KS5 Long Term Plan
Subject: Biology
Exam Board: AQA

Curriculum Statement of Intent

We encourage Biology students at St Paul's to develop an understanding and appreciation for the wonder of life that surrounds them. We offer a supportive yet challenging environment with varied opportunities to explore the natural world through research, group experiments and enquiry-lead learning, preparing our students for life in an increasingly scientific and technological world today and in the future.

Our KS5 biology curriculum will allow:

- All students to acquire the knowledge, understanding (recall and use), and the skills in biology to achieve their full academic potential. ***Achieving Excellence***
- Whilst working scientifically all our students to become more confident and competent in their scientific reasoning, problem solving, mathematical and practical skills.
- Students to become independent, resilient, confident, articulate and collaborative learners.
- The understanding of how society makes decisions about scientific issues and how sciences contribute to the success of the economy and society.
- Develop their interest in and enthusiasm for biology, including an interest in further study and/or a career associated with biology

Statement of Implementation

- In Year 12, students have 6 x 50 minute lessons per week, 3 lessons with each specialist teacher.
  In Year 13, students have 7 x 50 minute lessons per week split between the two specialist teachers.
- The biology curriculum has been sequenced to build upon previous learning. This sequencing ensures students are fully prepared for their mocks, PPEs and public exams, so that they can achieve their full potential.
- The AQA biology specification is divided into 8 Units delivered across the two years between two specialist teachers. It is broken down into units of teaching, with each unit lasting approximately half a term.
- Each unit is assessed at the end of the teaching block via end of topic tests, which include interleaved questions from previous units of teaching, ensuring that the students are regularly revisiting previous learning. The end of unit tests mirror the nature of the final examinations.
- Assessment outcomes are used to identify and where necessary take the appropriate action to maximise all student progress/attainment.
- Students are set weekly homework and independent tasks, for their directed studies lesson.
- All students must carry out 12 required practicals through the duration of the course. Each practical is associated with a particular CPACs. The Required Practical's are completed in Lab Books, which include exam style questions to help prepare them for both internal and external assessments. Successful completion of all CPACs leads to the Practical Endorsement qualification.
- Students are explicitly taught about the assessment objectives, command words and types of exam questions in order to create confidence, independence, and resilience with regards to preparation for the exams.
- In order for students to acquire, retain and use a comprehensive knowledge base and demonstrate the skills associated with working scientifically, teachers will:
  - Use PLCs, interleaving, knowledge tests, 20 mark pop quizzes, 5 markers, and Rosenshine's Principles to ensure students can recall and use their knowledge and understanding of the specification content.
  - Model the connections between the scientific theory, principles and applications.
  - Through scientific enquiry they will learn to question and use laboratory resources and equipment, obtaining data, drawing conclusions, analysing the data and evaluating the limitations of the evidence
  - Encourage students to develop their own viewpoint about scientific developments, science ethics, articulate advantages and disadvantages, through research, debate and discussion.

