**KS5 Biology**

Please note: the timing as to when topics are taught can only be an approximation year on year due to the 3:2 split of lessons between the A-level teachers

**Year Group 12:** Half Term 1

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| Number of Hours | Topic |
| 7 x 2 = 147 x 3 = 21 | 3.1 Biological Molecules (14 hours or 21 hours)3.2 Cells (21 hours or 14 hours) |
| As available | Revision work  |
| Reasons behind order of topic in this half term |
| * These topics are fundamental to the understanding of Biology. They are the building blocks of life and expand on ideas first covered at GCSE extended to A Level understanding.
* The Biological molecules topic first offers insight into the key carbon molecules (carbohydrates and lipids) in living organisms and the concept of monomers and polymers which contribute to metabolism in the form of catabolic (hydrolysis) and anabolic (condensation) reactions
* Cells are studied in more detail than at GCSE with the addition of extra organelles and functions which are not discussed at GCSE but are fundamental to living things and future topics of gene expression and cell function
* The use of the microscope is fundamental to understanding the structure and function of all organisms and there are several practical applications using the microscope to observe and count cells and look at cell division.
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**Year Group 12:** Half Term 2

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| Number of Hours | Topic |
| 8 x 2 = 168 x 3 = 24 | 3.1 Biological molecules continued (16 or 24 hours)3.2 Cells continued (16 or 24 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * Proteins are looked at in detail as one of the most important functional molecules in biology are a continuing theme throughout the course.
* Enzymes are studied in depth as essential catalysts in all biological reactions and experimental design of enzyme investigations is a focus of practical work.
* The second part of the cells topic looks at cell division in detail and transport across cell membranes
* Cell transport is important to many other aspects of the course such as absorption and gas exchange. There are practical investigation looking at water potential of plant tissue and factors affecting membrane permeability
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**Year Group 12:** Half Term 3

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| Number of Hours | Topic |
| 6 x 3 = 186 x 2 = 12 | 3.1 Biological molecules continued (6 hours)3.2 Cells continued (6 hours)[3.3 Organisms exchange substances with their environment](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141404) (6 or 12 hours)3.4 Genetic information, variation and relationships between organisms (6 or 12 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * The second part of the biological molecules topic focuses on nucleic acids as important information-carrying molecules and links to cell division and forms an important foundation for later topics of genetics and control of gene expression
* In addition, the smaller molecules that are not polymers including the energy currency of cells ATP, the universal biological solvent water and the importance of inorganic ions in cells is studied. These are important in future topics of diffusion, osmosis and active transport as well as osmoregulation and the kidney.
* The final part of the cells topic looks at cell recognition and the immune system and the complexities of the functions of white blood cells
* Exchange in organisms begins by looking at the relationship between [surface area to volume ratio](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141405) and absorption in living organisms and relates to cell transport
* The genetic information topic begins by looking at how DNA, genes and chromosomes are related which is important for future topics
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**Year Group 12:** Half Term 4

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| Number of Hours | Topic |
| 5 x 3 = 155 x 2 = 10 | [3.3 Organisms exchange substances with their environment](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141404) continued (10 or 15 hours)3.4 Genetic information, variation and relationships between organisms continued (10 or 15 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * [The exchange topic continues by looking at gas exchange](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141406) systems in mammals, fish, insects and plants which forms the foundation for the respiration and photosynthesis topics later on.
* The dissociation and association of oxygen with haemoglobin is examined in detail as an important aspect of gas exchange and once again for respiration which is also important for understanding muscle function
* The genetic information topic continues with protein synthesis which follows on from looking at genes and links back to DNA and cell organelles as well as laying the groundwork for a later topic on gene expression.
* It continues by looking at genetic diversity and adaptation in organisms including practical work looking at antibiotics and bacteria. This links to later topics on inheritance and evolution.
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**Year Group 12:** Half Term 5

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| Number of Hours | Topic |
| 5 x 3 = 155 x 2 = 10 | [3.3 Organisms exchange substances with their environment](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141404) continued (10 or 15 hours)3.4 Genetic information, variation and relationships between organisms continued (10 or 15 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * [The exchange topic then looks at digestion and absorption](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141407) which links in with the previous topics of enzymes and exchange
* [The final part of the exchange topic looks at mass transport](file:///C%3A%5CDocuments%5CA%20level%202015%5CAS%20%26amp%3B%20Year%201%5CSOW%5CAS%20Biology%20Scheme%20of%20work%20from%202015.docx#_Toc413141408) in mammals and plants which also includes a heart dissection to develop skills
* The genetic information topic continues looking at genetic diversity and adaptation and statistical analysis of data which is essential for the populations and genetics topics
* It continues by looking at species and taxonomical relationships which links to the evolution topic and biodiversity within the environment
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**Year Group 12:** Half Term 6

