

**Biology
GCSE**

Introduction

Welcome to your Biology course!

Biology is the study of living things, or “organisms”. In this course you will learn about the interdependence of all living things, and the way in which all animals and plants take part in the great cycles of nature. The course is divided into an Introductory section, followed by two major sections. You will study an environment and the diversity of organisms within it, and you will also study the functioning of living organisms.

The course also stresses the essential biological principles related to living organisms and their environment, including the personal, economic and technological applications of biology in modern society.

This Introduction is intended to give you all the information you need to make a successful start to the course. You will need to refer back to it at various points.



Oxford Open Learning

Aims and Objectives

This course has been designed and written with the purpose of preparing you to achieve the highest grades in your GCSE Biology examination. The aims and objectives of this course can be summarised in the following:

- to develop an understanding of essential biological principles based upon knowledge of living organisms and their environment
- to encourage a respect for all living organisms and their environments
- to encourage curiosity about, and appreciation of, biology as a subject which can provide life-long interest and enjoyment
- to recognise the inter-relationships between various areas of biology, including relationships between structure and function, between living organisms and between living organisms and the environment
- to develop an awareness of the effect of human activities on these relationships
- to promote the application of biological principles in personal, social, environmental, economic and technological contexts
- to encourage accurate observation, investigation and communication
- to develop scientific method in gathering knowledge and solving problems
- to develop skills needed for safe handling of, and working with, apparatus and biological material including living organisms
- to appreciate the relationships and applications of mathematics, physics and chemistry to biology.

You will probably find this list intimidating! However, possibly the most important overall aim of the course is to help you develop an interest in and enjoyment of the study of living organisms and all these other aims are aspects of this. When you consider that these aims and objectives are to be realised by dividing them into 28 parts (the number of lessons in the course) then it becomes less frightening!

Although this course is aimed at preparing you to take an examination, there are always a few students who just wish to take the course for interest, to widen their background knowledge, and to help to make many activities — from digging the garden to walking along a country lane; from eating a meal to reading the newspaper — more meaningful. This course will benefit you in these ways also!

Course Material

You will have to study the lessons side by side with the parts of the text book referred to, and also with the relevant practical work. You should read the **lesson** first, and carry out any activities included in it. Then you should **read** the set parts of the **text book**, which may also include some **activities**. After this you should carry out any **practical work** given on the separate **practical work sheet**. When you have completed all the set work given for each lesson, and you have gone over and revised any points you are not sure about, then you should attempt the test questions set.

Biology being the study of living things, it is essential that you carry out observations and investigations on living things. In the course you will be given help and advice on how well you can carry out simple practical work at home, if you don't have access to a Laboratory. Lessons 2 and 3 will give you specific and detailed instructions, and every lesson will have its own practical work sheet.

As time goes by, you will be expected to produce coursework based on your practical experiments. Such coursework will normally be produced under the direct supervision of your tutor and it is not possible to pass the examination without *some* practical sessions with your tutor. Full details of coursework are to be found later in the Introduction and extensive help will be given in the course for this aspect of your work.

Graph Paper

For some of the activities and questions set during this course you will need graph paper. It would be best for you to buy a small exercise book, or, if you prefer, punched A4 sheets for inclusion in your file.

Reading References

References to the text book are given in a separate table later in this Introduction. You should attempt to read the sections of the text book at least **twice**. On the first time through, be attentive to the main headings, and outline of the information, and then work through the lesson. Then read the text book sections again, making necessary notes. Often you will have to dip into the textbook at a number of different points but you will soon be good at picking out the information that tallies with the lesson itself.

Course Development and Student Assessment

The 28 lessons have been divided up into four modules.

Module One: Introductory section

This will introduce the method of study in more detail. It will include instruction on practical work, and the background required in mathematics, physics and chemistry.

Module Two: The Environment and the Diversity of Organisms within it

Many of the lessons in this section have two alternatives, A or B. You have to choose one particular habitat to study and a choice is given between woodland, or a pond. If you select woodland you will follow the A lessons; and if you choose a pond then you will follow the B Lessons.

Module Three: The Functioning of Living Organisms

Module Four: Development of Organisms and the Continuity of Life

Your course includes a variety of activities, tests and examinations. You should send no test or other material to your tutor *apart from* your answers to the 'lettered tests' (i.e. Test A, Test B ...) and to the 'Progress Tests' and the examination. Your answers to these will be marked by your tutor, and you will be sent specimen answers so you can compare your answers with those suggested.

