





STUDENT HANDBOOK 2023-2024

Name



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1. Foreword

"Biology is the study of complicated things that have the appearance of having been designed with a purpose" – **Richard Dawkins**

Dear student of biology,

Welcome to the Science Faculty of UTC Swindon. The staff aim to offer outstanding teaching and training support that will help you develop the knowledge and skills necessary to obtain your A-level qualification and subsequent employment.

This handbook provides helpful information about the school and your course. I hope that it will be useful to you and that it will answer any of your questions.

A-level biology can be challenging, it requires a deep understanding of complex biological concepts and a mastery of scientific research methods.

However, with the right mindset when it comes to studying and an effective revision strategy, it is possible to not only excel in the subject but find a deep love of how biology works.

A-level biology covers a lot of topics including biological molecules, cell structures to plants and ecosystems. These topics are covered in depth and will often require research, but this will allow to discover many incredible things when it comes to biology.

We wish you well in your studies and hope that you have an enjoyable and productive time as a student here.



2. Key Staff & Contact Details

Name	Role	Email
Cherise Osolin	Head of KS5	cosolin@utcswindon.co.uk
Helen Curtis	Attendance Officer & Reception	hcurtis@utcswindon.co.uk
Dr Alex Shevchuk	Head of Science & A-level Physics teacher	ashevchuk@utcswindon.co.uk
Ash Olson	A-level Biology teacher	aolson@utcswindon.co.uk
Annabel Ford	A-level Chemistry teacher	aford@utcswindon.co.uk

Head of Key Stage 5 (KS5) Cherise Osolin will be able to advise on many issues about general school procedures, as well as those specific for KS5. In the event of absence, general enquiries can be made to your designated year tutor.

The Attendance Officer will be able to help with attendance related issues on the day-to-day basis.

If you are having a problem, Head of KS5 will be your first point of contact. If you would prefer, you could also always talk to someone in the pastoral team on the first floor.



3. <u>Recommendations</u>

Biology sometimes reveals its fundamental principles through what may seem at first to be arcane and bizarre Elizabeth Blackburn



Key things on the route to success in Biology:

- 1. Use past papers and marking scheme.
- 2. Read the examines report.
- 3. Use variety of paper & digital resources \rightarrow part of your independent learning to support the content delivered as part of lessons.
- 4. Maths skills are essential.
- 5. Pay attention during the biology practicals, spend time interpreting and analysing the results.



4. Expectations

Biology is the science. Evolution is the concept that makes biology unique Jared Diamond

- 1. Punctuality.
- 2. Acceptable Classroom Conduct.
- 3. Good Organisation.
- 4. Homework.
- 5. Independent Work.

OUR VISION

Transforming lives through learning

OUR MISSION

To 'transform lives through learning' by igniting confidence, expanding opportunities, energising the community and generating prosperity. R Respectful
O Organised
C Constructive
K Kind

Through <u>our Learning Philosophy</u> and core values of empowerment, enterprise, connectedness and transformation, we will provide our students and staff with a safe and supportive environment in which to thrive and become independent learners.

OUR VALUES

Empowerment, enterprise, connectedness, and transformation.

This will help you to be a more efficient and independent learner on the road to potential career in biology or related sector. Some of the potential career opportunities are shown in the diagram below.







5. Curriculum Outline

AQA UTC Swindon follows the AQA Biology A-level Specification (7401/7402). In Y12 you will study advanced areas of biology such as biological molecules, an in-depth look at cells and genetics. These topics will be taught separately and independent of each other. Practical skills will be assessed in written papers and as part of Laboratory experiments.

In Y13 we will deliver energy transfer in and between organisms, and how these organisms interact with their environments. Genetics then takes centre stage as we move towards the end of year 13.

Practical Skills will be assessed in the written papers.

The A level biology exam will cover the whole of the two-year course via three papers.

Paper 1	+	Paper 2	+	Paper 3
What's assessed		What's assessed		What's assessed
 Any content from topics 1– 4, including relevant practical skills 		 Any content from topics 5–8, including relevant practical skills 		 Any content from topics 1–8, including relevant practical skills
Assessed		Assessed		Assessed
written exam: 2 hours91 marks35% of A-level		written exam: 2 hours91 marks35% of A-level	_	written exam: 2 hours78 marks30% of A-level
Questions		Questions		Questions
 76 marks: a mixture of short and long answer questions 		• 76 marks: a mixture of short and long answer questions		 38 marks: structured questions, including practical techniques
 15 marks: extended response questions 		 15 marks: comprehension question 		 15 marks: critical analysis of given experimental data
				 25 marks: one essay from a choice of two titles



Table below shows the breakdown of topics over the course of two years.

Code	Description
3.1	Biological molecules
3.2	Cells
3.3	Organisms exchange substances with their environment
3.4	Genetic information, variation and relationships between organisms
3.5	Energy transfers in and between organisms (A-level only)
3.6	Organisms respond to changes in their internal and external environments (A-level only)
3.7	Genetics, populations, evolution and ecosystems (A-level only)
3.8	The control of gene expression (A-level only)

You can also view the detailed steps of your learning journey in the diagram below.







