areas. • Discuss and present in groups: – the types of conflicts related to solving urban problems in Hong Kong; and – the methods for dealing with these conflicts.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
10. What would make a sustainable city? 11. What are the characteristics of such a city? 12. How can we make a city "sustainable"? 13. What is the price for developing a sustainable city?	• Definitions of "sustainable development and a "sustainable city" • Characteristics of a sustainable city • Methods of developing a city into a sustainable one, e.g. better and careful planning of the city, regenerating and re-imaging the city • Price for developing a sustainable city	Sustainable development Environment Change over time	• Browse the information on the Internet and summarise the characteristics or indicators of a sustainable city. • Re-design the development of a selected area in Hong Kong based on the sustainable indicators compiled from various sources and construct a land use map using appropriate IT tools (e.g. GIS).
14. Is environmental degradation a necessary evil for improving living standards in a growing city? 15. How should we choose? Can we afford not to choose a sustainable future in the long run?	• Relationship between urban development, socio-economic development, living standards and environmental conditions • Consequences of not developing a city in a sustainable way in the long run (i.e. aggravation of urban problems and the impact on human beings and the environment)	Change over time People-environment interrelationship Sustainable development Environment	• Conduct a role-play to demonstrate how different stakeholders perceive the need to keep a balance between environmental conservation and urban development. • Discuss in groups the consequences of not choosing a sustainable future in the long run. Use a type of graphic organiser to organise the main points being discussed.

Values and attitudes	• Show sensitivity to the development of the surrounding environment • Show concern for the problems caused by urban development • Develop a sense of responsibility and willingness to take action in protecting and improving the urban environment

Time allocation: 24 hours

Case / Specific Examples: Hong Kong (Teachers can consider making reference to some other examples of sustainable cities in the world in addition to Hong Kong.)

5. Combating Famine — Is technology a panacea for food shortage?

This module focuses on the issue of famine as a basis for geographical enquiry. Through exploring the causes of famine and why it occurs in some regions and not others, students develop a basic understanding of how various agricultural factors shape farming characteristics and determine farming yields. From this basic understanding, students can examine the extent to which famine is a naturally or human-induced disaster. The two case studies chosen for this topic allow students to identify how different factors lead to significant variation in the agricultural characteristics of regions with similar natural environmental settings. They also enable students to examine the role and influence of technology in agriculture, and the positive and negative effects of using agricultural technology in raising yields and combating the food shortage problem.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Why do some regions have surplus food production whereas others are suffering from famine? 2. What is "famine"? 3. Where do most famines occur? What are the similarities found in regions frequently affected by famine?	• The availability of food supplies is uneven and does not match demand on a global scale – Global patterns of food production and consumption in relation to population – Global contrasts in diet and food consumption – Patterns of trade in food • Definition of "famine" • Causes of famine in relation to economic, technological, social and physical conditions	Location and distribution Spatial association Region Spatial variation People-environment interrelationship	• Select and record information from print sources, audio-visual and computer technologies, maps and photographic records to describe and define key issues and problems related to famine. • Read and draw maps (using GIS) from atlases or statistical data to highlight the location of areas suffering from famine. • Draw diagrams and graphs (e.g. bar, line, pie, scatter) using appropriate computer software to illustrate the spatial distribution of food availability based on statistical data collected from various sources. • Compare patterns from mapped data to identify how the interaction between physical and human environments affects food production and consumption.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. What are the factors that affect agricultural production in an area? How do these factors shape the characteristics of farming in an area?	• Physical, economic, social and political factors affecting agriculture (especially agricultural production and agricultural characteristics)	Agricultural system Agricultural factor Interaction	• Use graphic representations to display the major physical and human factors that affect agriculture.
5. Where is Sahel? Where is Southern California? What are the characteristics of their natural environments? 6. What are the agricultural characteristics of nomadic farming in Sahel? What are the agricultural characteristics of irrigation farming in Southern California?	• Location of Sahel and Southern California • Characteristics of the physical environments of Sahel and Southern California, in particular climate, soil, vegetation cover and relief • Agricultural characteristics of nomadic farming in Sahel and irrigation farming in Southern California, with a specific focus on the differences in their technological, economic, political and socio-cultural aspects	Location Place	• Correlate aerial photos / satellite images with maps and use the evidence to recognise the main characteristics and patterns of different agricultural activities. • Summarise the similarities and differences in the characteristics of nomadic herding and irrigation farming by means of graphic representation (e.g. using input-output model).
7. Why are agricultural characteristics so varied even in similar natural environmental settings? 8. How true is it to say that human factors are becoming more and more dominant than physical factors in influencing agriculture?	• Factors affecting agricultural characteristics in Sahel and Southern California, emphasising how the same set of factors operates so differently in creating such variation • The diminishing role of physical factors in influencing agriculture, particularly in more developed areas • The growing importance of human factors, especially technology, in influencing agriculture	Spatial variation Interaction between physical and human factors Physical system Human system	• Design a questionnaire for interviewing local farmers about how the natural environment and technology influence agricultural activities.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
9. To what extent can technology help to increase agricultural production and alleviate food shortage? Is genetically modified food a possible way out? 10. Have we really overcome most of the farming constraints imposed by the natural environment? What price do we have to pay for this "success"? 11. Is it possible for us to minimise the negative impact of using technology in agriculture, and at the same time produce enough food for everyone?	• Modern farming methods, e.g. the use of chemicals, irrigation, draining and their effects on farming yields • A brief overview of the possible environmental, economic and social (including health) implications of genetically modified food • Consequences of misuse and overuse of agricultural technology, e.g. reduction of bio-diversity, habitat loss, land degradation, soil erosion, chemical pollution of land and water courses, and the impact on the rural landscape • Measures taken to ensure sustainable agricultural development, e.g. multiple cropping, water and soil conservation methods, and organic farming	Impact of technology Change over time Limitation of technology Resource management in agriculture Sustainable agricultural development	• Rank the desirability of various technological solutions for overcoming farming constraints. • Summarise the positive and negative effects of technology on agriculture from the information collected from various sources. • Role-play stakeholders to enhance understanding of the current and alternative practices for raising food production and their impact on the environment. • Conduct a field visit to an organic farm in Hong Kong.

