

AM SYLLABUS (2028)

GEOGRAPHY

AM 13

SYLLABUS

Geography AM 13

(Available in September)

Syllabus Paper 1 (3hrs) + Paper II (3hrs) + Short-Term Field Reports + Individual Fieldwork Report**INTRODUCTION**

Geography is a subject that straddles the natural and social sciences. It is also a subject that looks at phenomena from the spatial perspective, more specifically geography looks at distributions over the Earth's surface. The syllabus includes the main physical characteristics that make up the natural environment and the central themes that govern humans and their actions on the planet.

The syllabus will enable students to use their acquired geographical knowledge in real life situations and as a basis for lifelong education. The range of learning skills includes:

- recalling relevant content from geographic subject matter;
- understanding the diverse characteristics of people, places and environments;
- interpreting maps, globes and other geographic tools and technologies such as charts, graphs, aerial photographs;
- understanding that space and spatial relationships are fundamental components of human interdependence on the local, regional, or global scale;
- recognising spatial relationships between people and their environments; and
- solving problems systematically using geographic methods.

This syllabus is an attempt at making geography a user-friendly subject, where students following it will pass through a positive experience. This course of study places an emphasis on the classroom element together with fieldwork. Special attention has also been given to include the geography of the Maltese Islands as a core area.

Assessment Objectives

The examination will assess the ability of the candidate in the following manner.

1. *With reference to knowledge and understanding*

- To recall accurately specific factual information relating to physical and human concepts, principles, theories and physical and human inter-relatedness across a range of scales and time sequences.
- To demonstrate an understanding of geographical ideas relating to physical and human processes which either on their own or in combination, underline distributions and spatial outcomes across a range of scales and time sequences.
- To contextualise the local in a global perspective.
- To demonstrate a critical awareness of the value of the application of theories.
- To show awareness that while geographical projects are concerned with data collection, presentation, analysis, interpretation, and the formulation of conclusions, these may be both tentative and incomplete.

2. *With reference to skills*

- To analyse, organise, and present information in a coherent essay or a structured response from data stimulus material.
- To collate, present and interpret data from a wide range of primary and secondary sources and in a variety of forms.
- To collate, apply or evaluate evidence in problem solving situations.
- To undertake a teacher-led and an individual geographical project.
- To apply a range of skills to personal and group fieldwork and to use suitable geographical techniques.
- To acquire an awareness of the significance of the attitudes and values of others and of the impact of cultural differences on geographical issues.
- To demonstrate an understanding of the decision making and of the values and perceptions of the decision makers.

Scheme of Assessment

The assessment will be divided as follows:

- two written papers: each of three hours duration and each carrying 36% of the total mark;
- two short-term fieldwork reports that carry a total of 8% of the total mark;
- an individual fieldwork report carrying 20% of the total mark.

The written examination papers (36 + 36 = 72%)

In each paper, candidates are required to answer four questions out of six. Questions carry equal marks.

Paper I Physical Geography: to assess the knowledge and skills of candidates in relation to the following topics:

- Atmospheric Processes and Patterns;
- Geomorphology;
- Coastal Environments;
- Fluvial Systems and Processes;
- Biospheric Processes and Patterns.

Importance will be given to the interrelationships and interactions between human activities and the environment.

The topics will assess the candidates' knowledge in relation to the situation in Malta, e.g. a candidate must show an understanding of the processes affecting weather and climate in Malta.

Various geographical skills will be integrated within the different units, for example, the interpretation of synoptic charts (see Appendix I).

Paper II Human Geography: to assess the knowledge and skills of candidates in relation to the following topics:

- Population, Migration and Settlement Dynamics;
- Food Supply and Manufacturing Industries;
- Extractive Industries and Energy;
- Global Interdependence.

Importance will be given to the impact of human activities on the environment.

The topics will assess the candidates' knowledge in relation to the situation in Malta, e.g. population changes and migration in Malta.

Various geographical skills will be integrated within the different units for example the use of choropleth and dot density maps in population studies (see Appendix I).

The Short-term Fieldwork Reports (8%)

The short-term reports are freely structured and are written accounts of two teacher-guided field trips. Each short-term fieldwork report carries 4%.

Each candidate must produce two short-term fieldwork reports (even if the fieldwork was carried out within a group).

