SCOTTISH QUALIFICATIONS AUTHORITY

GEOLOGY
Intermediate 2

Fifth edition – published February 2004

SCOTTISH QUALIFICATIONS AUTHORITY

NOTE OF CHANGES TO ARRANGEMENTS
FIFTH EDITION PUBLISHED FEBRUARY 2004

COURSE TITLE: Geology (Intermediate 2)

COURSE NUMBER: C043 11

National Course Specification:

Course Details:	New details of the Instrument of Assessment for External Assessment

National Unit Specification:

All Units	No Changes

SCOTTISH QUALIFICATIONS AUTHORITY

National Course Specification

GEOLOGY (INTERMEDIATE 2)

COURSE NUMBER C043 11

COURSE STRUCTURE

This course has three mandatory units as follows:

D8XK 11	***Minerals and Rocks***	***1 credit (40 hours)***
D247 11	***Earth Physics and Earth Movements***	***1 credit (40 hours)***
D8XL 11	***History of the Earth***	***1 credit (40 hours)***

It is recommended that the units be taught in the order given above.

In common with all courses, this course includes 40 hours over and above the 120 hours for the component units. This is for induction, extending the range of learning and teaching approaches, support, consolidation, integration of learning and preparation for external assessment. This time is an important element of the course and advice on its use is included in the course details.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained the Intermediate 1 Geology course or its component units. It would, however, be possible for able candidates to enter the course with no prior knowledge of geology. Previous experience of a science or Geography at Intermediate 1 or Intermediate 2 or equivalent would be advantageous.

Administrative Information

Publication date: February 2004

Source: Scottish Qualifications Authority

Version: 05

National Course Specification (cont)

COURSE Geology (Intermediate 2)

CORE SKILLS

This course gives automatic certification of the following:

Complete core skills for the course	Problem Solving	Intermediate 2
Additional core skills components for the course	Using Graphical Information	Intermediate 2

For information about the automatic certification of core skills for any individual unit in this course, please refer to the general information section at the beginning of the unit.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Course Specification: course details

COURSE Geology (Intermediate 2)

RATIONALE

Geology at Intermediate 2 builds on knowledge and understanding skills and attitudes already developed in Intermediate 1 Geology:

- candidates will acquire extended knowledge of a range of varied topics, such as continental drift; life in past ages; the ways in which rocks form; earthquakes and what they tell us about the Earth; and rocks in the field
- skills such as those of observation, recording, interpretation, problem solving and communication will be further developed
- the use of field studies will further develop positive attitudes towards caring for the environment
- candidates will meet and use aspects of physics, chemistry, biology and geography

Because of its considerable scope, geology makes a significant contribution to general education.

AIMS OF THE COURSE

The main aims of the course are to:

- provide candidates with a broad-based scientific education
- develop skills of observation, recording, analysis, interpretation and communication
- develop awareness of the natural environment and of the processes which have shaped it

COURSE CONTENT

The main topics covered by the units are as follows.

Minerals and Rocks (40 hours)

Minerals (testing and identifying). The formation of igneous, sedimentary and metamorphic rocks. The field relationships and structures of rocks.

Earth Physics and Earth Movements (40 hours)

Earthquakes. The internal structure of the Earth. Isostasy. Geological structures and geological maps. Continental drift, sea-floor spreading and plate tectonics.

History of the Earth (40 hours)

Fossils. The uses of fossils in stratigraphy. The principles of stratigraphy. The elucidation of the geological history of a selected area.

MINERALS AND ROCKS

CONTENT	SUPPLEMENTARY NOTES
Minerals The following minerals should be studied: quartz, feldspar, calcite, biotite, muscovite, talc, malachite, amphibole, barite, cassiterite, sphalerite, chalcopyrite, fluorite, galena, garnet, gypsum, haematite, halite, magnetite, olivine, pyrite, pyroxene.	The following mineral properties should be studied: colour, streak, hardness, cleavage, lustre, crystal shape, fracture, density, reaction with acid, flame tests.
Rocks The following rocks should be studied: granite, basalt, dolerite, gabbro, rhyolite, andesite, pitchstone, obsidian, tuff, agglomerate, sandstone, conglomerate, chalk, fossiliferous limestone, greywacke, arkose, shale, coal, breccia, mudstone, chert, flint, rock salt, slate, marble, schist, gneiss, mylonite, hornfels, migmatite, metaquartzite.	The following rock properties should be studied: colour, grain size, texture, mineralogy, internal structure, presence of fossils. Records of observations and tests should be kept. Using records or keys, candidates should be able to identify the minerals and rocks listed.