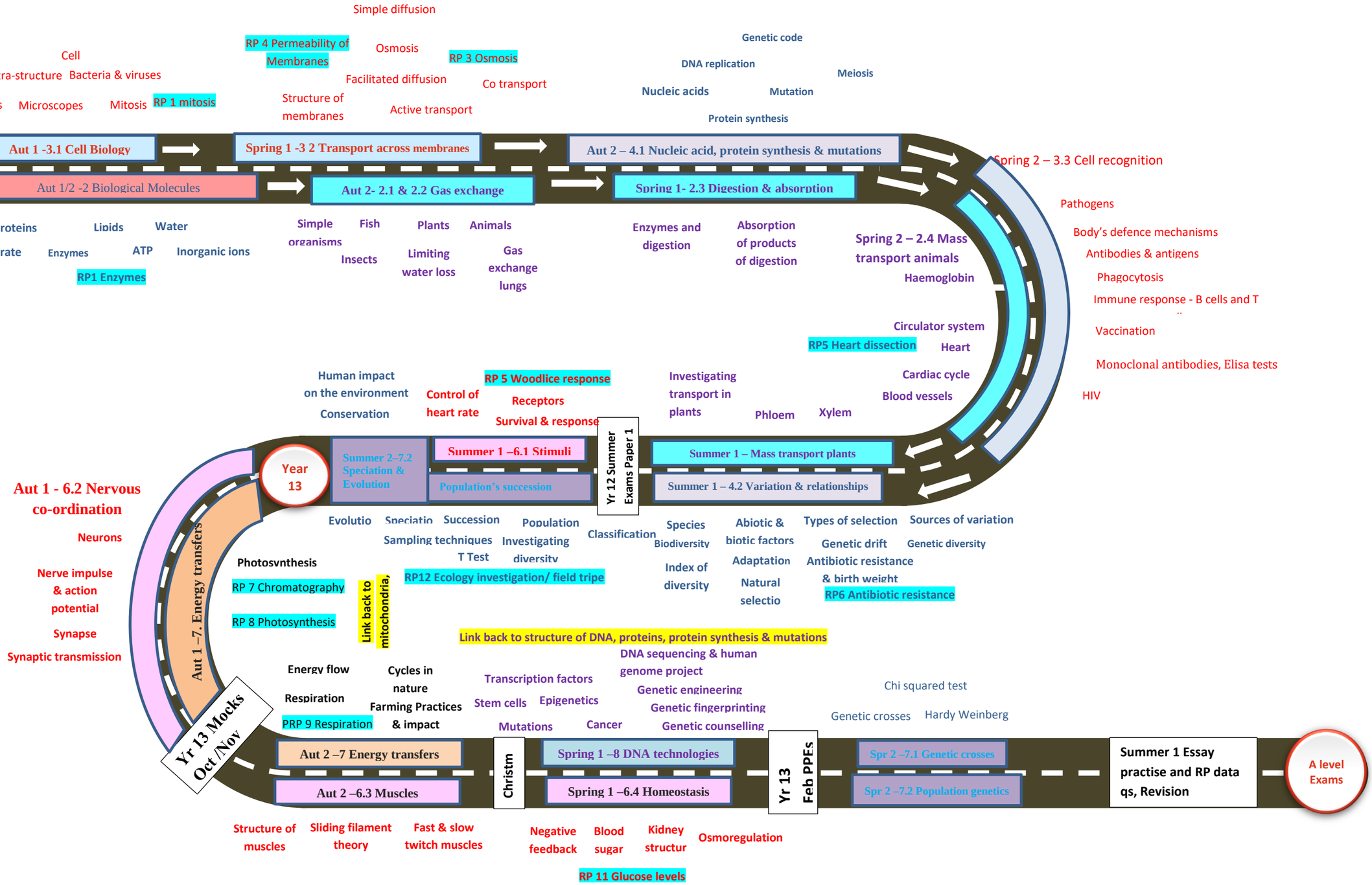
A level Biology Long Term Plan September
YEAR 12

Year 12 September	Teacher 1 12B SKE 12D KOA		Teacher 2 12B JWA 12D RDA	
	Topics	**Assessment**	**Topics**	**Assessment**
Autumn 1 21 lessons including all assessments	**Biological molecules 3.1** carbohydrates, lipids, protein structure and food tests	Joint progress test. Knowledge test End of section	**Cells 3.2.** Microscopes, cell structure & mitosis Required practical 2	Joint progress test. Required practical 2 Knowledge test End of section
Autumn 2 21 lessons including all assessments	**Biological molecule 3.1** Enzymes Required practical 1 Water, mineral ions & ATP Start exchange 3.3	2 x 20 mark pop tests Required practical 1 Knowledge test Interleaved test	**Cell membranes 3.2** Transport across membranes Required practical 3 & 4	Required practical 3 & 4 2 x 20 mark pop tests Knowledge test Interleaved test
Spring 1 18 lessons including all assessments	**Exchange 3.3** Gas exchange, digestion & absorption	2 x 20 mark pop tests Knowledge test Interleaved test	**Nucleic Acids 3.1 & 3.4** Structure of nucleic acids, DNA replication, protein synthesis, meiosis and mutations	2 x 20 mark pop tests Knowledge test Interleaved test
Spring 2 18 lessons including all assessments	**Exchange 3.3** Mass transport Required practical 5	Required practical 5 2 x 20 mark pop tests Knowledge test Interleaved test	**Cell membranes 3.2** Cell recognition & immune response	2 x 20 mark pop tests Knowledge test Interleaved test
Summer 1 18 lessons including all assessments	**Response 3.6** Survival and response Receptors, control of heart rate	2 x 20 mark pop tests Knowledge test Interleaved test	**Genetic diversity 3.4** Variation, diversity, adaptation and classification Field work techniques	2 x 20 mark pop tests Knowledge test Interleaved test
Summer 2 18 lessons including all assessments & exams	Required practical 10: Choice chamber 2L **Populations 3.7.3** Species, population, habitat, niche, community, ecosystems, biotic & abiotic factors, carrying capacity, competition & predation, succession. 5 L *Some of this unit already been taught in Unit 4*	2 x 20 mark pop tests Required practical 10	**Evolution may lead to speciation 3.7.4** Genetic diversity, gene pool, natural selection, selection types, evolution & speciation. Genetic drift & founder effect. Measuring population size 9L *Some of this unit already been taught in Unit 4*	2 x 20 mark pop tests Required practical 12
Field Trip, write up & Required Practical 12 – Completed by end of term across both teachers' lessons.				
Year 12 Exams End of June beginning of July fitting around GCSE & A level Exams – Full Paper 1 A level				