The Individual Fieldwork Report (20%)

The Individual Fieldwork Report is a longer report of 2,500-4,000 words, structured according to specified criteria.

THE PRACTICAL WORK

Two short-term fieldwork reports

- These reports are intended to ensure that the candidate has participated in the teacher-guided field trips.
- The choice of topics is open but should be balanced to contain both human and physical aspects of Maltese geography.
- The length of reports should reflect the true nature of the fieldwork and must not exceed 1,000 words.
- Working, forming part as a member of a group, is accepted.
- The work submitted must be tutor/teacher-led. It must satisfy the examiners that the candidate has adequate experience of fieldwork.

The authentication form available on the MATSEC Support Unit website is to be filled in and duly signed and submitted with the reports.

The Individual Fieldwork Report

- The individual enquiry is primarily intended to assess the basic skills needed for geographical research or investigation performed by the candidate.
- Candidates should seek advice on the choice of a suitable topic, sources of relevant primary and secondary information and appropriate fieldwork, analytical and presentational techniques.
- Data collection in the field is an essential requirement and students are requested to base their individual enquiry on primary data. Individual enquiry based on published secondary data will not be considered as meeting the requirements at this level. Published secondary data should be used to support the enquiry (e.g. data from the National Statistics Office, Government reports or local academic research).
- Candidates should have knowledge on how to relate primary data collected from the field with published secondary data. They should also be able to place their study within the context of other studies published in the literature to combine theory and practice.
- All enquiries should normally involve the formulation and testing of a suitable hypothesis or be based on research questions which are manageable within the time available.
- Topics selected should not be too complex to allow valid conclusions to be drawn, nor too large in area or scale. Suitable topics will be small in scale and specific in nature.
- The enquiry should show clear evidence of careful planning of hypothesis or research question formulation, data collection and data analysis.
- The enquiry should show the candidate's ability to select and use a range of appropriate methods for the accurate observation, collection, sampling (if appropriate) and measurement of data.
- The enquiry should demonstrate the use of appropriate techniques to represent clearly the data collected. Techniques may include descriptive statistical (e.g. mean, mode, median, percentages), cartographic, graphic (including Lorenz curve) and diagrammatic forms. Appendix I provides a guide on the type of fieldwork, cartographic and statistical analysis methods that are considered indispensable skills for geographers.
- The candidate is required to use appropriate techniques to analyze the data collected. These techniques must include at least one statistical method of analysis to test the hypotheses or support the research questions (e.g. Spearman rank correlation, Nearest Neighbour Analysis, Chi-Square test).
- The submitted report should take the form of a short written account, which should not exceed 4,000 words in length; it should be illustrated with relevant maps, diagrams and, if appropriate, photographs; it must be typed on A4 paper and paginated.
- The assessment criteria are presented in Appendix II. Tutors are to fill in the Assessment Criteria Sheet and present it with each report when MATSEC moderators visit the institution, for the project moderation process.

The authentication form available on the MATSEC Support Unit website is to be filled in and duly signed and submitted with the reports.

Private candidates

Private candidates are also required to submit the two Short-term Fieldwork Reports and one Individual Fieldwork Report, which are assessed by the MATSEC Board of Examiners. The private candidate is to identify a private tutor to guide him/her on the short-term fieldwork reports. The authentication form available on the MATSEC Support Unit website is to be filled in and duly signed and submitted with the reports.

PAPER ONE: PHYSICAL GEOGRAPHY

ATMOSPHERIC PROCESSES AND PATTERNS

- sources of atmospheric energy; solar radiation budget; migration of the solar energy, long-wave/short-wave radiation; greenhouse gases
- atmospheric properties - moisture and heat, vertical and horizontal variations on a global scale; stability and instability, cloud formations and types; humidity; environmental lapse rate, types of precipitation (frontal, orographic, conventional), global patterns of precipitation
- global circulation - the Tricellular model, ITCZ, air masses and their characteristics, fronts, cyclones and anticyclones, global wind systems, ocean currents and ocean circulation
- location and broad outline characteristics of major climatic zones, including diurnal, seasonal, and annual variation in climate parameters - Arctic, cool temperate western margins, cool temperate continental, Mediterranean, Asian monsoonal climate, tropical deserts, tropical continental areas, tropical eastern margins, equatorial
- origin and development of temperate cyclones (depressions) and anticyclones
- the nature and occurrence of extreme events - storms, snowfall, drought
- origin, development, movement and character of tropical cyclones (hurricanes)
- water balance, water surplus and water deficits