Values and attitudes	• Appreciate the limitations of agricultural technology • Be aware of the advantages and disadvantages of technology • Show concern about the difficulties encountered by people in other areas

Time allocation: 24 hours

Case / Specific Examples: Nomadic herding in Sahel and irrigation farming in Southern California

6. Disappearing Green Canopy— Who should pay for the massive deforestation in rainforest regions?

Tropical rainforest is a biome with the greatest number of plant and animal species. It is characterised by its complexity in structure and in the function of its ecosystem, and yet it is also a fragile ecosystem under threat. As such, tropical rainforest is a good illustration for demonstrating the concept of an ecosystem. In studying this module, students will understand the structure and function of a tropical rainforest ecosystem under threat. People-environment interrelationship is examined with particular reference to the loss of forest as a result of human action. The module also demonstrates how disturbance of one component of an ecosystem disturbs the equilibrium of the system. Through this study, students develop a sense of environmental protection and understand the need for sustainable development.

Guiding questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What is happening to tropical rainforests?	• Global distribution of tropical rainforests • Deforestation in rainforest regions – rate and conditions	Deforestation Location and distribution	• Collect information from the Internet and other sources about the destruction rate of tropical rainforest. • Interpret related graphs and figures. • Construct maps to show the distribution of the tropical rainforest and its destruction rate using GIS or other IT tools.
2. What would a tropical rainforest look like before large-scale deforestation? 3. Why does it look like that? 4. What is the evidence for saying that tropical rainforest is a complex but fragile ecosystem?	• Definition of an ecosystem • Abiotic components and biotic components of a tropical rainforest ecosystem • Links and interrelationships between abiotic and biotic components, such as the influence of abiotic components on the characteristics of biotic components • Energy flow in a tropical rainforest ecosystem • Nutrient cycling in a tropical rainforest ecosystem	Ecosystem Abiotic and biotic components Spatial association Ecological equilibrium Energy flow Nutrient cycling	• Read climatic graphs. • Extract information from photos and pictures. • Field trip to Hong Kong Park or Tai Po Kau Nature Reserve to look at the characteristics of some tropical and sub-tropical plants. • Use graphic representation to show the interrelationships between abiotic and biotic components.