A level Biology Schedule September
YEAR 13

Year 13	Teacher 1 13B KOA 3 periods per week to all biologists	Teacher 2 13A JWA 4 periods per week 13B RDA 4 periods per week

Autumn 1 21 lessons including all assessments	**Topics** Complete 3.6.1.1 Tropisms and IAA Plus Taxes and Kinesis (9L) 3.6.1 Reflex Actions (3L) 3.6.1.2 Response Structure and function of a Pacinian corpuscle, eye - rods & cones (3L)	**Assessment** 1 x 20 mark pop test Required practical 11 Knowledge test week beginning End of section test week beginning Required practical 11	**Topics** Recap population genetics 3.7.3 & 3.7.4 Recap and revise (4L) **Energy 3.5** Respiration, photosynthesis &	**Assessment** Knowledge test End of section test on 3.4 & 3.7. Start Essay Writing
Yr 13 Mock Exams - November				
Autumn 2 14 lessons including all assessments	Complete 3.6.1 3.6.1.3 control of heart rate (6L) Then start Response	2 x 20 mark pop tests Knowledge test 3.6.1 & 3 Interleaved test	**Complete 3.5** Required practical's 7, 8 & 9 Energy flow through ecosystem Nutrient cycles (11L Max)	2 x 20 mark pop tests Required practical's 7 & 8 Knowledge test 3.5 Interleaved test
Spring 1 18 lessons including all assessments	**Response 3.6.2** Nervous co-ordination and muscles **Response 3.6.4** Homeostasis (15L Max) Complete by PPES	2 x 20 mark pop tests Knowledge test 3.6. 2 & 4 Interleaved test	**Gene Technology 3.8** (15L Max) Complete by PPES	2 x 20 mark pop tests Knowledge test 3.8 Interleaved test
Yr 13 PPEs February/March Full paper 1 & 2 Plus essay				
Spring 2 12 lessons including all assessments	**Genetics 3.7.1** Crosses including chi squared and Harvey Weinberg (12L)	Knowledge test 3.7.1 interleaved test	**Genetics 3.7.2. 3 & 4** **Population genetics,** populations, adaptation succession, speciation and evolution. Recap. (6L)	Essays 1 per fortnight Knowledge test3.7.3 & 4 interleaved test
Summer 1	**Revision** Holistic approach covering: Biological molecules 3.1, Exchange, 3.3, Response, 3.6 Essay writing	3 x Interleaved tests & **Full paper 3 mock**	**Revision** Holistic approach covering: Cells 3.2, Nucleic acids and diversity, 3.4, Energy 3.5, Genetics 3.7 and Gene technologies 3.8 Essay writing	3 x Interleaved test & **Full paper 3 mock**
	Revision – • Essay writing 25 marks per essay • lots of 5/6 mark extended writing questions • Application / data questions • Sit full mock papers 1, 2 & 3 straight after Easter week			