Coastal climates

- at the macro scale: the comparison between oceanic and continental climates; at the meso-scale: comparisons of coastal and inland climates; at the local scale, the nature and origin of land and sea breezes
- storm surges

Sea-level change

- nature and causes of eustatic and isostatic changes; raised beaches; the causes, threat and scale of present and future sea-level change; main impacts on the Maltese Islands

Environmental Issues

- global warming, climate change, acid rain and the destruction of the ozone layer
- basic concepts of environmental hazards and related risk assessment; the prediction and management of extreme climatic hazards - cyclones, snowfall, storms (mid-latitude depressions), fog and smog, drought
- the hazards to life posed by climatic uncertainty and drought in semi-arid regions

Processes and Patterns of Climate in the Maltese Islands

- the main characteristics of climate in the Maltese Islands
- an understanding of the processes affecting weather and climate in the Maltese Islands
- interpretation of weather charts and rose diagrams
- the effects of climate change on the Maltese Islands and related hazard impacts of local, extreme weather events – flooding (valley and coastal), storm waves, rock falls, wind gusts, hailstorms

GEOMORPHOLOGY

Global tectonics

- structure of the Earth (core, mantle, crust); the nature and components of the continental and ocean crust: mountain ranges, trenches, mid-ocean ridges, rift valleys
- elementary plate tectonics - theory and evidence of continental drift, sea-floor spreading; constructive, destructive, collision and conservative plate margins and associated landforms: volcanoes, islands and island arcs, fold mountains, trenches and rift valleys
- origin, pattern and characteristics of global hazards and basic concepts of related risk assessment, i.e. earthquakes, volcanoes; tsunamis,

Rocks, weathering and landform evolution

- classification of rocks
- types, origin, formation and age of the sedimentary rocks of the Maltese Islands
- physical and chemical weathering processes; factors affecting the type and rate of weathering
- the Maltese Islands – north-east tilt and resultant topography (inland and coastal); limestone formations; faults and faulting; horst (ridges) and graben (valleys) sequences; theories of dry valley formation of main valley characteristics and local examples; karst development and results landforms (plateau, caves, sinkholes) and local examples

Slope Processes

- processes of slope development and resultant slope forms (straight, concave, convex); mass movement phenomena, surface and sub-surface wash, colluvation
- soil-slope relationships, influence of slope angle and slope position on soil drainage and properties
- development of soil catenas in relation to slope processes
- influence of slopes and soil on vegetation and land use
- impact of human activities on slopes
- measurement of slope form and angle, for example, the use of pantometers, clinometers

COASTAL ENVIRONMENTS

The coast as a physical unit

- a transition zone between land and sea
- coastal zonation, i.e. - offshore, foreshore and backshore
- sea-level change and concept of emergent and submergent coastlines
- wave form and motion; constructive and destructive waves; storm waves and swell wave environments; longshore drift

Processes of weathering and erosion

- wetting and drying, salt crystallisation and solution weathering
- wave quarrying (hydraulic action), abrasion, attrition, solution
- wave refraction

Coastal landforms

- erosional landforms - shore (wave-cut) platforms, bays and headlands, cliffs and associated features; influence of rock type and rock structure on the form and evolution of bays and cliffs
- constructional landforms - beaches, their form and composition, beach profiles and changes through time; erosion, transport and deposition by waves; bars, spits, forelands and barrier beaches; origin and development of sand dunes, mud flats and salt marshes
- emergent coastal landforms such as raised beaches; submerged coastal landforms such as rias
- Malta's coastal landforms – development of headlands, bays, arches and stacks, scree slopes (rdum), clay slopes, cliffs, shore platforms, beaches (sand and shingle) and local examples

Coastal ecosystems

- ecosystems in Malta (sand dunes and salt marshes)
- marine ecosystems in Malta: supralittoral (splash zone), mediolittoral communities (intertidal zone), upper infralittoral communities (shallow waters)

Environmental Issues

- coastal erosional hazards, i.e. cliff retreat and cliff collapse;
- design and effectiveness of coastal and flood protection measures; hard and soft engineering solutions to problems of coastal erosion; sea walls, groynes, creation of offshore islands, beach recharging;
- land reclamation, schemes and associated problems;
- problems posed for the human occupancy of coastal areas by rising sea-levels at the present day and in the future;
- the fragility of coastal environments; problems of beach, spit and sand dune instability due to human actions; beach and off-shore gravel extraction; impacts of sea walls, breakwaters and groynes; methods of sand dune stabilization.