CONTENT	SUPPLEMENTARY NOTES
Igneous rocks	
Classification in terms of grain size and mineralogy. Acidic, intermediate and basic igneous rocks. Grain size related to rate of cooling. Formation of glassy igneous rocks. Phenocrysts.	
Intrusive igneous rocks: formation of dykes, sills, stocks and batholiths. Chilled margins.	Reference should be made to British examples.
Volcanoes: central vent and fissure eruptions; the roles of gas, ash and lava. Vesicles, amygdales and flow banding. Pillow lavas. The characteristics of basic and acidic lavas.	Here, good use could be made of audio visual materials.
Distribution of volcanoes and major lava flows. Xenoliths in intrusive and extrusive rocks. Columnar and sheet joints.	The distribution of volcanoes should be related to major Earth movements.
Sedimentary rocks	
Roles of weathering, erosion, transport and deposition. Classification in terms of grain size, grain shape, mineralogy, and origin. Rocks of clastic, organic and chemical origins.	
Structures in sedimentary rocks: bedding – regular, graded, cross; ripple marks; mud cracks; burrows.	

CONTENT	SUPPLEMENTARY NOTES
Metamorphic rocks Definition of the process of metamorphism. Classification of metamorphic rocks in terms of mode of formation or mineralogy. Grade of metamorphism. Appearance of new mineral assemblages as grade increases. *Regional metamorphism*: association with mountain-building. Formation of cleavage and foliation. Formation of slate, schist, gneiss and migmatites. Zones of regional metamorphism. *Thermal metamorphism*: association with igneous intrusions. Zones of thermal metamorphism in the thermal aureole. Formation of spotted rocks and hornfels. *Dynamic metamorphism*: association with movements on faults and in shear zones. Shatter zones. Formation of fault breccia and mylonite.	
Rocks in the field In addition to features previously mentioned, the following should be studied: effects of faults and folds on field relationships; formation of unconformable relationships. Differences between thrust fault and unconformable relationships; and between sills and lava flows.	Candidates should have ample opportunity to interpret rock structures and field relationships. In class, hand specimens, photographs, diagrams, maps and models should be used. Field studies should be undertaken. Where it is not possible to make field visits, simulated fieldwork exercises should be given.
Recognition of relative age relationships among rocks and structures.	Candidates should recognise the significance of superposed and cross-cutting relationships. They should also be aware of the fact that a rock is younger than the fragments which it contains.

EARTH PHYSICS AND EARTH MOVEMENTS

CONTENT	SUPPLEMENTARY NOTES
Earthquakes	
Production of earthquakes by fault movements and volcanic eruptions.	Candidates should study recent earthquakes (eg, Anchorage, 1964; Mexico City, 1985; Armenia, 1988; California, 1989) to gain an appreciation of the causes and effects of damage. The effects of earthquakes and tsunami can best be shown by use of audio visual material.
Focus, epicentre. Intensity, magnitude. Properties of P, S and L waves. *Recording earthquakes*: how a seismometer works. Geographical and depth distribution of foci. Correspondence between incidence of foci and oceanic ridges, island arcs and young mountain chains. *Use of earthquake data to determine internal structure of the Earth*: reflection, refraction and changing velocities of P and S waves. Discontinuities.	Given data may be used to plot the positions of epicentres. Simple experiments will show that energy in the form of sound is often released when materials fracture. The difference between intensity and magnitude can be illustrated by reference to the explosions produced by a nearby firework (high intensity, low magnitude) or a distant bomb (low intensity, high magnitude). The differences between P and S waves can best be shown using a 'slinky' while L waves may be likened to ocean waves. The way in which a seismometer works may be shown by means of a simple model. Reflection, refraction and changing velocities of earthquake waves can be shown by the behaviour of pebbles which strike a water surface at different angles. The effect of the core on P waves can be shown by use of light beams and a converging lens.
Structure of the Earth	
Major discontinuities: Moho; core-mantle boundary. *Crust*: oceanic (basaltic) and continental (granitic). *Mantle* (peridotite). *Core*: outer (liquid iron and iron sulphide) and inner (solid iron-nickel). Density differences among these layers. Lithosphere and asthenosphere.	Specimens of basalt, granite and peridotite should be available for study. It should be pointed out that while the continental crust is broadly granitic in composition, it consists of a wide variety of rock types. Meteorites of various types may be seen on museum visits. It should be pointed out that most of these come from fragmented, differentiated bodies.
Isostasy	
The principle of isostasy: isostatic equilibrium and disequilibrium. The role of isostatic movements in the formation of raised	The idea that the crust floats on the mantle in the same way that wooden blocks float on water should be established. The effects of loading and unloading floating blocks are analogous to those produced when the crust is loaded or unloaded (eg, by the formation of an ice sheet

shorelines and atolls.

which later melts).