Guiding questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
5. Why are tropical rainforests all over the world disappearing at a faster rate in recent times?	• Types of destruction in the tropical rainforests • Reasons for such destruction – economic development, agricultural development and population growth	Human interference Scale of development	• Extract relevant information from photos and pictures. • Role play: How different parties can develop the potential of tropical rainforests.
6. What is the impact of large-scale deforestation in tropical rainforest regions? 7. How will it affect the local and global environments? 8. How will it affect the indigenous people? 9. How will it affect our lives in Hong Kong?	• Impact of large-scale deforestation in tropical rainforests on climate, biosphere and lithosphere at a local and global scale • Socio-economic impact on the local community and other places in the world	People-environment interrelationship Scale of impact	• By looking at graphs and newspaper cuttings, assess the impact of deforestation of tropical rainforests on the local and global natural environments. • Through a case-study investigation, evaluate the kinds of socio-economic impact on both the local community and people far from this place.
10. How can tropical rainforests be prevented from disappearing? 11. Will the protection of tropical rainforests hinder the development of the local economy? 12. Can we strike a balance? 13. What price has to be paid to protect tropical rainforests, and who should pay?	• Measures to protect tropical rainforests, such as afforestation, regulation on logging activities, setting up of national parks and natural reserves • Roles played by different parties, including native people and local dwellers, government officials, private developers and environmentalists, in developing and protecting rainforests • Problems of developing and protecting rainforests, such as conflict of interest among different parties (e.g. native people, local dwellers, private developers and environmentalists), the great debt borne by less developed countries and weak government control • Possible compromises between development and conservation and the consequences of different decisions made • Sustainable development of tropical rainforests	Environmental conservation and management Conflict of interest Sustainable development	• Discussion: Ask students to give suggestions on the measures that can be used. • Debate: “As the tropical rainforest is very valuable, we should, by all means and at all costs, protect it.” • Discussion: How to compromise between development and conservation?

Values and attitudes	• Appreciate the interdependence of human beings and the natural environment • Show concern for the problems caused by deforestation • Develop a sense of responsibility and willingness to take action in protecting the tropical rainforests

Time allocation: 24 hours

Case / Specific Examples: No specific cases are required but teachers are advised to quote appropriate examples from around the world

7. Climate Change — Long-term fluctuation or irreversible trend?

This module introduces the issue of climate change as a typical example of the interaction between humans and the natural environment. The focus of the issue is on whether climate change, in particular global warming, is just a longer term climatic fluctuation. This module leads students to examine the evidence to investigate whether climate change is an irreversible phenomenon. In addition to studying the causes and impact of climate change at a global scale, this module also has a second focus on local climate change, mainly the combined influence of global warming and urbanisation. The investigation of the issue will also ensure that students acquire a basic understanding of the elements and associated patterns of the local and global climate. Moreover, they should be able to understand better how human activities affect our natural environment, and how resulting changes of the natural environment in turn affect us.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. What is weather? What is climate? 2. How is our climate like? 3. What evidence is there to prove that our climate is changing?	• Definition of 'weather' and 'climate' • A brief introduction of climate at local, national and global scale. • Evidence showing our climate is changing all over the world: e.g. sharp increase of mean global temperature in recent decades, heat waves and unusually warm weather, sea-level rise and coastal flooding, the melting of glaciers, more frequent extreme weather conditions	Weather and climate Pattern Change over time	• Read and interpret climatic graphs. • Identify climatic characteristics and distribution patterns from climatic maps and graphs. • Collect climatic data of Hong Kong by visiting the Hong Kong Observatory Resource Centre and interpret the trend of Hong Kong's climate change over a long period of time. • Construct thematic maps showing global climatic zones using GIS or other software programmes. • Collect evidence from various sources, including the Internet, to illustrate that the global climate is changing.
4. What is global warming? 5. Is global warming a long-term fluctuation of temperature, or is our Earth really heating up? 6. What are the causes of global warming? Is global warming a natural or human-induced climate change at global scale?	• Greenhouse Effect: the mechanism and the role of human activities (e.g. deforestation, burning of fossil fuels, garbage burning, emission of chlorofluorocarbons, agriculture) in enhancing the process • Natural and human causes of global warming • Supporting and opposing arguments for global warming is an irreversible trend	Long-term trend Climate change Interaction between physical and human systems People-environment interrelationship	• Debate the issue "Global warming is a long-term fluctuation of temperature". • Use a concept map or other graphic organisers to display the causes of global warming.

Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
7. Is our climate also changing at a local scale? 8. How is the climate of our urban areas different from our rural areas? Why is there such a difference? 9. What are the effects of urban growth and development on the climate of our city?	• Urban growth and development leading to local variations in climate, focusing on heat island effect • Effects of urban growth and development on microclimate, in terms of atmospheric composition, temperature, sunshine, precipitation, humidity and wind • Observed climate change in Hong Kong	Microclimate Urban climate Heat island effect Spatial variation	• Use data loggers / measuring meters / apps and software programmes in the field to collect data of microclimate. • Use GIS or other computer software to plot the data collected from a urban climate fieldwork onto a digital map. • Construct a map to show the spatial variation of microclimate in an urban area. • Construct a scatter diagram to show the correlation between an element of urban climate (e.g. temperature) and the distance from the urban centre.
10. What will be the impact of climate change? How will it affect our lives? 11. What can be done about it? 12. Why is it so difficult to reach a global agreement to deal with climate change?	• Consequences of climate change, focusing on winners and losers around the world, e.g. impact on sea level, flood frequency, new farming opportunities, health risks, climate prediction becoming more difficult, and extreme weather events • Mitigation and adaptation measures at local and global levels • A brief review of the complexities of reaching a global agreement, in particular the conflicting views and roles of key players	Interdependence between human and physical environment International cooperation Individual interest and common good Conservation Sustainable development	• Use GIS or other computer programmes to simulate the impact of climate change, e.g. the flooding of coastal regions as a result of sea-level rising. • Study the potential impact of climate change on one country, including predicting the consequences of global warming and evaluating its plan for prevention and control of the negative impact.

Values and attitudes	• Show concern for the impact of climate change on the global environment • Be aware of the consequences of the interactions between human activities and the natural environment • Recognise the existence of uncertainty in explaining long-term change

Time allocation: 24 hours

Case / Specific Examples: No specific cases are required, but teachers are advised to quote appropriate examples from around the world for studying climate change at a global scale, while for local scale, teachers should consider using Hong Kong and the neighbouring region as examples.

2.2.2 Curriculum Content of the Elective Part

1. Dynamic Earth: The building of Hong Kong

This elective is for those students with a strong interest in geology and geomorphology. It aims to provide a conceptual framework and a better understanding of geology and geomorphology contained in the Compulsory Part of the curriculum.

The structure of this elective is based on the processes involved in shaping the Earth's surface. The focus is on a general understanding of the geology and geomorphology of Hong Kong and how the major internal and external processes shape its overall physical landscape. The management of geological resources and geological hazards are discussed in order to relate this knowledge to students' daily lives and help them to apply it.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Earth's structure and processes	• How should we look at the Earth as a system? • What is the overall structure of the Earth? • How is rock formed?	• Earth systems: interaction between the atmosphere, the lithosphere and the hydrosphere • The internal structure of the Earth and crustal movement • Rock cycle and formation (volcanism, sedimentation, metamorphism)	Earth as a system Earth structure Plate Tectonics Crustal movement Rock cycle	• Use graphic organisers to show the relationship between different elements in the Earth system and rock cycle. • Use diagrams to illustrate the internal structure of the Earth. • Identify the major plates in the world map.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Physical landscape of Hong Kong	• What is the general geomorphology and geology of Hong Kong? • What are the major landform features in Hong Kong?	• Geomorphology and geology of Hong Kong - Overall landform distribution - Rock types and their distribution in Hong Kong - Major geological features (folds and faults) in Hong Kong • Modification of Hong Kong landscapes by urban development	Landform Rock type Geological feature Spatial distribution Spatial association Pattern Impact of urbanisation	• Interpret different geological and relief maps to describe the distribution of various rock types, geological features and relief of Hong Kong. • Identify major geological features in Hong Kong from photographs or diagrams and describe their characteristics. • Conduct field trips to some of the geological sites in Hong Kong to identify these geological features. • Overlay the map that shows urban development with the relief map (or use GIS) to show how urban development has modified Hong Kong's landscape.
3. Processes shaping the physical landscape of Hong Kong	• What are the major internal and external processes shaping the present physical landscape of Hong Kong?	• Internal processes including: - Folding - Faulting - Volcanism • External processes including: - Weathering - Erosion - Mass wasting	Internal process External process Spatial association	• Overlay different maps (or use GIS) to show the relationship among geomorphology, rock types and geological features. • Use diagrams to explain how the internal and external processes have shaped Hong Kong's physical landscape.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. Management of geological resources and geological hazards	• How can people manage the geological resources and geological hazards in Hong Kong?	• Geological resources – Reclamation materials - Sources of materials and their distribution - Environmental impact of the extraction of reclamation materials - Local example: Hong Kong International Airport • Geological hazard – Landslides - Causes of landslides in Hong Kong, including natural and human factors. - Slope management and landslide prevention, e.g. strengthening slopes, restricting development on slopes, maintaining slopes, regular checking of slopes - Local example: Sham Wan Landslide	Geological resource Geological hazard People-environment interrelationship Interaction between physical and human factors	• Gather information to understand the types of reclamation materials and their distribution. • Group discussion: Environmental impact brought about by extraction of reclamation materials. • Interpret the climatic graphs, and relief and geological maps of Hong Kong to explore the causes of landslides. • Interpret the relief map of Hong Kong (or use GIS) to find out the sites where landslides may occur. • Conduct a field trip to Sham Wan to identify the measures that have been adopted to prevent landslides from happening again.