FLUVIAL SYSTEMS AND PROCESSES

- the drainage basin as an environmental system - an integrated physical environment unified by the transfer of energy and mass and involving the dynamic interaction of weathering, slope, soil, vegetation and water flows
- basin morphology, drainage density and factors controlling them
- the drainage basin hydrological cycle; main components of flow and exchanges in temperate drainage basins - precipitation inputs, interception, stemflow, dripflow, direct (channel) precipitation; pathways of water movement - overland flow, throughflow, infiltration, percolation and groundwater flow; outputs; seasonal variations; influence of vegetation communities and land use within basin of these flows and exchanges
- the river hydrograph - flow components and comparison of low and storm flow conditions, and the influence of land-use, basin shape and size
- river flow; type of flow - laminar, turbulent; patterns of flow, downstream and across channels
- transport and deposition processes; solute, suspended and bed load, their origin and character
- impact of human activities and river flow within basin; flood hazards associated with urban growth and land use change; flood hazard assessment; effects of river regulation and land use change on channel morphology and sediment transport
- hydrology and hydrogeology in Malta – passage of water through rocks; natural sources (rainwater), natural reservoirs (aquifers – main sea level and perched), wells and springs; extraction of water; karst environments and related landforms
- water resources in Malta; exploitation and degradation of water resources; sources of pollution; water supply problem, types of management of water resources (traditional and modern practices)

BIOSPHERIC PROCESSES AND PATTERNS

The Nature of Ecosystems

- plant succession with a special focus on the major vegetation communities of the Maltese Islands that form part of the successional sequence towards the climatic climax – sclerophyll forest, maquis sclerophyllous scrub, garigue, steppic grassland
- Malta's terrestrial ecosystems - minor communities which are either specialised to occupy particular habitats that are rare in the islands or a relic from a previous ecological regime, now surviving in a few refugia, for example rupestral communities; freshwater communities; temporary rainwater pools, permanent pools, watercourse communities, permanent springs and caves; other ecosystems such as agroecosystems, semi-natural woodland (Buskett), afforestation areas, disturbed ground
- protected areas
- degradation of habitats and loss of biodiversity in Malta
- arresting factors, including human activity

Soils and vegetation

- global patterns of soils and vegetation in relation to climate
- factors of soil and vegetation formations - parent material, relief, climate, time, biota; role of human activity in accelerating or retarding soil formation
- processes of soil formation - weathering, leaching, podsolization, mechanical downwash
- soil properties - pH, soil profile, soil texture and soil structure
- main types of soils in the Maltese Islands, soil complexes formed through human agency
- the concept of soil fertility in relation to human and physical factors
- vegetation formations – savannah (woodlands & grasslands), broad-leaved deciduous forest, Mediterranean evergreen scrub, tropical rainforest (deciduous & evergreen) desert scrub; and their associated soils and nutrient cycles
- plant adaptations to semi-arid tropics (savanna), temperate (broad-leaved deciduous and Mediterranean evergreen scrub) and desert climatic conditions
- soil data collection and description (including sieving)

Environmental Issues

- causes and environmental consequences, of the destruction of tropical rainforests
- soil erosion, land degradation and desertification; causes and consequences; and reference to the Maltese Islands with local examples
- local environmental measures and legislation – Marine Protected Areas (MPAs), Natura 2000 sites, Special Areas of Conservation (SPAs), Special Areas of Conservation (SACs); Habitats Directive (Flora and Fauna), Marine Strategy Framework Directive (MSFD)
- the potential and problems of irrigation development in arid and semi-arid regions - water storage, water quality and salinization.