CONTENT	SUPPLEMENTARY NOTES
Structural geology and geological maps Strike and dip. The following should be recognised in a wide range of maps, sections and block models: anticline, syncline, dome, basin; normal fault, reverse fault, thrust fault, tear fault; dyke, sill, batholith, volcanic plug, lava flow, unconformity.	Candidates should be able to identify the upthrown and downthrown side of a fault, and they should be able to distinguish between a thrust fault and a surface of unconformity. Using superposed and cross-cutting relationships, candidates should be able determine the sequence in which structures formed. Maps, sections and models should show a maximum of five cross-cutting relationships. If possible, folds, faults, igneous bodies and unconformable relationships should be seen in the field.

CONTENT	SUPPLEMENTARY NOTES
Plate tectonics *Continental drift*: study of the evidence which suggests that continental drift has taken place, with particular reference to South America and Africa.	Maps of South America and Africa should be studied to show the geological and topographical evidence in favour of continental drift. Evidence from past glaciations and fossils should also be considered. Video tapes can be used to show the supposed movements of continents in ancient times.
Sea-floor spreading: reversals of the Earth's magnetic field; sea-floor magnetic stripe anomalies symmetrical about ridges; determination of spreading rates.	Candidates should know that the Earth's magnetic field has reversed on numerous occasions and that cooling igneous rocks are magnetised in the direction of the field prevailing at that time. They should realise that the symmetry of ocean floor anomalies indicates that spreading takes place from ridges and that dating field reversals allows spreading rates to be determined. The development of symmetrical magnetic stripe anomalies may be shown by means of simple models. Problems may be given on spreading rates.
Main features of plate margins *Destructive*: oceanic trench associated with island arc or Andean mountains; Wadati-Benioff zone; andesitic volcanism; granites – emplacement and associated thermal metamorphism; major compressive deformation and formation of mountain belts through geological time; regional metamorphism. *Constructive*: topographic symmetry of oceanic ridge; axial rift valley indicative of tension; basaltic fissure eruptions; shallow focus earthquakes. *Conservative*: transform faults and how they differ from tear faults; shallow focus earthquakes; San Andreas Fault as an example of a transform which appears on a continent.	Study of plate tectonics should show how this concept unifies the ideas of continental drift and sea-floor spreading.

HISTORY OF THE EARTH

CONTENT	SUPPLEMENTARY NOTES
Fossils What fossils are.	Fossils are the remains or traces of organisms found in rocks. Details of modes of preservation are not required. It should, however, be pointed out that organisms with hard parts living in areas of deposition have the greatest chance of being preserved.
Morphology of fossils The morphological features given should be known. *Brachiopod*: pedicle valve, brachial valve, foramen. *Bivalve*: tooth, socket, muscle scar, pallial line, pallial sinus. *Gastropod*: suture, whorl, aperture. *Ammonite*: septum, suture line, chamber. *Belemnite*: guard, phragmocone, pro-ostracum. *Coral*: septum, tabula, columella. *Echinoid*: test, spine, mouth, ambulacral plate. *Trilobite*: cephalon, thorax, pygidium, eye. *Graptolite*: stipe, theca. *Plant*: stem, root, leaf.	The morphological features, given should be clearly illustrated by; study of specimens or plaster casts. Fossils should be seen as once living organisms. Comparisons should be drawn with present-day organisms.
Morphology related to mode of life The following examples should be studied. *Bivalves*: differences – valve thickness and shape; gape; pallial sinus among deep burrowers, shallow burrowers and attached forms. *Echinoids*: differences – thickness and shape of test; position of mouth and anus between burrowing and non-burrowing forms. *Dinosaurs*: Differences – dentition; body armour between carnivorous and herbivorous forms.	Here, the mode of life of fossil organisms should be deduced by: (i) interpreting the functions of morphological features, and (ii) comparing fossil organisms with living forms. For example, dinosaurs may be compared with living reptiles, and ammonites may be compared with *Nautilus.*

CONTENT	SUPPLEMENTARY NOTES
Ammonites: Significance of form of suture, shell shape and ornamentation.	Strength to resist water pressure imparted by corrugated septa. Mobile forms had streamlined shapes, with narrow cross-sections. They would be able to escape from predators. Less mobile forms had heavily ornamented shells with broad cross-sections. They would have been resistant to attack.
Uses of fossils in stratigraphy *Relative dating*: zone fossils. Evolution of graptolites (reduction in number of stipes); and ammonoids (change in suture from goniatite through ceratite to ammonite forms). Use of graptolites and ammonites in zoning.	Because rocks of different ages contain different assemblages of fossils, fossils can be used to date rocks. A zone fossil has a narrow stratigraphic range so it defines a small part of the geological column. Such fossils are very useful for matching up rock sequences in different areas. Graptolites and ammonites make good zone fossils because they changed rapidly.
Fossils and ancient environments: What fossils tell us about habitats and environmental conditions.	Present-day brachiopods, echinoderms and corals are entirely marine. It is likely that fossils of these organisms will be found only in marine rocks. Ammonites, belemnites, trilobites and graptolites are thought to have been marine because they are found only in association with forms which are almost certainly marine. Dinosaur fossils and the fossils of vascular plants would indicate terrestrial habitats, while thin-shelled bivalves or gastropods may indicate fresh or brackish water conditions. A species may exhibit different forms in different habitats: eg, dog whelks from sheltered waters have thin, ornamented shells while those from exposed areas have thick shells which lack ornament. Present-day reef-building corals are restricted to warm (temperature 25-30 ^{o}C), clear, sunlit waters of normal salinity. It is likely that ancient coral reefs were formed under similar conditions. Pollen grains and insect remains in Quaternary deposits provide good evidence of changing climates.