6. Evidence of Work

There's biology in everything, even when you're feeling spiritual. Helen Fisher

Class Work and Independent Work

Theory

You will organise your notes in a folder that you will keep in either an electronic folder or a paper folder. It's your responsibility to keep the notes and have them organised. Good organisation involves such information as **dates**, **titles** and **subtitles**, **deadlines** and sources of information.

Problem Solving

This is a crucial part of your work. Solving problems is an application of theory into practice. You are expected to solve problems in class and at home. You are expected to follow certain guidelines and structure and communicate your solution clearly with good English. Again, you can keep your solutions, worksheets & notes in a folder or have them in your exercise book.

Practical Work

This is the core of scientific method. As a student, you must organise your practical (laboratory) work and store it in a Practical folder. There you must keep your final analysis and write ups and all worksheets together. The front page of the folder will contain a check sheet so when the experiment is done it's ticked on the check sheet and feedback given by the teacher.

Study Time

It is recommended that for every hour in the classroom you spend an hour outside the classroom. You are expected to complete the end of chapter summary questions from your textbook independently. Asking for help when issues arise that can't be resolved through review of class notes or referring to the textbook is a must. In addition, you will be set independent tasks which need to be completed to deadline and will be marked and returned to you.



Biology is the most powerful technology ever created. DNA is software, protein are hardware, cells are factories. Arvind Gupta

Interim

Theory has many sources – teacher's lecture in the class, textbook or Internet – so you must be able to learn it with a required degree of understanding. It is the main principles, laws and relationships that we as teachers want to see you understand. Here the ultimate test would be your ability to apply the knowledge. Solving problems and answering examstyle questions is the application. Therefore, our day-to-day assessment could be in the form of a mini-test made up of three questions: one theory, one problem requiring a structured solution, and one exam-style question. A problem should already be known to you or be similar to a known one. The exam-style question is there to develop a habit of the method and look of the exam question as well as to give a teacher an idea if the student is on target or not.

Official External

Exams are taken once a year in May/June. You must ensure that you have sufficient time for revision at home.

Official Internal

Internal Assessment is in the form of past paper questions and will occur periodically.

Evidence of Assessment

Independent work will be set and marked on point mark basis (e.g. 36/47).

Laboratory work has a focused assessment and those will be marked against CPAC criteria.

Exams are the external indication of success of a student.

8. Guidance on Practicals

Practical work is at the heart of biology and practical assessments have been divided into those that can be assessed in written exams and those that can only be directly assessed whilst students are carrying out experiments.

A-level grades will be based only on marks from written exams.

A separate endorsement of practical skills will be taken alongside the A-level. This is assessed by teachers and will be based on direct observation of students' competency in a range of skills that are not assessable in written exams.



The assessment of practical skills is a compulsory requirement of the course of study for Alevel qualifications in biology. It will appear on all students' certificates as a separately reported result, alongside the overall grade for the qualification. These arrangements will include:

- A minimum of 12 practical activities to be carried out by each student.
- Teachers will assess students against Common Practical Assessment Criteria (CPAC).
- Each student will keep an appropriate record of their practical work, including their assessed practical activities.
- Students who demonstrate the required standard across all the requirements of the CPAC will receive a 'pass' grade.
- There will be no separate assessment of practical skills for AS qualifications.
- Students will answer questions in the A-level exam papers. These questions may draw on, or range beyond, the practical activities included in the specification.

Here is the list of Biology experiments that you will be completing as part of your course:

Code	Topic	Description
RP1	3.1.4.2	Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction
RP2	3.2.2	Preparation of stained squashes of cells from plant root tips; set- up and use of an optical microscope to identify the stages of mitosis in these stained squashes and calculation of a mitotic index
RP3	3.2.3	Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue
RP4	3.2.3	Investigation into the effect of a named variable on the permeability of cell-surface membranes
RP5	3.3.4.1	Dissection of animal or plant gas exchange system or mass transport system or of organ within such a system
RP6	3.4.4	Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial growth
RP7	3.5.1	Use of chromatography to investigate the pigments isolated from leaves of different plants, eg leaves from shade-tolerant and shade-intolerant plants or leaves of different colours
RP8	3.5.1	nvestigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts
RP9	3.5.2	Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms
RP10	3.6.1.1	Investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or maze
RP11	3.6.4.2	Production of a dilution series of glucose solution and use of colorimetric techniques to produce a calibration curve with which to identify the concentration of glucose in an unknown 'urine' sample
RP12	3.7.4	Investigation into the effect of a named environmental factor on the distribution of a given species



9. Independent Learning

Science is beautiful when it makes simple explanations of phenomena or connections between different observations. Examples include the double helix in biology and the fundamental equations of physics Stephen Hawking

Being an independent learner means having better chances for a successful career. It is all about one's ability to make the right decisions and have enough self-discipline to execute them.

