



# **Student Guide for GCE Applied Science**

**What every student needs to know**

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Registered address AQA, Devas Street, Manchester M15 6EX

Dr Michael Cresswell Director General.

# Contents

Why AQA GCE Applied Science? .....	Page 2
Why should I choose this course? .....	Page 2
What qualification will I get? .....	Page 2
What qualifications do I need before I start? .....	Page 3
What exactly will I study? .....	Page 3
How will I be tested? .....	Page 8
How will I learn? .....	Page 8
What will this qualification lead to? .....	Page 8

## Why AQA GCE Applied Science?

There is an extremely wide variety of employment opportunities for those interested in science. Career options range from a vast choice of medical opportunities through to employment in conservation and environmental projects. Those who study science can also, for example, go on to work as electronic or mechanical engineers, dieticians, technicians and research scientists. In fact science-based careers form one of the largest employment areas in the UK.

The AQA GCE Applied Science course will allow you to study how science is applied in many different types of professions and industries. The focus of the course is scientific usage, concentrating on how scientists and others use science in their work. During the course you will be given the opportunity to visit scientific workplaces and meet people who use science on a daily basis. You will also learn how science contributes to our lifestyle and the environment in which we live.

The course is designed to allow you to spend a considerable amount of your time in the laboratory, working on the kind of practical projects that may be undertaken by employees working in science-based industries.

## Why should I choose this course?

The course that you choose to study will depend on your interests, strengths and preference for a particular style of learning as well as your future ambitions.

During this course you will be able to:

- follow a programme of learning which is practically-based and which improves your practical skills;
- follow a balanced science programme covering biology, chemistry and physics;
- visit scientific workplaces;
- work independently on a number of projects;
- learn about the work of different types of people using science and the scientific skills that they use;
- gain ideas about employment opportunities in science;
- prepare for courses in higher and further education;
- keep track of your progress and achievement throughout the course by a programme of continuous assessment.

As well as using ICT for presenting your work, you will also be encouraged to use it for researching information, monitoring and recording experimental work.

## What qualification will I get?

This course can be taken to achieve a number of different qualifications. Your school or college will advise you which option is best for you.

The qualifications available are:

Qualification	Number of units	Grades available
AS single award	3	A-E
AS double award	6	AA-EE
A Level single award	6	A-E
A Level double award	12	AA-EE

All these qualifications carry the normal number of UCAS points for AS and A Level subjects. You should expect to spend the same amount of time for a double award qualification as you would for two single award AS or A Level qualifications.

### What qualifications do I need before I start?

There are no formal entry requirements for this course. It is, however, normally expected that you will have followed a GCSE Science course. Some schools and colleges may also insist that you have also successfully completed a GCSE programme in mathematics and English. In essence, certain schools and colleges may have their own entry requirements to the GCE Applied Science course and it is advisable that you check with them before embarking on this course.

The most important requirement is that you have a practical interest in and enthusiasm for science and that you feel able to undertake the amount of portfolio work required to fulfil the demands of the course.

### What exactly will I study?

You will be given the opportunity to study a course that concentrates on the application of science, focusing on some of the vocational opportunities that you may pursue as a future career. The course is designed to give you ideas of the type of thing that scientists are involved with. It is divided into units.

The units studied will depend on which qualification you follow.

Qualification	Units studied
AS Single Award	1, 2*, 3
AS Double Award	1, 2*, 3, 4, 5*, 6
A Level Single Award	1, 2*, 3, 7 plus <b>one</b> unit from 8*, 11*, 14* and <b>one</b> unit from 9, 10, 12, 13, 15, 16
A Level Double Award	1, 2*, 3, 4, 5*, 6, 7 plus <b>two</b> units from 8*, 11*, 14* and <b>three</b> units from 9, 10, 12, 13, 15, 16

\* denotes a unit which is externally assessed

## GCE Applied Science Student Guide

The course structure means that you will have to study some compulsory units. If you study the AS single award, all of the units are compulsory. This will ensure that you have a good grounding in biology, chemistry and physics. If you then go on to study the A Level single award, Unit 7 is compulsory and the remaining two are optional. In this way you can tailor the course to suit your own interests.

Choosing the AS double award also means that all units are compulsory and this will give you a good background in the three major science disciplines. If you then go on to study the A Level double award, Unit 7 is compulsory and you can then specialise. All of the units you study have an Applied Science theme which runs throughout. By choosing five options in each unit, you will learn a body of knowledge and develop practical skills which will then be used either in a written examination or to produce a portfolio of material.