CONTENT	SUPPLEMENTARY NOTES
Principles of stratigraphy Relative dating of the following by study of superposed and cross-cutting relationships: intrusion, extrusion, tilting, folding, faulting, erosion, deposition, formation of unconformable relationship.	
The use of graded bedding, cross-bedding, mud cracks, ripple marks, and animal burrows as way-up structures.	
The origins of sediments related to grain size, grain shape and mineral constituents.	These features should be related to environments of deposition. *Grain size*: coarse-grained sediments are deposited in high-energy environments whereas fine-grained sediments are deposited in low-energy environments. *Grain shape*: desert sands tend to have very well-rounded grains; beach sands are often rounded; river sands may be sub-rounded or sub-angular; sand in glaciofluvial deposits is often very angular. The reasons for such differences should be explained. *Mineralogy*: the changes which affect sediments during transport should be considered. A sediment which consists of pure quartz sand has probably been transported over long distances. A sediment which is rich in feldspar has probably been rapidly transported over a short distance. Salt deposits have been formed by the evaporation of sea water whereas coal and many limestones are of organic origin.
	Stratigraphic principles should be illustrated by means of field studies or by the use of simulated fieldwork exercises.

National Course Specification: course details (cont)

COURSE Geology (Intermediate 2)

ASSESSMENT

To gain the award of the course, the candidate must achieve all the component units of the course as well as the external assessment. External assessment will provide the basis for grading attainment in the course award.

When units are taken as component parts of a course, candidates will have the opportunity to demonstrate achievement beyond that required to attain each of the unit outcomes. This attainment may, where appropriate, be recorded and used to contribute towards course estimates, and to provide evidence for appeals. Additional details are provided, where appropriate, with the exemplar assessment materials. Further information on the key principles of assessment are provided in the document, *Assessment*, published by HSDU in May 1996.

DETAILS OF THE INSTRUMENTS FOR EXTERNAL ASSESSMENT

The external assessment consists of:

1. an examination paper
2. a fieldwork report.

The externally set and assessed question paper will be one paper of 2 hours with a total of 95 marks. The paper will consist of structured, short-answer questions. The assessment of knowledge and understanding will be based on the Course content, and approximately one third of the total marks will be allocated to problem solving abilities.

Information on the requirements for the fieldwork report is contained in the Unit *Earth Physics and Earth Movements (Intermediate 2).* The fieldwork report is internally marked out of 30, and detailed marking guidelines are contained in the Unit *Earth Physics and Earth Movements (Intermediate 2)* the fieldwork report is externally moderated, and the marks scaled out of a total of 15.

The Course award will be based on the total score achieved in the examination paper (95 marks) and The fieldwork report (15 marks)

National Course Specification: course details (cont)

COURSE Geology (Intermediate 2)

GRADE DESCRIPTIONS

The descriptions below are of expected performances at Grade C and at Grade A. They are intended to assist candidates, teachers, lecturers and users of the certificate and to help establish standards when question papers are being set. The grade of the award will be based on the total score obtained in the examination.

AT C
Candidate must:

Demonstrate a good level of ability to integrate knowledge, understanding and skills acquired in the component units of the course.
Demonstrate a good level of ability to retain knowledge over an extended period of time.
Apply knowledge and understanding to unfamiliar aspects of situations.
Give reasoned explanations and draw valid conclusions in unfamiliar aspects of problem solving situations.
Apply problem solving skills to the elucidation of structures and histories of geological maps and models.

AT A
Candidate must:

Demonstrate a high level of ability to integrate knowledge, understanding and skills acquired in the component units of the course.
Demonstrate a high level of ability to retain knowledge over an extended period of time.
Apply knowledge and understanding to demanding aspects of situations.
Give reasoned explanations and draw valid conclusions in demanding aspects of problem solving situations.
Apply problem solving skills to the elucidation, using more complex inter-relationships, of structures and histories of geological maps and models.

National Course Specification: course details (cont)

COURSE Geology (Intermediate 2)

The overall assessment proposed for the course ie, the combination of internal and external assessment, should provide the necessary evidence for the core skills where an automatic award is proposed. Confirmation of this will be provided at a later date.