PAPER TWO: HUMAN GEOGRAPHY

POPULATION, MIGRATION AND SETTLEMENT DYNAMICS

Population

- size, growth changes, density and distribution of world population
- concepts of optimum, over and under population, carrying capacity, problems of food supply
- physical and human factors underlying population distribution at world, national, regional and local scales
- nature and uses of population pyramids; demographic transition model and its applicability; the applicability of the model in contemporary conditions
- population growth in Malta; growth and decline; birth and mortality rates; distribution of population; the effects of the changing demographic trends in Malta for example the effect of ageing

Migration

- types of migration by duration, distance and motivation; the main types of internal and international migration (including reference to different case studies)
- theories of migration (e.g. Ravenstein gravity model, Push Pull Theory, Zelinsky); conflicts between environment and population change and redistribution; refugees
- internal and international migration in Malta (including asylum, refugee status and subsidiary protection in Malta)

Settlement classification, hierarchy, urban land use, and urbanization process

- Rank-size rule; Christaller's Central Place Theory as a basis for analysing settlement patterns (K3, K4 and K7); concepts of hierarchy, threshold and range
- world urbanization trends in the growth of large cities, the cause of urban growth and decline within developed and less developed countries; rural to urban migration and counter urbanization trends; Alonso's urban land use (bid-rent) theory
- the phenomenon of primacy and associated problems
- urban residential segregation (socio-economic, ethnic); critique of theories of segregation (Burgess, Hoyt, Ullman and Harris)
- causes, characteristics and consequences of squatter settlements and shanty towns
- social and economic criteria used to identify least developed, less-developed and newly industrialized countries - use of GNP per capita; percentage employment in the major sector of the economy; Human Development Index; literacy levels; the physical quality of life index
- settlement patterns and types in Malta; housing and home ownership, including second homes and vacant dwellings; high rise buildings; urban sprawl and land use conflicts
- Urban Conservation Areas (UCAs) in Maltese settlements; heritage loss in village cores
- development control; planning and environment; role of local authorities (Planning Authority, Environment and Resources Authority, Superintendence of Cultural Heritage); the Strategic Plan for Environment and Development in Malta; Outside Development Zones (ODZs); role of NGOs
- protection of historic landscapes in Malta
- sustainable urban mobility; mobility measures in Malta (Park and Ride, Controlled Vehicular Access System in Valletta, pedestrianisation, air quality, electric mobility, public transport systems); the relationship between land use and transport; location and role of sea ports (ferry services, container terminals, cruise liners, yacht marinas) in Malta
- the shift from small retail businesses in town centres to supermarkets and out of town shopping complexes / villages; factors contributing to this transformation; advantages and disadvantages of this type of development; new emerging trends of online retail: advantages and disadvantages
- the use of cartographic representations for spatial data - choropleth maps, dot density maps, flow maps, isoline maps, aerial photographs and land use maps
- statistical methods - the Lorenz Curve; the Nearest Neighbour Analysis, diagrams and charts (bar diagrams, pie charts, scatter graphs, line graphs logarithmic graphs, triangular graphs, time-series graphs)

FOOD SUPPLY AND MANUFACTURING INDUSTRIES

The role of agriculture

- indigenous agriculture as a basis for sustainable development
- the Green Revolution, its characteristics, advantages and disadvantages, with reference to wheat and rice; environmental impact of the green revolution – soil degradation, soil and water pollution, loss of species, problems arising from the use of irrigation, health, desertification and salinization
- environmental impacts and environmental conflicts of agricultural activities, including accelerated soil erosion and those arising from the use of agrochemical conflicts arising from land-use changes - conflicts associated with water-resource exploitation and afforestation; potential impacts of global climate change on farming systems
- protection of natural and historic landscapes in Malta
- the role of agriculture in Malta; environmental impact of agriculture; the potential and problems related to irrigation in arid to semi-arid regions (water storage, water quality, waterlogging, salinization)
- nature conservation; hunting, trapping

Farming systems and agricultural land use

- classification of farming systems and agricultural land use; the world distribution of major types of agriculture
- concepts of Von Thunen's model of agricultural land use
- influence of the physical environment on agricultural activities, including soils, climate, relief, altitude, slope
- influence of human factors on agricultural activities, including economic, social, technological and political, including the Common Agricultural Policy (CAP) of the European Union
- the problems with agriculture in Malta – main food crops; animal husbandry; changes to the farming population