Values and attitudes	• Appreciate the beauty of nature • Appreciate the interdependence of human beings and the natural environment.

Time allocation: 24 hours

Case / Specific Examples: Hong Kong

2. Weather and Climate

This elective is for those students with a strong interest in weather and climate. It aims at providing a more academic and systematic foundation for students' further study pursuit in this field.

This elective introduces three fundamentally important properties of the atmosphere, namely heat, moisture and motion. By using Hong Kong and other places in the Mainland as examples, students learn about the basic weather elements and how climate varies with location and time. They also study the interrelationship between climate and human activities, specifically about how climate influences human activities and how human responds to these influences.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Control factors of the climatic system	• What are the major control factors of the climatic system? • How does the operation of these factors result in global climatic pattern?	• Energy in the atmosphere - Energy budget - Factors affecting insolation - Global temperature distribution pattern • Atmospheric motion - The tri-cellular model - Global pressure pattern - Planetary wind systems • Moisture in the atmosphere - A brief introduction of humidity and condensation - Types of precipitation - Global precipitation distribution pattern • Major global climatic zones	Climatic system Energy budget Atmospheric circulation Humidity and condensation Climatic zone	• Construct annotated diagrams to show how the global circulation system works. • Construct a map using appropriate IT tools (e.g. GIS) to outline the major climatic zones.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Climate of China	• How and why does the climate of different places vary? • How and why does the climate of a place varies over time?	• Factors affecting the climate of a location • An introduction of the climate and the major climatic zones of China • North-South and East-West variation of climate in China: causes and characteristics • Seasonal occurrence of weather systems in Hong Kong and the Zhujiang Delta Region: formation and impact - Cold fronts - Typhoons	Climatic factors Location and distribution Pattern Monsoon Spatial variation Weather system	• Collect various types of climatic data of different places from the Internet. • Construct a climatic graph. • Interpret climatic graphs and climatic data to explain the climatic conditions of a place. • Interpret weather charts to describe and explain the weather of a place. • Identify seasons and weather systems from weather charts. • Construct annotated diagrams to show the formation and characteristics of weather systems.
3. Relationship between weather hazards and human activities	• What kinds of weather hazards occur in China? • What is the impact of weather hazards on human activities in China? • How do people respond to these hazards in China?	• A brief introduction of the major types of weather hazards (e.g. floods, droughts, sandstorms, typhoons, cold surges and heat waves) and their distribution in China. • Causes and impact of drought in North China • Strategies adopted to combat droughts in North China, e.g. water transfer projects, improved farming methods, water conservation projects, proper water management • Evaluation of the effectiveness of these strategies	Weather hazards People-environment interrelationship Environmental management strategy	• Collect information about the major types of weather hazards found in China and summarise their impact on human activities. • Use GIS or other IT tools to construct map overlay to show the relationship between physical factors (e.g. relief, rainfall distribution, temperature distribution) and the occurrence of weather hazards. • Identify the distribution patterns of weather hazards from thematic maps. • Discuss the strategies that can be adopted to combat weather hazards and evaluate their effectiveness.

Values and attitudes	• Appreciate the beauty of nature • Show concern for those affected by weather hazards • Develop a better understanding of China through the enquiry study of weather hazards

Time allocation: 24 hours

Case / Specific Examples: Hong Kong and the Mainland

3. Transport Development, Planning and Management

This elective is for those students with an interest in knowing more about transport geography, and for those who want to broaden their scope of study. It has an academic focus and provides a foundation of knowledge for further studies in related fields. By providing students with a basic understanding of transport planning and management, this elective is also career-related and offers a more direct pathway for those who wish to plan ahead in terms of career development.