APPROACHES TO LEARNING AND TEACHING

Integration

It is important that every opportunity is taken to integrate knowledge and understanding from the separate units. There are many places where such integration could take place:

- candidates should appreciate the wide range of geological knowledge and understanding which must be applied to the study of ancient environments
- candidates should be aware of the significant geological effects of living things
- plate tectonics should be seen as a concept which unifies ideas of continental drift and sea-floor spreading, and which greatly improves our understanding of Earth history
- the study of plate movements, folds and faults shows that the Earth is internally mobile
- the distribution of volcanoes can be related to constructive and destructive plate margins
- regional metamorphism and the intrusion of granite batholiths can be related to processes taking place at destructive plate margins
- the raised shorelines seen on Scottish coasts can be related to isostatic movements
- the use of field studies is an ideal way of bringing together the many strands of geological knowledge and understanding

Use of the additional 40 hours

The following beneficial activities could be carried out:

- making field visits improves understanding of the processes which form rocks and rock structures
- the more demanding parts of the units could be reviewed and additional practice could be given in problem solving
- practice could be given in answering the types of questions which are liable to appear in the external exam. Some of these questions may be of a more demanding type than are required for a pass in a unit assessment. Such questions may, for example, require the integration of knowledge and understanding from separate units. Candidates should build up a folio of such questions in case they are needed for appeal procedures following the course exam

Fieldwork studies

Fieldwork forms a compulsory part of this course. Accounts of field studies are parts of the assessment requirements for all units. It should be noted that such accounts may be based on simulated fieldwork exercises. Such simulated exercises may be based on real or contrived situations. Where a real situation is used, the teacher or lecturer should visit the field site. Specimens of rocks and fossils should be collected; photographs or slides should be taken; diagrams should be drawn; and observations should be recorded. Maps may also be drawn. In the classroom or laboratory, materials with question sheets can be set out in stations.

It should be noted that fieldwork reports of about 400 words are required for each unit. However, these reports may be combined into a single report of about 1,200 words. Within the limits imposed by the nature of the area studied, such a unified report should meet the requirements of all three units. Reports of fieldwork may also afford the candidate opportunities to demonstrate achievement beyond that required to attain the unit outcomes.

While making field visits is not compulsory, fieldwork does provide a valuable means of enhancing knowledge and understanding of geological processes and geological history. In addition, field visits foster positive attitudes to the environment.

Where field visits are undertaken, the following points should be borne in mind.

- every precaution must be taken to ensure the complete safety of candidates
- the guidance set out in *A Code for Geological Fieldwork*, published by the Geologists' Association, should be followed
- teachers and lecturers should visit field sites beforehand. Candidates should be briefed on codes of behaviour and on hazards which may be encountered in the field and on industrial sites
- all who go on field visits should be properly equipped with the necessary materials and clothing

SPECIAL NEEDS

This course specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Minerals and Rocks (Intermediate 2)

NUMBER D8XK 11

COURSE Geology (Intermediate 2)

SUMMARY

This unit seeks to allow candidates to acquire detailed knowledge and understanding of minerals, rocks, and rock-forming processes. Problem solving skills will be enhanced. Through the use of practical work, candidates' skills of observation, manipulation, recording and communication will be developed. The study of rocks in the field would enable candidates to develop a caring attitude towards the local environment.

OUTCOMES

1 Demonstrate knowledge and understanding related to rocks and minerals.
2 Solve problems related to rocks and minerals.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained the Intermediate 1 Geology course or its component units. It would, however, be possible for able candidates to enter the course with no prior knowledge of geology. Previous experience of a science or Geography at Intermediate 1 or Intermediate 2 or equivalent would be advantageous.

CREDIT VALUE

1 credit at Intermediate 2.

Administrative Information

Superclass: RF

Publication date: July 2002

Source: Scottish Qualifications Authority

Version: 01

National Unit Specification: general information (cont)

UNIT Minerals and Rocks (Intermediate 2)

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Additional core skills components for the unit	Critical Thinking	Intermediate 2
	Using Graphical Information	Intermediate 2

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Minerals and Rocks (Intermediate 2)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to rocks and minerals.

Performance criteria

(a) Rocks are correctly classified with respect to mineralogy, texture and mode of formation.
(b) The description of the modes of formation of igneous, sedimentary and metamorphic rocks is correct.
(c) The description of the modes of formation of rock structures is correct.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria.

OUTCOME 2

Solve problems related to rocks and minerals.

Performance criteria

(a) Relevant information is selected and presented in an appropriate format.
(b) Information is accurately processed using calculations where appropriate.
(c) Valid conclusions are drawn and explanations given are supported by evidence.
(d) Predictions and generalisations are made based on the available evidence.
(e) The sequence of formation of geological structures is correctly established from cross-cutting and superposed relationships.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria including the interpretation and communication of graphical information at the appropriate level. With reference to PCs (c) and (d), the candidate's answers must include valid conclusions and explanations based on an evaluation of the supporting evidence.