Your tutor will, of course, give detailed advice on your specific learning needs. The progress tests follow an examination layout and procedure very closely, and it is a good idea to treat these as an exam, if you can, and to revise all previous work for them.

In the test questions set, the course tries to give examples of all the different types of questions which you may find. As the course develops special help will be given to you on interpretation of questions and examination technique.

At the end of the course, examination papers will be set that will be similar to the format of the examinations to be set by the examination board. Details about how to answer it will be given in Lesson 28.

Text Books

You will need to buy (or borrow!) one accompanying textbook. This book is:

GCSE Biology D.G. Mackean pub. John Murray,
3rd ed; ISBN: 0-7195-8615-1

Mackean's book is easily the best book on Biology at this level. Although not necessary for the course, you might also like to look at:

Biology for Life M.B.V. Roberts. pub. Nelson.

One easy way to purchase supporting texts is through the OOL website (www.ool.co.uk). You'll find other useful books in your library or bookshop.

Supplementary Books

Experimental Work in Biology D.G. Mackean (John Murray)
[experiments to carry out].

Biology: A Functional Approach M.B.V. Roberts Nelson

These are text books written for 'A' level, but can be useful reference books if you want more information.

Sequence of Lessons & Text Book References

Module One: Introductory section		
Lesson	Title of lesson	Mackean reading refs.
1	Living Things	2-4; 308
2	Practical Work	
3	Scientific Background: Physics, Chemistry, Maths	366-367
Module Two: The Environment and the Diversity of Organisms within it		
Lesson	Title of lesson	Mackean reading refs.
4	The Ecosystem	232-241 265-269
Tutor-marked Assignment A		
5A or 5B	Deciduous Tree Ecosystem: Field Techniques The Freshwater Pond Ecosystem: Field Techniques	269-275 289-291 269-275 289-291
6A or 6B	Woodland Habitat Study: Abiotic Factors Light, Temperature, Soil Pond Habitat Study: Abiotic Factors Temperature, Light, Water	243-244 277 43-44 63-64 277
7A or 7B	The Diversity of Organisms in Woodland Tree, Herb, Alga, Pleurococcus The Diversity of Organisms in Pond Herb, Alga, Pond Snail	284-288 291-307 294-298
8A or 8B	The Diversity of Organisms in Woodland Worm, Snail, Butterfly The Diversity of Organisms in Pond Waterlouse, Insect, Fish	309-311 273-274 291-293
Tutor-marked Assignment B (woodland or pond)		
9A or 9B	The Diversity of Organisms in Woodland Bird, Mammal, Fungi, Bacteria The Diversity of Organisms in Pond Frog, Fungi, Bacteria	293-294 299-305 293 299-305 314-315

Module Two: The Environment and the Diversity of Organisms within it (continued)		
10	Interrelationships: Populations	276-282 232-241
11	The Circulation of Nutrients: Carbon, Water and Nitrogen	236-238
Tutor-marked Assignment C		
12	Human Interaction with the Environment: Effects on Natural Habitats, Pollution, Conservation	242-254 255-265
Tutor-marked Assignment D Progress Test 1A (woodland) or 1B (pond)		

Module Three: The Functioning of Living Organisms		
Lesson	Title of lesson	Mackean reading refs.
13	Cells	5-10 28-36
14	Plant Nutrition	37-50
15	Plant Transport Water Uptake and Transportation	52-70
16	Animal Nutrition Food Classes, Human Diet	11-15 94-104
Tutor-marked Assignment E		
17	Alimentary Canal Structure, Function & Assimilation; Enzymes	15-19 105-115 168-170
18	Animal Transport Circulatory System, Blood	116-130
19	Respiration	2-27 131-138
20	Excretion	139-144 112-113
Tutor-marked Assignment F		
21	Sensitivity and Response: Skin, Plant Hormones	88-90 145-149 171-172
22	Mammals: The Nervous System, the Eye	172-189 190-195
23	Support and Movement: Locomotion	52-61 162-168
Tutor-marked Assignment G Progress Test 2		

Module Four: Development of Organisms and the Continuity of Life		
Lesson	Title of lesson	Mackean reading refs.
24	Reproduction Asexual, Sexual, Flowering Plant	71-82
25	Reproduction - Human	150-161 348-349
Tutor-marked Assignment H		
26	Growth and Cell Germination	83-87 324-328
27	Genetics	198-229
28	Revision	308-337
Practice Examinations 1, 2 & 3		

Examination Requirements

The course has been written to prepare you for the Biology GCSE papers set by the Assessment and Qualifications Alliance (AQA). This is Science: Biology syllabus 3411 for exams in 2003.

