

A Level Biology OCR

Syllabus

Ripon Grammar School



Contents:

Aims of the course and course structure

Suggested reading list

The specification

Assessment Objectives

Unit Weightings

Year 12 Target:

Year 12 Mock:

Year 12 Result:

A Level Target:

A Level Target:

Biology – OCR Syllabus

This guide is intended to give you an overview of the course, its structure and contents and how you will be assessed.

Most importantly it contains the syllabus specification i.e. everything you need to know. The syllabus statements are a guide to the knowledge and understanding that you require at A Level. For each section of the course you will be expected to consolidate your notes and understanding by reviewing your text book and other material.

If you are aiming for the top grades it is essential that you are conducting further reading. To assist you, we have included a reading list with books and periodicals that are available in the library. This list is not exhaustive; if you have other suggestions that are not on this list, please let your teacher know and they can be added to the list for the future.

Aims of the course

OCR's A Level in Biology A specification aims to encourage learners to:

- develop essential knowledge and understanding of different areas of the subject and how they relate to each other
- develop and demonstrate a deep appreciation of the skills, knowledge and understanding of scientific methods
- develop competence and confidence in a variety of practical, mathematical and problem solving skills
- develop their interest in and enthusiasm for the subject, including developing an interest in further study and careers associated with the subject
- understand how society makes decisions about scientific issues and how the sciences contribute to the success of the economy and society (as exemplified in 'How Science Works' (HSW)).

Overview of A Level Biology

Content Overview	Assessment Overview	
<p>Content is split into six teaching modules:</p> <ul style="list-style-type: none">• Module 1 – Development of practical skills in biology• Module 2 – Foundations in biology• Module 3 – Exchange and transport• Module 4 – Biodiversity, evolution and disease• Module 5 – Communication, homeostasis and energy• Module 6 – Genetics, evolution and ecosystems <p>Component 01 assesses content from modules 1, 2, 3 and 5.</p> <p>Component 02 assesses content from modules 1, 2, 4 and 6.</p> <p>Component 03 assesses content from all modules (1 to 6).</p>	<p>Biological processes (01)</p> <p>100 marks</p> <p>2 hour 15 minutes written paper</p>	<p>37%</p> <p>of total A level</p>
	<p>Biological diversity (02)</p> <p>100 marks</p> <p>2 hour 15 minutes written paper</p>	<p>37%</p> <p>of total A level</p>
	<p>Unified biology (03)</p> <p>70 marks</p> <p>1 hour 30 minutes written paper</p>	<p>26%</p> <p>of total A level</p>
	<p>Practical endorsement in biology (04)*</p> <p>(non exam assessment)</p>	<p>Reported separately (see section 5g)</p>

Forms of assessment

All three externally assessed components (01–03) contain some synoptic assessment, some extended response questions and some stretch and challenge questions.

Stretch and challenge questions are designed to allow the most able learners the opportunity to demonstrate the full extent of their knowledge and skills. Stretch and challenge questions will support the awarding of A* grade at A level, addressing the need for greater differentiation between the most able learners.

Biological processes (Component 01)

This component is worth 100 marks, is split into two sections and assesses content from teaching modules 1, 2, 3 and 5. Learners answer all the questions.

Section A contains multiple choice questions. This section of the paper is worth 15 marks.

Section B includes short answer question styles (structured questions, problem solving, calculations, practical) and extended response questions. This section of the paper is worth 85 marks.

Biological diversity (Component 02)

This component is worth 100 marks, is split into two sections and assesses content from teaching modules 1, 2, 4 and 6. Learners answer all the questions.

Section A contains multiple choice questions. This section of the paper is worth 15 marks.

Section B includes short answer question styles (structured questions, problem solving, calculations, practical) and extended response questions. This section of the paper is worth 85 marks.

Unified biology (Component 03)

This component assesses content from across all teaching modules 1 to 6. Learners answer all the questions. This component is worth 70 marks.

Question styles include short answer (structured questions, problem solving, calculations, practical) and extended response questions.