	Unit title and brief description	Areas of science that you will study:
1 AS Unit	<b>Investigating Science at Work</b> This unit gives you a general introduction to the use of science in the workplace and also details of those people who will use science in their daily work. You will research local organisations which use science and be encouraged to visit a workplace.	the types of organisations that use science; how science is used in organisations; how health & safety regulations are used in the workplace; how the organisation impacts on the local community.
2 AS Unit	<b>Energy Transfer Systems *</b> In this joint physics and biology unit you will consider some essential knowledge regarding the uses and transfer of energy in physical and human biological systems. The unit also looks at some of the ethical issues that may be considered when diagnosing and treating illnesses.	the structure and function of the circulatory and respiratory systems; how to find out about physiological status through monitoring; the process of respiration; ethical issues relating to monitoring, diagnosis and treatment of the circulatory and respiratory systems; imaging methods used in monitoring and diagnosis; applications of energy transfer.
3 AS Unit	<b>Finding out about Substances</b> This chemistry unit explores the work of the analytical chemist and the types of work that they may undertake.	how to obtain and prepare samples for analysis; qualitative chemical analysis; volumetric analysis; chromatographic techniques; colorimetric techniques; energy changes that take place when substances react.

<p>4 AS Unit</p>	<p><b>Food Science and Technology</b></p> <p>This unit uses biological knowledge and explores the work of a food scientist, technologist and nutritionist or dietician.</p> <p>In particular, this unit considers the process of designing and preparing a new food product and some of the science that is considered.</p>	<p>the type of diet required for different client groups;</p> <p>the causes of food spoilage and methods of food preservation;</p> <p>the packaging of products;</p> <p>the labelling of products;</p> <p>legislation relating to the management of hygiene in the food industry;</p> <p>how to prepare a design brief for a product;</p> <p>making the product;</p> <p>testing the product by government agencies.</p>
<p>5 AS Unit</p>	<p><b>Choosing and Using Materials *</b></p> <p>In this unit you will learn some of the physics and chemistry required by a materials scientist and you will be given the opportunity to look at the ways materials are tested. You will learn about the structure of different materials and how their structure may be changed to make them more suitable for a particular purpose.</p>	<p>identifying the purposes for which materials are needed;</p> <p>relating the physical properties of materials to their structure;</p> <p>the different classes of materials;</p> <p>justifying the use of a particular material;</p> <p>methods for measuring physical properties;</p> <p>explaining the changes in the physical properties of modified materials in terms of their structure.</p>
<p>6 AS Unit</p>	<p><b>Synthesising Organic Compounds</b></p> <p>This unit uses knowledge of organic chemistry to look at how research chemists would work. In this unit you will learn how to synthesise organic compounds and learn some of the essential skills required by research chemists.</p>	<p>organic compounds and functional groups;</p> <p>types of chemical reaction;</p> <p>the use of spectroscopic techniques (either infrared mass spectrometry or NMR) in identifying organic compounds;</p> <p>how to make and purify organic compounds;</p> <p>how to determine yield and purity.</p>
<p>7 A2 Unit</p>	<p><b>Planning and Carrying out a Scientific Investigation</b></p> <p>In this unit (compulsory for both the A Level single and double award) you will draw on the knowledge and skills you have learned to conduct an investigation from an area of science that interests you. Many scientists carry out investigations as part of their job and you should consider the correct procedure to undertake and report on an extended investigation of your choice.</p>	<p>how to plan an investigation;</p> <p>how to carry out the investigation;</p> <p>recording and processing the data obtained;</p> <p>evaluating and drawing conclusions from the investigation;</p> <p>presenting the outcomes of the investigation.</p>