This elective aims at providing an introduction to the development of an urban transport system. It covers fundamentals in the geographical analysis of transport. The main focus is on studying the relationships of transport development, problems, planning and management, as well as their interrelationships with urban spatial forms and development. Local and national examples are used to explain the mechanism and dynamics of transport systems.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. The development of transport and logistics in Hong Kong	• What are the core elements of a transport system and major transport patterns? • What are the major transport modes in Hong Kong? • How have Hong Kong's transport system and logistics developed?	• Transport systems: demand, nodes, linkages, networks, locations, flows, and terminals • Transport patterns (including personal travel and freight transport) • Distance, transport cost, modal choice and modal competition • Unimodal transport and multimodal transport • Major transport modes in Hong Kong (including water transport, rail transport, road transport, air transport, pipelines) • The development of Hong Kong as a transport and logistics hub in the Zhujiang Delta Region	Transport system Node, linkage, network and flow Transport pattern Transport cost Modal choice and competition Location and distribution Change over time and space	• Describe the transport patterns and major transport modes in Hong Kong based on the information and data collected from the websites of the Transport and Housing Bureau and Transport Department. • Plot the routes and networks of two airline companies with Hong Kong International Airport as their hub / origin on world maps for comparison. • Choose an area near your school/home to conduct a traffic flow investigation, which includes counting the number of different types of vehicles passing through designed checkpoints with mobile devices and present and analyse the data collected with suitable cartographic (e.g. flow lines, bar charts and pie charts) and statistical methods (e.g. frequency table, mean, median and mode). • Conduct a survey on modal choice with survey apps. • Visit a logistics company in Hong Kong and / or browse the website of the Hong Kong Logistics Development Council to understand more about the development of logistics in Hong Kong.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Transport problems in Hong Kong	• What are the transport problems in Hong Kong? • Why are there such problems?	• The relationship between transport, energy and environment • Traffic congestion, traffic accidents, car parking and environmental problems (e.g. noise pollution, air pollution, visual impact, effects on ecosystems) • The causes of transport problems in Hong Kong (e.g. lack of planning in the past, high concentration of population and economic activities)	Environment People-environment interrelationship Transport problem	• Collect news articles on Hong Kong's transport problems from various sources and summarise the causes, effects and possible solutions in tabular form / using a concept map.
3. Transport planning and traffic management in Hong Kong	• How does the Hong Kong government cope with the transport problems? To what extent are these measures effective? • What are the transport innovations adopted by the Mainland? To what extent can these innovations be used in Hong Kong to solve its transport problems?	• Improvement of transport infrastructure in Hong Kong (e.g. provision of additional road capacity) • Expansion and improvement of public transport in Hong Kong • Various measures involved in managing road use in Hong Kong • Development of a sustainable transport system in Hong Kong • Effectiveness of the transport planning and traffic management measures in Hong Kong • Transport innovations adopted by the Mainland (e.g. bus-rapid transit (BRT), Maglev train and high speed railway) and the feasibility of implementing them in Hong Kong to solve transport problems	Transport planning Traffic management Sustainable development Transport innovation	• Conduct an investigation to study the transport planning and traffic management measures of a chosen area in Hong Kong, which includes: - Identify and take photographs of the measures (with GPS locations); - Using mapping apps or software programmes to present relevant data collected; and - Evaluate the effectiveness of the measures.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. Transport development and urban morphology	• What are the interrelationships between transport development and urban forms? • To what extent the concepts of "transit-oriented development" help to develop a better urban and transport environment in Hong Kong?	• Evolution of transportation (including transport modes, routes, networks) and urban forms, including the space/time relationship of one-hour commuting with different transport modes • Impact of transport on urban land use (e.g. nodes and linkages, land rent theory, distance decay) • The impact of "transit-oriented development" on the transport and urban development of Hong Kong	Urban morphology Commuting Accessibility Distance decay Urban and transport planning Transit-oriented development (TOD)	• Construct a simple connectivity matrix (or geographic accessibility and potential accessibility) to show the accessibility of different nodes or locations in a region. • Choose a MTR station in Hong Kong to conduct a fieldwork to investigate the impact of "transit-oriented development" on the transport development and internal structure of the area near the chosen station.