National Unit Specification: support notes

UNIT Minerals and Rocks (Intermediate 2)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit, and on learning and teaching approaches, is given in the table in the Content section of the course details.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 will be assessed by means of an integrated end of unit assessment. The end of unit assessment has no specified mark allocation. However, the following approximate percentage mark allocations are recommended. (Note that the numbers given express a ratio of marks allocated. Candidates would not be expected to undertake test items with the actual mark allocations shown.)

Outcome 1 **(knowledge and understanding)** **60%**

PC:

(a)	Classification of rocks.	(8)
(b)	Formation of igneous, sedimentary and metamorphic rocks.	
	Igneous rocks.	(10)
	Sedimentary rocks.	(10)
	Metamorphic rocks.	(8)
(c)	Formation of rock structures.	(24)

Outcome 2 **(problem solving)** **40%**

PC:

(a)	Selecting and presenting information.	(4)
(b)	Processing information.	(8)
(c)	Drawing conclusions and giving explanations.	(14)
(d)	Making predictions and generalisations.	(6)
(e)	Establishing the sequence of formation of geological structures.	(8)

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

(a) Selecting, presenting and processing information
- Sources of information include text; tables, diagrams, charts and graphs; numerical information.
- Formats of presentation include written responses; tables, diagrams, charts and graphs.

(b) Calculations include averages, ratios and percentages.

(c) From information given, candidates should be able to draw conclusions with explanations supported by using relevant evidence and developing an appropriate approach.

(d) From given situations, candidates should be able to make predictions and generalisations eg by predicting viscosity of a lava from the type of volcano.

(e) From information given, usually in graphical form, candidates should be able to determine the sequence of the formation of various geological structures.

National Unit Specification: support notes

UNIT Minerals and Rocks (Intermediate 2)

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Earth Physics and Earth Movements (Intermediate 2)

NUMBER D247 11

COURSE Geology (Intermediate 2)

SUMMARY

This unit seeks to allow candidates to acquire a detailed knowledge of what earthquakes tell us about the interior of the Earth; the causes and effects of isostatic movements; the movement of continents and the opening of oceans; and geological maps and block models. Skills of problem solving will be greatly enhanced. Practical work will develop skills of observation, interpretation, recording and communication. The study of rocks in the field will foster positive attitudes towards caring for the environment.

OUTCOMES

1 Demonstrate knowledge and understanding related to Earth physics and Earth movements.
2 Solve problems related to Earth physics and Earth movements.
3 Collect and analyse information related to Earth physics and Earth movements obtained through practical work.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained the Intermediate 1 Geology course or its component units. It would, however, be possible for able candidates to enter the course with no prior knowledge of geology. Previous experience of a science or Geography at Intermediate 1 or Intermediate 2 or equivalent would be advantageous.

Administrative Information

Superclass: RF

Publication date: July 2002

Source: Scottish Qualifications Authority

Version: 04

National Unit Specification: general information (cont)

UNIT Earth Physics and Earth Movements (Intermediate 2)

CREDIT VALUE

1 credit at Intermediate 2.

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	Problem Solving	Intermediate 2
Additional core skills components for the unit	Using Graphical Information	Intermediate 2

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT Earth Physics and Earth Movements (Intermediate 2)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to Earth physics and Earth movements.

Performance criteria

(a) The properties of earthquakes and earthquake waves are correctly described.
(b) The internal structure of the Earth is correctly described.
(c) The origin and effects of isostatic movements are correctly described.
(d) Geological structures are correctly identified.
(e) The effects of large-scale Earth movements are correctly described.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria.

OUTCOME 2

Solve problems related to Earth physics and Earth movements.

Performance criteria

(a) Relevant information is selected and presented in an appropriate format.
(b) Information is accurately processed using calculations where appropriate.
(c) Valid conclusions are drawn and explanations given are supported by evidence.
(d) Predictions and generalisations are made based on the available evidence.
(e) The sequence of formation of geological structures is correctly established from cross-cutting and superposed relationships.
(f) Movement directions on faults are correctly established.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria, including the interpretation and communication of graphical information at an appropriate level. With reference to PCs (c) and (d), the candidate's answers must include valid conclusions and explanations based on an evaluation of the supporting evidence.

National Unit Specification: statement of standards (cont)

UNIT Earth Physics and Earth Movements (Intermediate 2)

OUTCOME 3

Collect and analyse information related to Earth physics and Earth movements obtained through practical work.

Performance criteria

(a) Geological structures in the field are correctly described with respect to their modes of formation and effects.
(b) The cross-cutting and superposed relationships of rocks and structures in the field are correctly established.
(c) Fieldwork is planned, organised, conducted and reviewed effectively.