8 A2 Unit	<p><b>Medical Physics *</b></p> <p>This unit uses a variety of physics principles and applies them in a medical setting. It looks at the work undertaken in medical physics departments and the scientific techniques used.</p>	<p>how physiological measurements are indicators of health;</p> <p>the use of diagnostic techniques;</p> <p>Thermography and its uses;</p> <p>the use of X-rays;</p> <p>radiation, its uses and dangers;</p> <p>the uses of ultrasound;</p> <p>lasers and fibre optics in medicine;</p> <p>Magnetic Resonance Imaging (MRI);</p> <p>how radioisotopes, ultrasound and light are used in therapy.</p>
9 A2 Unit	<p><b>Sports Science</b></p> <p>This unit utilises biological knowledge to consider the work undertaken by coaches and physiotherapists working in sport. You will also have the opportunity to study first aid techniques.</p>	<p>health and fitness;</p> <p>sports injuries and conditions;</p> <p>first aid techniques;</p> <p>prevention of sporting injuries and conditions;</p> <p>occupations involving the application of science to sport.</p>
10 A2 Unit	<p><b>Physics of Performance Effects</b></p> <p>This unit uses essential physics principals to consider the type of work used by those designing equipment for use in theatres, concert venues and discos. You will be given the opportunity to visit a performance and assess the sound and/or lighting systems that are being used.</p>	<p>the nature of sound and its application to sound systems;</p> <p>sound control systems;</p> <p>the nature of light and its application to lighting systems;</p> <p>lighting control systems;</p> <p>evaluating a performance.</p>
11 A2 Unit	<p><b>Controlling Chemical Processes *</b></p> <p>In this chemistry unit, the essential factors about chemical reactions that contribute to the commercial preparation of chemical products are considered.</p>	<p>the industrial manufacture of chemical compounds;</p> <p>calculating quantities of substances;</p> <p>reaction conditions;</p> <p>laboratory investigations.</p>
12 A2 Unit	<p><b>The Actions and Development of Medicines</b></p> <p>This unit uses essential chemical principles to look at the type of practical work and knowledge that, for example, a pharmacologist may need and use.</p>	<p>the different categories of medicines and their actions;</p> <p>the development of a medicine;</p> <p>methods of analysing medicines.</p>

13 A2 Unit	<b>Colour Chemistry</b> This chemistry-based unit contains the type of knowledge that may be required by those working in the paint or dye industry. You will be given the opportunity to make and use some dyes and learn about the chemistry involved.	the origin of colour in dyes and pigments; the extraction of a natural (plant) dye and preparation of a synthetic dye; application of dyes to fabric; scaling up a laboratory preparation to industrial manufacture; the use of coloured pigments in oil-based paints.
14 A2 Unit	<b>The Healthy Body *</b> This unit is biology-based and in it you will learn about some of the essential knowledge that, for example, nurses and other technicians may use whilst treating patients.	how basic homeostatic mechanisms maintain a healthy body; cellular respiration; how to monitor concentrations of substances in the blood <ul style="list-style-type: none"> <li>• <i>blood pH</i></li> <li>• <i>oxygen saturation</i></li> <li>• <i>blood glucose</i></li> </ul> how a healthy diet helps to maintain a healthy body; monitoring the levels of cholesterol, vitamins and minerals in the body; the structure and function of the digestive system.
15 A2 Unit	<b>The Role of the Pathology Service</b> This unit is based around biological and biochemical knowledge and considers the role of the pathology department in a hospital. This unit explores the work of those employed in this sort of laboratory. You may be given the opportunity to visit a centre that carries out tests and reports the findings to the medical profession to help in the diagnosis of illnesses.	the role of the biochemistry department; the role of the haematology department; the role of the microbiology department; the role of the pathology department; working within the biochemistry and microbiology departments.
16 A2 Unit	<b>Ecology, Conservation and Recycling</b> This unit uses essential biological knowledge and looks at the important theme of science in conservation and recycling which is now an essential part of the work undertaken by many local councils and authorities. As part of this unit you will be given the opportunity to carry out some fieldwork and may be given the opportunity to visit a recycling scheme.	the type and populations of organisms that live in a habitat; the relationships of organisms with their physical and biological environment; environmental change and damage; managing conservation; recycling materials.

## How will I be tested?

Units marked \* are assessed by written examination lasting for one and a half hours. The examination consists of short, structured questions (Unit 5 may contain a comprehension exercise) and each paper is marked out of 80. All other units are assessed through a portfolio of evidence, (research, projects and reports that you complete throughout the course) which you must prepare with guidance from your teacher/assessor. The examined units represent one third of each qualification and the portfolio represents the remaining two thirds of each qualification.

## How will I learn?

As with other courses and subjects, your school or college will use a number of techniques to help you learn. Some will involve a formal teaching situation where you will be given, or be expected to take, notes. You will be expected to develop research skills and techniques where you will find out for yourself either by using books or the Internet. You may be asked to use local businesses and organisations as sources of information. You will almost certainly be expected to undertake a substantial amount of practical scientific work either as part of a group or by working independently. You should remember that in order to obtain the higher marks in your portfolio work, it is important that you are able to demonstrate independence in your work, be able to use your findings in order to make accurate conclusions and be able to evaluate the effectiveness of your practical work and research.

## What will this qualification lead to?

The GCE in Applied Science will prepare you for a career in the science industry or industries that use scientific knowledge and skills. It will also prepare you to take on learning and training in further and higher education. The types of courses include, for example, many science and paramedical degrees. It should be remembered that taking a GCE in a science subject does not limit you to following science courses later on. You should always seek specific advice from your school or college about the combination of subjects that may be best for your particular ambitions or career intentions.





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