Values and attitudes	• Be aware of the importance of transport and logistics development in Hong Kong. • Show concern about the problems caused by transport development, and appreciate the effectiveness of various transport planning and traffic management measures in alleviating the problems.

Time allocation: 24 hours

Case / Specific Examples: Hong Kong and the Mainland

4. Regional Study of Zhujiang (Pearl River) Delta

This module, which focuses on studying the socio-economic and environmental aspects of the Zhujiang (Pearl River) Delta Region, provides an opportunity for students to apply geographical concepts (e.g. region, change, people-environment interaction) and knowledge (e.g. factors affecting agricultural and industrial location, land use pattern, urban expansion) developed in the Compulsory Part of this curriculum in an integrative manner. The aims of this study are to study the significant changes and development that occurred in the region in the past decades, and to examine how the natural environment of the region is being affected and how the issue can be managed and resolved.

In developing lesson plans for this elective, teachers should ensure that their designs enable students to achieve the curriculum objective of 'acquiring knowledge and understanding' of the region. Teachers are also reminded that in-depth regional study in Geography provides a good opportunity for students to develop and apply both subject and generic skills, as well as to cultivate values and attitudes.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
1. Zhujiang (Pearl River) Delta as a region	• Where is Zhujiang (Pearl River) Delta? • What is a 'region'? Why is Zhujiang (Pearl River) Delta regarded as a region?	• Location of Zhujiang (Pearl River) Delta: site and situation • The environmental and socio-economic characteristics of Zhujiang (Pearl River) Delta as a region	Location Region	• Prepare a 10-minute computer presentation to briefly introduce the major environmental and socio-economic characteristics of the Zhujiang (Pearl River) Delta Region.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
2. Changing agricultural and industrial development	• What changes can be observed in agriculture and manufacturing industries since the 1980s? • What are the reasons for such changes?	• Changes and development in agriculture and manufacturing industries of Zhujiang (Pearl River) Delta – Agriculture: from subsistence to export-oriented and internal consumption – Manufacturing: from labour-intensive to capital and technology intensive • Reasons for such changes and development	Change over time Development Factors affecting agricultural and industrial development	• Construct maps (GIS as a tool for map making) to show the distribution of various types of agricultural and industrial activities to be found in the region. • Use map overlay to identify the changing agricultural and industrial pattern in the region over a period of time. • Draw a series of divided bar charts showing the changing pattern of different types of industries developed in the region.
3. Changing land use pattern	• What changes can be observed in the land use pattern since the 1980s? • What are the reasons for such changes?	• Changing land use pattern since the 1980s: from rural-agricultural dominant to urban-industrial dominant • Urban expansion as a result of economic development and urban growth • A brief introduction of the resulting features of urban expansion: city clusters and villages-in-the-city	Settlement pattern Urban expansion and urban growth Spatial interaction	• Identify the changing land use pattern of Zhujiang (Pearl River) Delta Region from a series of satellite images taken over a period of time. • Conduct a group project to study villages-in-the-city found in Shenzhen or Guangzhou.

Topics	Guiding Questions	Explanatory Notes	Concepts	Skills and Suggested Learning Activities
4. Change, development and the natural environment	• What are the consequences of the above changes and development on the natural environment? • What have been and should be done to alleviate the problem?	• Environmental pollution in Zhujiang (Pearl River) Delta: causes, types, spatial distribution and variation over time • Impact: e.g. social costs (health, quality of life), economic loss (costs for "clean-up" programmes, moving away of firms and companies) and the impact on Hong Kong (air and water pollution) • Management strategies: e.g. legislation, prevention, control, treatment, education (alternative life styles) and cross-border cooperation	Environmental degradation Pollution Conservation Environmental management	• Conduct a field trip to one of Hong Kong's inner city industrial districts of Hong Kong (e.g. San Po Kong, Kwun Tong) to study environmental degradation caused by industrial activities.

Values and attitudes	• Appreciate the inter-connectedness between Hong Kong and its neighbouring Zhujiang (Pearl River) Delta Region. • Show concern for the problems that affect both Hong Kong and other parts of the Zhujiang (Pearl River) Delta Region.

Time allocation: 24 hours

Case / Specific examples: Zhujiang (Pearl River) Delta