Content of A Level in Biology A (H420)

Module 1 – Development of practical skills in biology	1.1 Practical skills assessed in a written examination 1.2 Practical skills assessed in the practical endorsement
Module 2 – Foundations in biology	2.1.1 Cell structure 2.1.2 Biological molecules 2.1.3 Nucleotides and nucleic acids 2.1.4 Enzymes 2.1.5 Biological membranes 2.1.6 Cell division, cell diversity and cellular organisation
Module 3 – Exchange and transport	3.1.1 Exchange surfaces 3.1.2 Transport in animals 3.1.3 Transport in plants
Module 4 – Biodiversity, evolution and disease	4.1.1 Communicable diseases, disease prevention and the immune system 4.2.1 Biodiversity 4.2.2 Classification and evolution
Module 5 – Communication, homeostasis and energy	5.1.1 Communication and homeostasis 5.1.2 Excretion as an example of homeostatic control 5.1.3 Neuronal communication 5.1.4 Hormonal communication 5.1.5 Plant and animal responses 5.2.1 Photosynthesis 5.2.2 Respiration
Module 6 – Genetics, evolution and ecosystems	6.1.1 Cellular control 6.1.2 Patterns of inheritance 6.1.3 Manipulating genomes 6.2.1 Cloning and biotechnology 6.3.1 Ecosystems 6.3.2 Populations and sustainability.

It is essential that you are able to identify key themes that run through the course and practice the synoptic elements of the course. In addition to lessons, this can be done through the stretching and challenging components of your text books, practice questions (either given or at the end of sections in your text book) and through further reading.

How Science Works

How Science Works (HSW) was conceived as being a wider view of science in context, rather than just straightforward scientific enquiry. It was intended to develop learners as critical and creative thinkers, able to solve problems in a variety of contexts. Developing ideas and theories to explain the operation of living systems, from the molecular to the ecosystem level, is at the heart of Biology.

Learners should be aware of the importance that peer review and repeatability have in giving confidence to this evidence. Learners are expected to understand the variety of sources of data available for critical analysis to provide evidence and the uncertainty involved in its measurement. They should also be able to link that evidence to contexts influenced by culture, politics and ethics.

Understanding *How Science Works* requires an understanding of how scientific evidence can influence ideas and decisions for individuals and society, which is linked to the necessary skills of communication for audience and for purpose with appropriate scientific terminology.

The examples and guidance within the specification are not exhaustive but give a flavour of opportunities for integrating HSW within the course. These references, written in the form HSW1, link to the statements as detailed below:

- **HSW1** Use theories, models and ideas to develop scientific explanations
- **HSW2** Use knowledge and understanding to pose scientific questions, define scientific problems, present scientific arguments and scientific ideas
- **HSW3** Use appropriate methodology, including information and communication technology (ICT), to answer scientific questions and solve scientific problems
- **HSW4** Carry out experimental and investigative activities, including appropriate risk management, in a range of contexts
- **HSW5** Analyse and interpret data to provide evidence, recognising correlations and causal relationships
- **HSW6** Evaluate methodology, evidence and data, and resolve conflicting evidence
- **HSW7** Know that scientific knowledge and understanding develops over time
- **HSW8** Communicate information and ideas in appropriate ways using appropriate terminology
- **HSW9** Consider applications and implications of science and evaluate their associated benefits and risks
- **HSW10** Consider ethical issues in the treatment of humans, other organisms and the environment □
- **HSW11** Evaluate the role of the scientific community in validating new knowledge and ensuring integrity □
- **HSW12** Evaluate the ways in which society uses science to inform decision making.

Mathematical requirements

In order to be able to develop their skills, knowledge and understanding in A Level Biology, learners need to have been taught, and to have acquired competence in, the appropriate areas of mathematics relevant to the subject as indicated in the table of coverage below. Although Mathematics as an A Level is not a prerequisite, it will certainly help with this course. If you are less confident, you can seek support from the biology and mathematics departments. There is nothing in the course to be worried about but some elements do require practise.

