

Geology
Earth Physics, Structural
Geology and Plate Tectonics
Higher

4742

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HIGHER STILL

Geology

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Support Materials



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STAFF NOTES

1. Introduction

These staff and student materials have been prepared as part of the Higher Still Development Programme to support the delivery of the *Earth Physics, Structural Geology and Plate Tectonics (H)* unit and the Geology course at Higher. Whilst every effort has been made to offer accurate information, the Higher Still Development Unit cannot accept responsibility for errors or omissions.

These materials have drawn upon material produced by Highland Council and thanks are due to the council for its support for the study of geology.

The Higher unit: *Earth Physics, Structural Geology and Plate Tectonics* is designed to introduce students to the following aspects of the study of geology:

- (a) earthquake production, recording and use at interpreting the Earth's interior
- (b) structure and composition of the Earth's interior
- (c) the principle of isostasy
- (d) structures and related map work
- (e) plate tectonic theory as a unifying concept.

2. Contents

These materials consist of

- these staff notes
- Appendix 1 to these notes containing photocopiable student worksheets
- Appendix 2 to these notes containing the answers to the checkpoints and quizzes
- Appendix 3 to these notes containing the print-out of the computer disk
- a student guide to using the materials
- a student information book
- student activity sheets
- a computer disk.

Student Guide

This helps the student to use the study materials. A copy of the student guide should be made for each student.

Student Information Book

This relates to the content of the unit. Most of the student activities are linked to the information book which also contains a glossary of geological terms.

Class sets of the information book should be photocopied double-sided and bound if possible. This should make the books re-usable for at least three years so reducing photocopying costs.

Student Activity Sheets

If students do not write on these sheets then the material will be re-usable. Various diagrams and tables have been gathered together on separate consumable worksheets in Appendix 1 to these staff notes.

The student activity sheets should also be copied double-sided but not bound. It should be possible to get at least two years use out of them. Sufficient copies of the consumable work sheets need to be copied one for each student. These are best copied single-sided.

The student activity sheets also contain extension exercises shown in boxes. These extension exercises are non-essential but may be helpful in deepening the understanding of able students.

Throughout the activity sheets there are checkpoints and quick quizzes to enable the students and staff to check on student progress. The quick quizzes numbered 1 to 6 have been placed at strategic points in the student activity sheets. As much as possible students should treat these as unseen tests; however they may use the information book and/or their answer sheets to help them with the answers if necessary. Before attempting a Quick Quiz students should review the topic on which the quiz is based.

The answers to the checkpoints and quizzes are gathered together in Appendix 2 of these notes. Staff may wish to have one or two copies of these answers readily available, although it is suggested that the member of staff may wish to check the quick quizzes, in particular, as a diagnostic check which can be followed by remedial action if necessary.

Computer Disk

A computer disk is enclosed which provides a CAL program for structure contours. It works with software application Hypercard 2.0 on a Macintosh platform. An alternative is also provided on paper in Appendix 3 which could be used where the appropriate computer application is not available. Sufficient copies of the sheets need to be copied for each student.

3. Other relevant material

These materials should be used in conjunction with the Arrangements document for Geology. Particular reference should be made to the relevant contents tables of the Higher course specification and to the requirements of the unit. Other helpful material is contained in the Subject Guide for Geology and in the National Assessment Bank packages for Geology published by the Scottish Qualifications Authority (SQA).

The Scottish Consultative Council on the Curriculum (SCCC) published material to support the Short Courses in Geology. The material for the Category 1 Short Courses, viz *Geology: The Study of the Earth, Geology and Scenery* and *Geology, People and Environment* is being adapted, through the auspices of SCCC, to accommodate the corresponding units at Access 3 and Intermediate 1.