Fisheries

- fishing areas; conservation of fish stocks and EU policies on fishing; waste disposal in oceans and seas and general issues concerning the dumping of waste at sea;
- fishing and aquaculture in Malta; fish landings; services for those working in fisheries; local fishing management (trawling zones); environmental impacts;

Types of manufacturing activities

- the classification of economic activities by sector (primary, secondary, tertiary, quaternary); changing relative importance of sectors; including issues related to Malta (light industries; aviation industries; marine related industries; pharmaceutical industries); industrial estates in Malta (Malta Industrial Parks)
- location-behaviour and global organization of Multi National Companies (MNC)
- concept of a New International Division of Labour (NIDL)
- nature and applicability of (i) Weber's location theory, (ii) Myrdal's model
- environmental impacts of manufacturing; transnational environmental impacts of extractive, and manufacturing activities, pollution of land, air, sea and water courses, impacts on landscape

- description of spatial distributions – Location Quotient (LQ); Lorenz Curve; Nearest Neighbour Analysis
- use of diagrams and charts (bar diagrams, pie charts, scatter graphs, line graphs logarithmic graphs, triangular graphs, time-series graphs)

Other factors affecting industry and development

- the geography of food; causes and consequences of famine; Malthus Theory on Population; unequal distribution of food; types of aid; advantages and disadvantages of aid; the World Bank
- the geography of health; spread of diseases; determinants of health inequalities
- positive and negative impacts of globalisation

EXTRACTIVE INDUSTRIES AND ENERGY RESOURCES

Definitions, classifications and appraisals of natural resources

- finite (stock) resources and renewable (flow) resources with special reference to energy, forest, and ocean resources
- changing appraisals of resources over time
- views of resource use: the Club of Rome; the Bruntland report; Lovelock's 'Gaia' theory
- the concept of Sustainable Development; the United Nations Sustainable Development Goals (SDGs); Climate Change Conventions and agreements
- the lack of natural resources in Malta; quarrying and the building industry; salt panning; waste as a resource

Energy Resources

- energy surpluses and energy deficits on a national scale with reference to countries at different levels of development
- finite resources of coal, petroleum and natural gas
- renewable resources of wind, tidal and solar-power; hydro Electric Power (HEP)
- economic and social factors favouring the use of renewables; advantages and disadvantage of renewable energy
- factors influencing the locations and use of power station types; coal; oil, HEP and nuclear;
- the concept of energy resource combination
- The Organization of the Petroleum Exporting Countries (OPEC)
- The International Atomic Energy Agency (IAEA)
- energy production and demand in Malta; impact on the local environment; location and type of power stations in Malta; the Malta-Sicily interconnector; the role of renewables in energy diversification in the Maltese Islands

Forest and Woodland Resources

- natural forests and plantations; use of forests and woodland for timber, tree products, firewood, and amenity value;
- use of tropical forest resources with reference to both natural forest and managed plantations (e.g., rubber and teak);

Environmental Issues

- environmental impacts of extracting uranium, coal, petroleum and natural gas; fracking
- the environmental impacts of the use of the renewable resources of wind, tidal and solar power; and HEP
- effects of acid rain
- the world wide problems of oil spillage
- the environmental impact of quarrying in Malta
- the environmental impacts of increasing private car use including congestion; air and noise pollution; land take up (roads and parking areas); accidents
- waste disposal and management; local examples from Malta; types of waste collection, separation and initiatives of recycling

GLOBAL INTERDEPENDENCE

The nature and role of trade and aid in development

- visible and invisible trade (with reference to the situation in Malta)
- the developments in transport – example of container terminal development in Malta
- the Brandt Report
- North / South trade relations; World Trade Organisation (WTO); free trade; fair trade
- United Nations; the nature of aid programmes
- problems of international debt

Tourism

- Growth in international tourism, including factors contributing to growth in domestic and international tourism
- the distinctions between, and examples of the various types of tourism and recreational activities, – domestic and international; ecotourism; sun and sea; heritage; theme parks and purpose-built resorts; wildlife; wilderness holidays; city breaks; religious centres; cruises
- The environmental, social and economic impacts of tourism, including land-use conflicts
- Butler's model of tourism's role in regional and local economic development
- applicability of Myrdal's concept of cumulative causation in development of tourist regions backwash and spread effects; multiplier effects
- tourism in Malta – development and importance; positive and negative impacts; land use conflicts; role of EU in supporting sustainable tourism; role of airlines and cruise liner terminals