Practical Work

The Practical Endorsement is common across Biology A and Biology B (Advancing Biology). It requires a minimum of 12 practical activities to be completed from the categories defined below.

The assessment of practical skills is a compulsory requirement of the course of study for A level qualifications in biology, chemistry and physics. It will appear on all students' certificates as a separately reported result, alongside the overall grade for the qualification.

You will complete a minimum of 12 practical activities to be carried out by each student which, together, meet the requirements of Appendices 5b (*Practical skills identified for direct assessment and developed through teaching and learning*, covered in Module **1.2.1**) and 5c (*Use of apparatus and techniques*, covered in Module **1.2.2**) from the prescribed subject content, published by the Department for Education.

You will keep an appropriate record of their assessed practical activities in order to demonstrate the required standard across all the requirements of the CPAC which will mean you will receive a 'pass' grade. There will be no separate assessment of practical skills for AS qualifications but you will have to answer questions in the AS and A level examination papers that assess the requirements of Appendix 5a (*Practical skills identified for indirect assessment and developed through teaching and learning*, covered in Module **1.1**).

Synoptic Assessment

Synoptic assessment tests the learners' understanding of the connections between different elements of the subject. Synoptic assessment involves the explicit drawing together of knowledge, understanding and skills learned in different parts of the A level course. The emphasis of synoptic assessment is to encourage the development of the understanding of the subject as a discipline. All components within Biology A contain an element of synoptic assessment. Synoptic assessment requires learners to make and use connections within and between different areas of biology, for example, by:

- applying knowledge and understanding of more than one area to a particular situation or context
- using knowledge and understanding of principles and concepts in planning experimental and investigative work and in the analysis and evaluation of data
- bringing together scientific knowledge and understanding from different areas of the subject and applying them.

Assessment Objectives

	Assessment Objective
AO1	Demonstrate knowledge and understanding of scientific ideas, processes, techniques and procedures.
AO2	Apply knowledge and understanding of scientific ideas, processes, techniques and procedures: <ul style="list-style-type: none"> in a theoretical context in a practical context when handling qualitative data when handling quantitative data.
AO3	Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to: <ul style="list-style-type: none"> make judgements and reach conclusions develop and refine practical design and procedures.

Component	% of A Level in Biology A (H420)		
	AO1	AO2	AO3
Biological processes (H420/01)	13–14	15–16	8–9
Biological diversity (H420/02)	13–14	15–16	8–9
Unified biology (H420/03)	5–6	10–11	9–10
Practical endorsement in biology (H420/04)*	N/A	N/A	N/A
Total	31–34	40–43	25–28

* The Practical Endorsement is assessed and reported separately from the overall A level grade (see Section 5g).

Biology wider reading

As you embark on A Level Biology you will find a big step up from GCSE. It is important that you are widely read so you can more easily see the connections between complex themes and can contribute interesting ideas to your work. Below are some **suggestions** for reading over the summer that will give you a head start. All of these books and journals are in the library but you should also look out for authors such as Nick Lane, Ben Goldacre, Neil Shubin, Matt Ridley and Jared Diamond to mention just a few that you will find in good book shops or online. Enjoy!

Remember to check the **Library catalogue** (called 'Oliver') to see whether a book is shelved in the Main Library or Learning Centre; the link <http://is.gd/Biology> takes you to the complete list of these resources in the Library This number is the *classmark*, catalogue. which tells you where to find the book on the shelves

General – if you need help, ask a librarian.