It is hoped also to adapt the SCCC material for Category 2 Short Courses to accommodate the corresponding units at Intermediate 2 (*Earth Materials: Rocks and Minerals, Earth Physics and Earth Movements, History of the Earth*). These materials contain references to the Short Course material, in particular, to *Earth Physics and Earth Movements*. It is not anticipated that staff or students will have any difficulty in cross-referring once these materials have been adapted.

The use of slides or filmstrips would greatly enhance various aspects of the unit. Two filmstrips were originally issued with the Short courses in 1992 but are no longer available. If schools still have copies of them, they may be used to advantage.

Two videos were produced by the Auchterderran Staff Development and Resources Centre, Fife, as support material for the Short Courses. Copies of these were circulated to the Regional Science and Social Subject Advisers at the same time. Teachers are encouraged to use any other video material they consider relevant to the unit.

The use of additional materials (e.g. books, leaflets, BGS maps, computer software) would add greatly to the unit especially when backed up with worksheets written by the teacher. Exercises based on local geology would be of especial value. The extension exercises give the school the opportunity to utilise additional materials of their own.

Textbooks which are suitable for student research on several occasions in the course are:

Geological Science by Andrew McLeish, published by Blackie ISBN 0 216 91198 2
Aspects of Geology by P Kennett and C A Ross, published by Longman
ISBN 0 582 172357 (out of print).

Schools and colleges may also have other texts and materials.

Section 3 E1 Further examples of structure contour problems. Possible examples from SQA past Higher Grade papers could be used.

Section 10 E1 Further examples of three point problems. Examples from SQA past Higher Grade papers could be used.

4. Core Skills

Within the unit including the required fieldwork, there are opportunities to practise core skills including, in particular, the components of Problem Solving - Critical Thinking, Planning and Organising, and Reviewing and Evaluating - and the Using Graphical Information component of Numeracy. Information on the core skills embedded in the unit *Earth Physics, Structural Geology and Plate Tectonics (H)* and in the Higher Geology course is given in the final version of the Arrangements document. General advice and details of the Core Skills Framework can be found in *Core Skills: Information for Senior Managers* (HSDU June 1998).

5. Practical Experience

Students will benefit from observing and participating in various forms of practical experience. In this unit the use of geological maps and participation in field investigations are particularly valuable.

Experiments

To preclude difficulties which may arise it is recommended that teachers try out experiments in advance. Also, strict safety precautions should be enforced and due regard given to the COSHH regulations. Most of the experiments are shown on the videos described above. There are few experiments in this unit.

Map work

There are many opportunities to undertake map work as part of the core of this unit. This involves the ability to construct and use structure contours as well as identifying structures on maps. The use of British Geological Survey maps should also be considered especially as extension material.

Fieldwork

Fieldwork is a compulsory part of this unit and a reasonable amount of time should be spent outside examining and recording information in the field. Any opportunity for field observation greatly enhances the students' understanding and enjoyment of the course.

A report on fieldwork of the required nature is assessed for Outcome 3. Guidance on aspects of that report is included in the National Assessment Bank packages for this unit.

6. Learning and teaching approaches

Advice on learning and teaching can be found in *Achievement for All* (SOEID 1996), *Effective Learning and Teaching in Geography* (SOEID 1995), *Effective Learning and teaching in the Sciences* (SOEID 1994) and in the Subject Guide for Geology.

The materials were produced with the situation of small numbers of students in a composite class in mind. An open learning approach was therefore adopted. The teacher/lecturer should not however feel constrained to using the open learning approach too rigidly. A balanced diet of student-centred and staff-led approaches is probably best. Some staff may also wish to integrate work from this unit with work from any of the other three Higher units. Such an approach has much to commend it.

A student who has not undertaken the Intermediate 2 unit *Earth Physics and Earth Movements* may follow the activity sheets here as they integrate the Intermediate 2 materials. It is then possible to complete the Intermediate 2 or Higher assessment depending on the level reached during the unit. If the Intermediate 2 unit has already been completed only the Higher activities need to be attempted although revision may be required as suggested within the activities.