UTC Swindon wants to help you become an independent learner and at the same time retain freedom of choice. To promote independent learning, we have put together some options:

We have put together the reading list and useful online resources. You can read a scientific journal article here <u>https://www.scienceopen.com</u> and explore it even further as more information and discoveries are made in the field of biology almost week. You can turn this article into your own PowerPoint presentation and have up to 5 minutes at the end of a lesson to present it to the class if you wish.

During Y12 and Y13 to help you with this aspect of independent learning you will be requested to read around the subject. You will be presented with a reading list and required to choose two books per year from it. You will then have sufficient time to read and then write a review of the book. Should you find a biology related book that is not on the list please consult with your teacher before submitting that.



Another aspect of Independent Learning is linked to the curriculum, and may I say that without this component it is going to be hard to achieve an 'A*' in biology.

If you want to become a professional, you shouldn't restrict yourself to classwork and set tasks.

You should find additional sources of information, plan more, do more and offer more in class.

You shouldn't give up on a hard question or wait for the teacher to explain everything to you.

It is hard work but success tastes sweeter in the end!

May we wish you every success in your studies of A' level biology.



10. Biology Reading list

These books cover a range of biology topics so you should be able to find one that really interests you!

The Double Helix;	James Watson
Genome;	Matt Ridley
Mutants;	Armand Marie Leroi
Adventures in Human Beings;	Gavin Francis
Oxygen, The Molecule that Made the World;	Nick Lane
The Selfish Gene;	Richard Dawkins
The Greatest Show on Earth;	Richard Dawkins
The Blind Watchmaker;	Richard Dawkins
Bad Science;	Ben Goldacre
A Short History of Nearly Everything;	Bill Bryson
Hens, Teeth and Horses Toes;	Stephen J. Gould
The Panda's Thumb;	Stephen J. Gould
Darwin's Dangerous Idea;	Daniel Dennett
The Immortal Life of Henrietta lacks;	Rebecca Skloot
The World Without Us;	Alan Weisman
Darwin and the Barnacle;	Rebecca Stott
Do No Harm;	Henry Marsh



11. Action Verbs

These action verbs indicate the depth of treatment required for a given assessment statement. These verbs will be used in examination questions and so it is important that students are familiar with the following definitions.

Define	give the precise meaning of a word or phrase as concisely as possible.
Draw	represent by means of pencil lines (add labels unless told not to do so).
List	give a sequence of names or other brief answers with no elaboration, each one clearly separated from the others.
Measure	find a value for a quantity.
State	give a specific name, value or other brief answer (no supporting argument or calculation is necessary).
Annotate	add brief notes to a diagram, drawing or graph.
Apply	use an idea, equation, principle, theory or law in a new situation.
Calculate	find an answer using mathematical methods (show the working unless instructed not to do so).
Compare	give an account of similarities and differences between two (or more) items, referring to both (all) of them throughout (comparisons can be given using a table).
Describe	give a detailed account, including all the relevant information.
Distinguish	give the differences between two or more different items.
Estimate	find an approximate value for an unknown quantity, based on the information provided and scientific knowledge.
Identify	find an answer from a number of possibilities.
Outline	give a brief account or summary (include essential information only).
Analyse	interpret data to reach conclusions.
Construct	represent or develop in graphical form.
Deduce	reach a conclusion from the information given.
Derive	manipulate a mathematical equation to give a new equation or result.
Design	produce a plan, object, simulation or model.
Determine	find the only possible answer.
Discuss	give an account including, where possible, a range of arguments, assessments of the relative importance of various factors or comparisons of alternative hypotheses.
Evaluate	assess the implications and limitations.
Explain	give a clear account including causes, reasons or mechanisms.
Predict	give an expected result.
Solve	obtain an answer using algebraic and/or numerical methods.
Suggest	propose a hypothesis or other possible answer.
Hypothesise	write a testable statement



12. Biology learning & revision resources

- Revision Content: <u>https://mmerevise.co.uk/a-level-biology-revision/</u>
- Biology Simulations: <u>https://phet.colorado.edu/en/simulations/filter?subjects=biology&type=html,prototype</u>
- Biology notes, topic questions & past papers: <u>https://www.savemyexams.co.uk/a-level/biology/</u>
- An interactive cell biology site. <u>http://www.ibiblio.org/virtualcell/index.htm</u>
- Explore the genetic code. <u>http://www.dnai.org/a/index.html</u>
- Details of the history of the best scientific discoveries. <u>https://www.nobelprize.org/educational/</u>
- The site of the scientific journal. <u>http://nature.com</u>
- Podcasts, news and interviews with scientists about recent scientific developments. <u>http://royalsociety.org</u>
- The London Natural History Museum's website with lots of interesting educational material <u>http://www.nhm.ac.uk</u>
- The website of the British Medical Journal <u>http://www.bmj.com</u>
- The BBC news page for Science and the Environment. <u>http://www.bbc.co.uk/news/science_and_environment</u>