APPENDIX I

FIELDWORK, CARTOGRAPHY AND STATISTICAL ANALYSIS

Fieldwork is recognised as an established component of geographical education. It is one of the distinctive attributes of geography, offering valuable learning opportunities. The aim of geographic fieldwork is to understand geography at the local scale and to gain experience of gathering, analysing and presenting data. The application of geographical concepts and skills in the investigation of an identified problem or issue in the field is considered to be an essential part of the geographical sciences. Similarly the use of statistical analysis is considered to be an indispensable skill for the geographer. Fieldwork methods generally involve the gathering of information in the form of numerical quantities. Analysis of the data often involves the use of appropriate statistical methods to identify similarities and differences.

1. Cartographic component

Interpretation of thematic and quantitative maps as exemplified by:

- choropleth maps
- dot maps (to illustrate the distribution of features)
- isoline maps (= isopleth maps)
- weather charts
- aerial photographs and use of digital globes (e.g. google earth)

2. Statistical component

Graphic and diagrammatic techniques:

- bar diagrams (including composite bar charts)
- pie charts
- scatter graphs
- line (= arithmetic) graphs
- logarithmic graphs
- triangular graphs (= ternary diagrams)
- time-series graphs
- flow diagrams
- Lorenz curve

Descriptive and analytical statistical techniques:

- concept of normal distribution and skewness
- histograms
- frequency curves
- significance and confidence limits
- concept of simple correlation and correlation coefficient
- sampling error
- data types (nominal, ordinal, interval)

Measures of central tendency and dispersion:

- median
- mode
- median (plus running mean)
- range
- quartiles, inter-quartiles and percentiles
- standard deviation

Description of spatial distributions:

- Location quotient (LQ)
- Lorenz curve (to display the concentration of activities within an area)
- Nearest neighbour analysis (as a test for ‘non-randomness’ and as a means to give a statistical meaning to ‘clustered’, ‘dispersed’, ‘random’ and to regular distribution of phenomena over space)

Relationship between data:

- scatter diagrams (correlation graphs to show the relationship between dependent and independent variables)
- Chi-squared test (χ^2)

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

where: χ^2 = Chi-square co-efficient
 O = Observed Frequencies
 E = Expected Frequencies

- Spearman rank correlation coefficient (r_s)

$$r_s = \frac{1 - 6 \sum d^2}{n^3 - n}$$

where: r_s = Spearman’s Rank Correlation
 $\sum$ = total
 d = difference in rank
 n = number of cases

- Student’s t-distribution (to establish statistical significance of r_s)

3. General

- Tabulation (the clear and concise rendition of data on tables)
- Flow diagrams (= system diagram) construction
- Pictograms (the use of pictures to show observed results)
- Rose diagrams (to display orientated data)
- Desire lines (to illustrate the direction and scale of movement between areas or points of origin and destination)

4. Fieldwork Component

- Concept of the ‘scientific method’ in fieldwork investigation; hypothesis testing
- Data collection: primary research and secondary sources
- Sampling (obtaining a representative view from a sample of the population): random, systematic and stratified sampling methods;
- Bias in sampling (distortion or error in the sampled data);
- The use of quadrats, transects (belt and line) e.g. as in vegetation studies and land-use transects; random numbers
- Questionnaires: the design of a ‘good questionnaire’; closed- and open-ended questions; questionnaire administration
- Surveys (data collection without questionnaires): different types of surveys, e.g. land-use surveys; land-use transects; environmental surveys
- Interviews (going beyond the formal nature of questionnaires): the conduct of interviews in order to see how people stand on an issue or how they act in certain circumstances
- Measurement of slope form and angle, e.g. the use of pantometers, clinometers, ranging rods.
- Sketches, e.g. to show landform or feature of interest; labelling/annotation of sketch work.
- Soil data collection and description: soil profile and horizon descriptions

APPENDIX II**ASSESSMENT CRITERIA SHEET**

(to be filled in by the teacher/tutor and attached to each report for moderation)