Although all the topics required by AQA are covered in this course, it is a good idea to obtain a copy of your syllabus, so you can monitor your progress, either via the AQA Publications Dept or from the website www.aqa.org.uk.

The syllabus can be purchased from Publications, AQA, Aldon House, 39, Heald Grove, Rusholme, Manchester M14 4NA (tel: 0161-953-1170) or downloaded from www.aqa.org.uk/qual/pdf/AQA3411WSP.pdf.

The AQA syllabus 2640 conforms to the National Curriculum criteria for Biology. Your certificate will eventually say 'Science: Biology' rather than 'Biology'. **You are not allowed to take the Human Biology GCSE examination as well.** Many of the same topics are covered by the Biology (Human) syllabus 3415.

If you are aiming to take the examination with one of the other boards you will need to read their syllabuses very carefully as there may be some topics which are not fully covered here.

Examination Tiers

This summary of the syllabus is placed at the beginning of the course so that it will be easy to refer to it as you go through the course and as you approach the examinations. You might like to glance through it now so that you can get various basic points clear in your own mind.

When it comes to exams, it is difficult to produce a paper which tests the skills of candidates of different abilities. So particular exam papers test students who are looking to achieve a certain level.

There are “Foundation Tier” exams for those expecting to get a grade between C and G, and “Higher Tier” exams for those expecting a grade A* to D.

How do you know which tier you are aiming for?

The short answer is that it is very difficult to decide. The Oxford Open Learning course assumes that you are aiming to take the Higher Tier exams. But you don't have to decide at this stage. Much will depend on how well you cope with the course.

If you wish to study the subject at a higher level, you will be expected to have gained a grade C, at the very least. When you have made progress with your studies, your tutor should be able to advise you which tier to sit for.

The AQA Syllabus 3411

In the 2003 examination, candidates take one written paper as well as submitting coursework.

The written paper can be taken at either Foundation or Higher level. It is 2¼ hours long and is worth 80% of your marks. A number of different types of questions may be set. These include short-answer questions, structured questions, questions requiring extended prose, and open-ended questions.

Coursework is produced by everyone and is worth 20% of the total marks. Further details of the coursework requirements will be given later in the introduction.

The Subject Content of the Syllabus

The AQA syllabus in 2003 is divided into core content (assessed in the foundation tier) and additional content (assessed in the higher tier). The core and additional content is divided into a number of themes, which are in turn subdivided into several topics. The themes and topics are as follows:

Core Subject Content

Theme	Topic
Cell activity	10.1 Plant and Animal Cells 10.2 Transport Across Boundaries 10.3 Cell Division
Humans as organisms	10.4 Nutrition 10.5 Circulation 10.6 Breathing 10.7 Respiration 10.8 Nervous system 10.9 Hormones 10.10 Homeostasis 10.11 Disease 10.12 Drugs
Green plants as organisms	10.13 Plant Nutrition 10.14 Plant Hormones 10.15 Transport and Water Relations
Variation, inheritance and evolution	10.16 Variation 10.17 Genetics and DNA 10.18 Controlling Inheritance 10.19 Evolution
Living things in their environment	10.20 Adaptation and Competition 10.21 Humans Impact on the Environment 10.22 Energy and Nutrient Transfer 10.23 Nutrient Cycles

Additional Subject Content

Theme	Topic
Locomotion	10.24 Skeleton and Movement 10.25 Adaptions for movement
Patterns of feeding	10.26 Feeding adaptations in invertebrates 10.27 Feeding in mammals
Controlling the spread of disease	10.28 Treating infectious disease 10.29 Treating kidney disease
Applied Microbiology	10.30 Using microorganisms to make food and drink 10.31 Growing microorganisms in fermenters

All these themes and topics are covered in this course but not in the same sequence. Some topics and ideas are slightly easier to explain than others and these come earlier in the course. Where a topic is particularly well covered in the accompanying textbook, there is less explanation to be found in the course.