BRYSON, Bill	A short history of nearly everything	507
DAWKINS, Richard	Unweaving the rainbow : science, delusion and the appetite for wonder	500
DIAMOND, Jared	Collapse : how societies choose to fail or succeed	304.2
DIAMOND, Jared	The rise and fall of the third chimpanzee	599.93
INDGE, Bill	A-Z handbook : biology	570

Genetics and Evolution

DAWKINS, Richard	The selfish gene	576.8
DAWKINS, Richard	The ancestor's tale : a pilgrimage to the dawn of life	576.83
DAWKINS, Richard	Climbing mount improbable	576.8
DAWKINS, Richard	River out of Eden : a Darwinian view of life	576.8
JONES, Steve	Almost like a whale : the origin of species updated	576.5
JONES, Steve	Coral : a pessimist in paradise	593.6
JONES, Steve	Darwin's island : the Galapagos in the Garden of England	576.8
JONES, Steve	In the blood : God, genes and destiny	576.8
JONES, Steve	The language of the genes : biology, history and the evolutionary future	574.8
JONES, Steve	Y : the descent of men	599.96
JONES, Steve; VAN LOON, Borin	Genetics for beginners	576.5
JUDSON, Olivia	Dr. Tatiana's sex advice to all creation : the definitive guide to the evolutionary biology of sex	571.53
Miller, Jonathan; VAN LOON, Borin	Darwin for beginners	576.8
MILNER, Richard; GOULD, Stephen Jay	The encyclopedia of evolution : humanity's search for its origins	573.2
SHUBIN, Neil	Your inner fish : the amazing discovery of our 375-million-year-old ancestor	576.8

Human Biology and Medicine

ALLGROVE, Bob; MORROD, Peter	Molecules, medicines and drugs : a chemical story	547.9
BARTRIP, Peter	Quacks and cash <i>History today</i> : volume 40 issue 9, pp. 45-51	
BOWRON, Peter	Bloodstained mementos of Medieval medicine <i>History today</i> : volume 38, issue 10, pp. 4-5	
EMBER, Melvin; EMBER, Carol R.	Encyclopedia of medical anthropology : health and illness in the world's cultures [e-book]	Access via Oliver
KIPLE, Kenneth F.	Plague, pox and pestilence	614.4
PARKER, Steve; WINSTON, Robert	The human body book [e-book]	Access via Oliver

WINSTON, Robert	Human	599.9
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Ecology

ATTENBOROUGH, David	Life on earth	576.8
ATTENBOROUGH, David	The living planet	577
EYERS, Jonathan	How to snog a hagfish! : disgusting things in the sea	585.2
LIPTAK, Karen; GENTRY, Linnea	The glass ark : the story of biosphere 2	577.9
MACLEAN, Norman	Silent summer : the state of wildlife in Britain and Ireland	591

Biography & Autobiography

	The Hutchinson dictionary of scientific biography [e-book]	Access via Oliver
NICHOLLS, Henry	Lonesome George : the life and loves of the world's most famous tortoise	597.9
VENTER, Craig	A life decoded : my genome, my life	576.5
WATSON, James	The double helix : a personal account of the discovery of the structure of DNA	572.86

Neurobiology & Psychology

CALVIN, William H.	How brains think : evolving intelligence, then and now	612.82
CARTER, Rita	Mapping the mind	612.82
FRITH, Chris	Making up the mind : how the brain creates our mental world	612.82
MITHEN, Steven J.	The prehistory of the mind : a search for the origins of art, religion and science	569.9
MORGAN, Nicola	Blame my brain : the amazing teenage brain revealed	612.82
PINKER, Steve	The language instinct : the new science of language and mind	803
SACKS, Oliver	The man who mistook his wife for a hat	616.89
WINSTON, Robert	The human mind : and how to make the most of it	612.82

Fiction

JAMES, P. D.	Children of men	SF JAM
HUXLEY, Aldous	Island	SF HUX
HUXLEY, Aldous	Brave new world	SF HUX
CRICHTON, Michael	State of fear	SF CRI
HERRIOT, James	All creatures great and small	JF HER
HERRIOT, James	All things wise and wonderful	JF HER

Academic Journals

Scientific American	The most recent issues of these journals are on display in the Learning Centre. Older issues are kept in the Main Library – ask a librarian if you would like read a back issue. Many journals can also be accessed online – search the library catalogue to find access information, usernames and passwords.
Scientific American Mind	
New Scientist	
Biological Sciences Review	

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Maths Skills