Evidence requirements

Candidates should submit a fieldwork report of about 400 words, illustrated by apposite forms of graphical information, reflecting on observation, recording, identification and interpretation undertaken. The nature of the field area will determine which rock properties, structures and relationships are described.

The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in the fieldwork. This includes setting objectives for the fieldwork, planning of appropriate tasks, identifying and obtaining the necessary resources, carrying out the fieldwork and evaluating all stages. Conclusions and recommendations should be justified by reference to evidence drawn from the fieldwork.

National Unit Specification: support notes

UNIT Earth Physics and Earth Movements (Intermediate 2)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit, and on learning and teaching approaches, is given in the table in the Content section of the course details.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 will be assessed by means of an integrated end-of-unit assessment. The end-of-unit assessment has no specified mark allocation. However, the following approximate percentage mark allocations are recommended. (Note that the numbers given express a ratio of marks allocated. Candidates would not be expected to undertake test items with the actual mark allocations shown.)

Outcome 1 **(knowledge and understanding)** **60%**

PC:

(a)	Earthquakes and earthquake waves.	(12)
(b)	Internal structure of the Earth.	(12)
(c)	Isostatic movements.	(8)
(d)	Geological structures.	(6)
(e)	Large-scale Earth movements.	(22)

Outcome 2 **(problem solving)** **40%**

PC

(a)	Selecting and presenting information.	(4)
(b)	Processing information.	(6)
(c)	Drawing conclusions and giving explanations.	(10)
(d)	Making predictions and generalisations.	(4)
(e)	The sequence of formation of geological structures.	(10)
(f)	Movement directions on faults.	(6)

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

(a) Selecting, presenting and processing information
- Sources of information include text; tables, diagrams, charts and graphs; numerical information.
- Formats of presentation include written responses; tables, diagrams, charts and graphs.

(b) Calculations include averages, ratios and percentages.

(c) From information given, candidates should be able to draw conclusions with explanations supported by using relevant evidence and developing an appropriate approach.

(d) From given situations, candidates should be able to make predictions and generalisations eg by knowing when it is and when it is not possible to predict that the Earth's magnetic field is normal or reversed.

(e) From information given, usually in graphical form, candidates should be able to determine the sequence of the formation of various geological structures.
(f) From information given, usually in graphical form, candidates should be able to establish movement directions on faults.

Outcome 3

Collect and analyse information related to Earth physics and Earth movements obtained through practical work.

PC

(a) Geological structures are correctly described with respect to their modes of formation and effects.
(b) The cross-cutting and superposed relationships of rocks and structures are correctly established.
(c) Fieldwork is planned, organised, conducted and reviewed effectively.

The candidate should produce a fieldwork report of about 400 words, illustrated by apposite maps diagrams, photographs and other forms of graphical information and reflecting on observation, recording, identification and interpretation undertaken. If it is not possible to make fieldwork visits, the account should be based on simulated fieldwork that involves the candidate in all of the stages and decisions of a visit. In all cases the following aspects of assessment of fieldwork reports apply:

1. Gathering of Information (Total 10 marks)

- *Planning and organisation of work (2 marks)*
  Planning of the tasks and necessary resources should be appropriate to the objectives of the fieldwork eg
  - prior research such as obtaining and studying relevant maps
  - collection of necessary resources such as maps, safety and measuring equipment, recording equipment (clipboard, papers, pencils, camera etc.)

  In the field, the candidate should be able to amend or extend the original plan of approach, eg by returning to areas previously visited in the light of later observations.
- *Observation (5 marks)*
  Marks in this category are awarded for skills shown by the candidate in making disciplined accurate observations of whatever is under investigation. The mark awarded may be drawn partly from follow-up laboratory work carried out by the candidate.
- *Recording (3 marks)*
  Marks awarded should be based on the ability of the candidate to record, in a appropriate and complete form, observation, measurements, calculations and interpretations drawn from fieldwork and any further practical work.

2. Processsing Information (Total 10 marks)

- *Identification (4 marks)*
  There should be evidence of recognition of specific features and of their description to an appropriate degree of detail. Marks should be awarded for the quantity of identification from the possible range of features and for the quality of the description given.
- *Overall content (4 marks)*
  The mark should take account of the quality of the geological content of the report and the degree to which relevant illustrations such as maps, diagrams, photographs and graphs are integrated into the report.
- *Presentation of report (2 marks)*
  The report is of a scientific investigation and its structure and accessibility to the reader should reflect this. At all levels the report should have:
  - a title
  - a specification of the locality of the area or areas studied
  - illustrations eg maps, diagrams, photographs, graphs
  - an account of observations, measurements and interpretations.

  At Intermediate 2, there should be suggestions for amending the approach, for improving the methods or for further work.