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| Number of Hours | Topic |
| 7 x 3 = 217 x 2 = 14 | 3.5 Energy transfers in and between organisms (14 or 21 hours)3.7 Genetics, populations, evolution and ecosystems (14 or 21 hours) |
| As available | Revision Work |
| Reasons behind order of topic in this half term |
| * The first part of the energy transfers topic looks at energy flow through ecosystems and is a preparation for the respiration and photosynthesis topics
* It continues with nutrient cycles and looks at the cycling of carbon, nitrogen and phosphorus which links back to the biological molecules topic and links to respiration and photosynthesis.
* The populations topic looks at populations in ecosystems which follows on from the biodiversity topic and looks at how to study the distribution of organisms in an environment including a practical investigation with statistical analysis
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**Year Group 13:** Half Term 1

|  |  |
| --- | --- |
| Number of Hours | Topic |
| 7 x 3 = 217 x 2 =14 | 3.5 Energy transfers in and between organisms continued (14 or 21 hours)3.7 Genetics, populations, evolution and ecosystems continued (14 or 21 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * Energy transfers continues by looking at the process of photosynthesis in detail which follows on from nutrient cycles and plant mass transport and gas exchange
* Photosynthesis includes two investigations including chromatography of leaf pigments and dehydrogenase activity in chloroplasts
* The genetics topic continues by looking at monohybrid and dihybrid inheritance as well as epistasis and autosomal linkage and focuses on the chi squared analysis of genetic ratios following on from DNA and protein synthesis
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**Year Group 13:** Half Term 2

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| --- | --- |
| Number of Hours | Topic |
| 8 x 3 = 248 x 2 = 16 | 3.5 Energy transfers in and between organisms continued (10 or 18 hours)3.6 Organisms respond to changes in their internal and external environments (6 hours)3.7 Genetics, populations, evolution and ecosystems continued (16 or 24 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * Energy transfers then looks at respiration in detail which also follows on from nutrient cycles and mass transport and gas exchange in animals and links into muscles and movement. This includes an investigation into factors affecting rate of respiration in single-celled organisms
* The organisms’ responses topic starts by looking at how stimuli, both internal and external are detected and lead to a response. This includes an investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or a maze.
* The genetics topic continues by looking at how populations change over time by selection and how Hardy-Weinberg can predict allele ratios
* This follows by looking at how evolution by selection may lead to speciation over time which links back to the topic of species and taxonomy
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**Year Group 13:** Half Term 3

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| Number of Hours | Topic |
| 6 x 3 = 186 x 2 =12 | 3.6 Organisms respond to changes in their internal and external environments (12 or 18 hours)3.8 The control of gene expression (12 or 18 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * The organisms’ response topic continues by looking at neurones and nervous coordination including neurotransmitters and neuromuscular junctions
* This leads into explaining how skeletal muscles are stimulated to contract by nerves and act as effectors. This also involves looking at the contraction of muscles involving proteins and ATP as studied in biological molecules.
* The control of gene expression looks at alteration of the sequence of bases in DNA can alter the structure of proteins which links back to DNA and protein synthesis
* This leads into how gene expression is controlled by a number of features and the science of epigenetics and cancer
* Finally the use of genome projects to discover more about genes, their expression and personalised medicine
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**Year Group 13:** Half Term 4

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| --- | --- |
| Number of Hours | Topic |
| 5 x 3 = 155 x 2 = 10 | 3.6 Organisms respond to changes in their internal and external environments continued (10 or 15 hours)3.8 The control of gene expression continued (10 or 15 hours) |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * The final part of the response topic looks at how homeostasis is the maintenance of a stable internal environment including kidney structure and function and the principles of diffusion, osmosis and active transport. This includes the production of a dilution series of a 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
* The final part of the gene expression topic looks at how gene technologies allow the study and alteration of gene function allowing a better understanding of organism function and the design of new industrial and medical processes. This draws on all of the information from throughout the course on genes and gene expression.
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**Year Group 13:** Half Term 5

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| --- | --- |
| Number of Hours | Topic |
| 5 x 3 = 155 x 2 = 10 | Synoptic essay writing skills and practiceExam technique and practice including synoptic paper skillsRevision |
| As available | Revision work |
| Reasons behind order of topic in this half term |
| * Once all of the course has been covered it is possible to begin practising the synoptic essay from paper 3 of the exam. Although smaller essays are practised throughout the course it is not until all topics have been covered that essay titles from exam papers can be written.
* By looking at structure, planning and mark schemes students are given lots of practice at writing and marking essays.
* In addition to revision of all topics from the course, students get a chance to look at the sort of questions that occur on synoptic paper 3.
* Different skills required in exam questions are also looked at especially data analysis and mathematical questions which students find more difficult.
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