Assessment Criteria 1: Investigation and Planning 20%

Marks assigned		Marks given
16 – 20	Well organised. Clear, realistic plan. Full statement of aims and objectives in the enquiry. Identified hypothesis/es independently or listed research questions. Links to theoretical background. Clear location.	
11 – 15	Appropriate aims and sound planning. Aims and location described in the enquiry. Identified hypothesis/es independently or listed research questions. Some theoretical background.	
6 – 10	Proposal lists aims and data collection. Aims and location stated in the enquiry. Needed some assistance to identify hypothesis or research questions. A little relevant theoretical background.	
0 – 5	Much assistance needed in planning the enquiry. Aims and location indicated in the enquiry. Needed substantial assistance to identify hypothesis/es or research questions. No understanding or ability in planning investigation.	

Assessment Criteria 2: Data Collection 20%

Marks assigned		Marks given
16 – 20	Systematic research programme based on substantial data collection with a wide range of accurate observations/measurements. Data collection and sampling methods. Justification for the sampling method used. Considers all significant factors affecting data collection.	
12 – 15	Accurate observations and measurements. Explanation of data collection methods, including sampling. Some factors affecting data collection commented on.	
6 – 11	Narrow range of data collected. Some assistance needed in this section. Data collection methods described and some factors affecting them noted.	
0 – 5	Limited ability to complete research or make observations. One method of data collection. Much assistance needed in this section. Unable to carry out research on the topic.	

Assessment Criteria 3: Data Presentation 15%

Marks assigned		Marks given
12 – 15	Candidate selected appropriate and wide range of presentation techniques (such as graphs, flow diagrams, labelled sketch diagrams, tables). All methods executed precisely and accurately. Full annotation and integration of the above, into text. Well organised and logical presentation.	
8 – 11	Candidate selected and used appropriate presentation techniques. All competently executed and clearly labelled. Data organised and presented clearly.	
4 – 7	Candidate selected and used limited range of straightforward techniques. Most were appropriate, and executed neatly with sufficient labelling. Some meaningful organisation. Some assistance required in this section.	
0 – 3	Candidate used simple techniques, some of which were appropriate. One or two methods used. Labels give some information. Some organisation of material attempted. Much assistance required in this section. No attempt made to present data collected.	

Assessment Criteria 4: Analysis and Interpretation 30%

Marks assigned		Marks given
23 – 30	Effective, coherent and independent analysis and interpretation, using all information collected and presented, directly related to aims. Significant interrelationships and patterns identified and developed. Statistical analysis, significance testing accurate and appropriate. Good use of geographical terminology.	
15 – 22	Some independent analysis and interpretation; used most of data collected; referred to aims of the enquiry. Some inter-relationships identified and commented upon. Accurate statistical analysis were used. Appropriate geographical terminology. Moderate use of geographical terms.	
7 – 14	Some relevant analytical points linked to aims of enquiry and referring to much of data collected. Some interrelationships noted. Some assistance required in this section. Appropriate geographical terminology used in places. Very moderate use of geographical terms.	
0 – 6	Description of collected data. Much assistance needed to identify some interrelationships and patterns. No analysis and aims of the enquiry not related. Scarce use of geographical terms. No attempt made to analyse or interpret data collected.	

Assessment Criteria 5: Conclusions and Evaluation 15%

Marks assigned		Marks given
12 – 15	All information used to provide answers and reach concise and clear conclusions. Conclusions justified and related directly to aims of enquiry. Awareness of the limitations of the conclusions. Evaluation of enquiry as a whole. Comment on the possibilities for further studies on the topic. Good use of geographical terminology.	
8 – 11	Reference to data collected to draw some logical conclusions related to aims of enquiry. Some evaluative comments. Some opportunities for further study described. Appropriate geographical terms used.	
4 – 7	Some use of data collected to draw straightforward conclusions. May have required some assistance. Conclusions presented as facts rather than partial, tentative or incomplete. Little opportunities for further study suggested. Evaluation linked to data collection. Some appropriate geographical terminology.	
0 – 3	Much assistance required to produce a basic conclusion, with only an indirect link to data collected and/or aims of the enquiry. Much comment repetitive of ideas noted elsewhere. Minimal use of geographical terminology. No attempt made to draw conclusions to the enquiry.	

Total marks out of 100 marks