Coursework

What does Coursework Entail?

There is no need to be alarmed by the prospect of coursework; it will form a natural part of your studies. Coursework is not supposed to be a *special* requirement; the exam boards say it should be a *normal* part of your work. During your study, you will work on your coursework in much the same way as you would approach one of the tutor-marked assignments.

To do well in coursework you will need almost exactly the same skills as you will require for success in the examination and the same qualities that you will require to get you through this course of study. All three require an ability to work and think independently, to hunt out information and make notes, to make good use of resources (e.g. libraries) and to organise and express your ideas effectively.

Indeed, the very fact that you are studying through an open learning, flexistudy or “supported self-study” mode means that you will be starting at an *advantage* when it comes to coursework compared with the typical classroom-based 16-year-old. As long as you show some of the skills you have learnt along the way you will get a good mark. Perhaps it’s a shame it only counts for such a small percentage of the examination!

It is expected that your tutor will give you a certain amount of help with your coursework even though he/she is also going to mark the finished work. Your tutor should help you select an appropriate topic or topics, according to your interests and aptitudes, and suggest possible avenues of investigation that might prove fruitful. You may be advised on the methods you adopt to collect information and ideas, and *some* help may be given with preparatory drafts. But after that you are on your own.

So you will need to plan your time carefully. Discuss a possible timetable for producing coursework with your tutor and work out your own private calendar to meet that deadline. It is perhaps advisable that you should have completed most of your basic studies before embarking on your coursework in order to create a good impression. But right from the beginning you can be looking out for topics which are of special interest to you and keeping a file of any useful items (e.g. records of your diet or fitness levels) which might contribute to your investigations.

Because coursework is a very individual thing, this course can only give you a limited amount of guidance with this aspect of your studies. About half way through the course, you will be asked to start thinking about the coursework requirement and, in due course, a few tentative topics will be suggested that might tie in with what you have learnt so far and the assignments that you have already done.

A little later you will be expected (with your tutor’s help) to hit on a specific topic or topics and you will be given some assistance with the planning of your investigations. Finally, there will be some guidance on how to present your findings and ideas objectively and persuasively.

With luck, the coursework should be the most enjoyable and rewarding part of your studies!

How many pieces of work will be assessed as coursework?

This is up to you and your tutor. You must submit at least two pieces of work, but it is more likely that you will produce three or four pieces of investigational work which demonstrate *different* practical skills.

What skills will you need to show in your coursework?

There are four skill areas: planning experimental procedures; obtaining evidence; analysing evidence and drawing conclusions; and evaluating evidence. Your tutor will eventually give you a mark for each of these categories.

Ways of achieving the highest marks are closely defined by the syllabus, so you should study your copy of the syllabus carefully.

From the selection of investigations you do, your tutor will take the best mark that you achieve in each different skill area. You will need to give your tutor a great deal of information about how you set up the investigation, the theories that were testing, the equipment you used, the results you gained, the conclusions that you wish to draw, the help that you got from other people or from books, etc., and an assurance that it is all your own work.

Your tutor will be expected to keep records of your coursework performance and submit the marks to the exam board. Work by some students will eventually be checked by moderators from the exam board to make sure that your tutor's marking system and standards are much the same as everyone else's.

Vocational Objectives

Although this course leads to a specific examination, it is, of course, a means to an end for most students, that end being better opportunities in the workplace. GCSE Biology will enable you to apply for a wide variety of jobs with a realistic chance of success and to perform those jobs more successfully. Relevant careers include medicine, nursing, physiotherapy, veterinary science, dentistry and pharmacology.

The practical skills developed by this course will be of great importance in a wide variety of vocations.

Using the Internet

All students would benefit from access to the Internet. You will find a wealth of information on all the topics in your course. As well as the AQA website (www.aqa.org.uk), you should get into the habit of checking the Oxford Open Learning site (www.ool.co.uk) where you may find news, additional resources and interactive features as time goes by. If you have not already done so, you may register for your free copy of *How to Study at Home*, our 200-page guide to home learning, or enrol on further courses. Put it on your Favourites list now!

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