3. Interpretation (Total 10 marks)

- *Interpretation (10 marks)*
  Under this heading the assessor should consider the quality of the interpretations made, and the extent to which interpretations are justified.
  At Intermediate 2 candidates should be able to justify their explanation from evidence gathered but should also show an awareness of the methods used and of their own capabilities and make suggestions for improvement.

The field study for this unit is the only fieldwork required at Intermediate 2, and the mark for fieldwork contributes to the final external mark. The fieldwork report may also afford the candidate opportunities to demonstrate achievement beyond that required to attain the unit outcomes.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT History of the Earth (Intermediate 2)

NUMBER D8XL 11

COURSE Geology (Intermediate 2)

SUMMARY

This unit seeks to allow candidates to acquire detailed knowledge of fossils and the principles of stratigraphy. Skills of problem solving, observation, interpretation, analysis, recording and communication will be developed. Knowledge, understanding and skills will be applied to the elucidation of the geological history of a chosen area. The use of field studies would encourage the development of positive attitudes towards the environment.

OUTCOMES

1 Demonstrate knowledge and understanding related to the history of the Earth.
2 Solve problems related to the history of the Earth.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained the Intermediate 1 Geology course or its component units. It would, however, be possible for able candidates to enter the course with no prior knowledge of geology. Previous experience of a science or Geography at Intermediate 1 or Intermediate 2 or equivalent would be advantageous.

Administrative Information

Superclass: RF

Publication date: July 2002

Source: Scottish Qualifications Authority

Version: 01

National Unit Specification: general information (cont)

UNIT History of the Earth (Intermediate 2)

CREDIT VALUE

1 credit at Intermediate 2.

CORE SKILLS

This unit gives automatic certification of the following:

Complete core skills for the unit	None	
Additional core skills components for the unit	Critical Thinking	Intermediate 2
	Using Graphical Information	Intermediate 2

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

National Unit Specification: statement of standards

UNIT History of the Earth (Intermediate 2)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Demonstrate knowledge and understanding related to the history of the Earth.

Performance criteria

(a) The morphological features of fossils are correctly described.
(b) The relationship between an organism's morphology and its mode of life is correctly described.
(c) The uses of fossils in stratigraphy are correctly described.
(d) The principles of stratigraphy are correctly described.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria.

OUTCOME 2

Solve problems related to the history of the Earth.

Performance criteria

(a) Relevant information is selected and presented in an appropriate format.
(b) Information is accurately processed using calculations where appropriate.
(c) Valid conclusions are drawn and explanations given are supported by evidence.
(d) Predictions and generalisations are made based on the available evidence.
(e) The sequence of formation of rocks and geological structures is correctly established from cross-cutting, way-up, and superposed relationships.

Evidence requirements

Evidence is produced from a closed book test which demonstrates successful achievement of all of the above performance criteria, including the interpretation and communication of graphical information at an appropriate level. With reference to PCs (c) and (d), the candidate's answers must include valid conclusions and explanations based on an evaluation of the supporting evidence.

National Unit Specification: support notes

UNIT History of the Earth (Intermediate 2)

This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this unit, and on learning and teaching approaches, is given in the table in the Content section of the course details.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcomes 1 and 2 will be assessed by means of an integrated end of unit assessment. The end of unit assessment has no specified mark allocation. However, the following approximate percentage mark allocations are recommended. (Note that the numbers given express a ratio of marks allocated. Candidates would not be expected to undertake test items with the actual mark allocations shown.)

Outcome 1 **(knowledge and understanding)** **60%**

PC:

(a) Morphological features of fossils. (8)
(b) Organism's morphology and mode of life. (10)
(c) Uses of fossils in stratigraphy. (16)
(d) Principles of stratigraphy. (26)

Outcome 2 **(problem solving)** **40%**

PC:

(a) Selecting and presenting information. (4)
(b) Processing information. (6)
(c) Drawing conclusions and giving explanations. (12)
(d) Making predictions and generalisations. (6)
(e) Sequence of formation of rocks and geological structures. (12)

Test items should be constructed to allow candidates to generate evidence relating to the performance criteria as follows:

(a) Selecting, presenting and processing information
- Sources of information include text; tables, diagrams, charts and graphs; numerical information.
- Formats of presentation include written responses; tables, diagrams, charts and graphs.

(b) Calculations include averages, ratios and percentages.
(c) From information given, candidates should be able to draw conclusions with explanations supported by using relevant evidence and developing an appropriate approach.
(d) From given situations, candidates should be able to make predictions and generalisations eg by generalising the shape of salt crystals deposited from water
(e) From information given, usually in graphical form, candidates should be able to determine the sequence of the formation of various geological structures.

National Unit Specification: support notes (cont)

UNIT History of the Earth (Intermediate 2)

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).