Year 12
T1 3p
T2 3p
Aut 1 -3.1 Cell Biology
Aut 1/2 -2 Biological Molecules
Spring 1 -3 2 Transport across membranes
Aut 2- 2.1 & 2.2 Gas exchange
Aut 2 – 4.1 Nucleic acid, protein synthesis & mutations
Spring 1- 2.3 Digestion & absorption
Spring 2 – 2.4 Mass transport animals
Spring 2 – 3.3 Cell recognition
Cell
Cell ultra-structure
Bacteria & viruses
Studying cells
Microscopes
Mitosis
RP 1 mitosis
Simple diffusion
RP 4 Permeability of Membranes
Osmosis
RP 3 Osmosis
Facilitated diffusion
Co transport
Structure of membranes
Active transport
Genetic code
DNA replication
Meiosis
Nucleic acids
Mutation
Protein synthesis
Polymer
Proteins
Lipids
Water
Carbohydrate
Enzymes
ATP
Inorganic ions
RP1 Enzymes
Simple organisms
Fish
Insects
Plants
Animals
Limiting water loss
Gas exchange lungs
Enzymes and digestion
Absorption of products of digestion
Haemoglobin
Pathogens
Body's defence mechanisms
Antibodies & antigens
Phagocytosis
Immune response - B cells and T
Vaccination
Monoclonal antibodies, Elisa tests
HIV
Circulator system
RP5 Heart dissection
Heart
Cardiac cycle
Blood vessels
Human impact on the environment
Conservation
Control of heart rate
RP 5 Woodlice response
Receptors
Survival & response
Investigating transport in plants
Phloem
Xylem
Yr 12 Summer Exams Paper 1
Year 13
Summer 2–7.2 Speciation & Evolution
Summer 1 –6.1 Stimuli
Population's succession
Summer 1 – Mass transport plants
Summer 1 – 4.2 Variation & relationships
Evolutio
Speciatio
Succession
Sampling techniques
T Test
Population
Investigating diversity
Classification
Species
Biodiversity
Index of diversity
Abiotic & biotic factors
Adaptation
Natural selectio
Types of selection
Genetic drift
Antibiotic resistance & birth weight
RP6 Antibiotic resistance
Sources of variation
Genetic diversity
Aut 1 - 6.2 Nervous co-ordination
Neurons
Nerve impulse & action potential
Synapse
Synaptic transmission
Aut 1 –7. Energy transfers
Photosynthesis
RP 7 Chromatography
RP 8 Photosynthesis
Link back to mitochondria,
RP12 Ecology investigation/ field tripe
Link back to structure of DNA, proteins, protein synthesis & mutations
Energy flow
Respiration
PRP 9 Respiration
Cycles in nature
Farming Practices & impact
Transcription factors
Stem cells
Epigenetics
Mutations
Cancer
DNA sequencing & human genome project
Genetic engineering
Genetic fingerprinting
Genetic counselling
Chi squared test
Genetic crosses
Hardy Weinberg
Yr 13 Mocks Oct /Nov
Aut 2 –7 Energy transfers
Aut 2 –6.3 Muscles
Christm
Spring 1 –8 DNA technologies
Spring 1 –6.4 Homeostasis
Yr 13 Feb PPEs
Spr 2 –7.1 Genetic crosses
Spr 2 –7.2 Population genetics
Summer 1 Essay practise and RP data qs, Revision
A level Exams
Structure of muscles
Sliding filament theory
Fast & slow twitch muscles
Negative feedback
Blood sugar
Kidney structur
Osmoregulation
RP 11 Glucose levels

Summary of A level Biology - AQA A - Level Biology (7402) https://filestore.aqa.org.uk/resources/biology/specifications/AQA-7401-7402-SP-2015.PDF HT1.

Year 12 – Paper 1

Section 1 Biological Molecules

1.1 Monomers and polymers
1.2 Carbohydrates
1.3 Lipids
1.4 Proteins
• 1.4.1 Proteins – general structure of proteins
• 1.4.2 Enzymes – structure and how they work
  - Factors affecting enzyme activity
  - Enzyme inhibition

1.5 Nucleic acids are important information-carrying molecules
• 1.5.1 Structure of DNA and RNA
• 1.5.2 DNA replication
1.6 Energy and ATP
1.7 Water
1.8 Inorganic ions
Required practical 1 - Enzymes

Section 3 Organisms exchange substances with their environment

3.1 Surface area to volume ratio
3.2 Gas exchange
- Gas exchange in single-celled organisms and insects
- Gas exchange in fish
- Gas exchange in the leaf of a plant
- Limiting water loss
- Structure of the human gas exchange system
- The mechanism of breathing
- Exchange of gases in the lungs

3.3 Digestion and absorption
- Enzymes and digestion
- Absorption of the products of digestion

3.4 Mass transport
.3.4.1 Mass transport in animals
- Haemoglobin
- Transport of oxygen by haemoglobin
- Circulatory system of a mammal
- The structure of the heart
- The cardiac cycle
- Blood vessels and their functions

Required practical 5 – Heart dissection
3.4.2 . Mass transport in plants
- Transport of water in the xylem
- Transport of organic molecules in the phloem
- Investigating transport in plants

Section 2 Cells

2.1 Cell structure
- 2.1.1 Structure of eukaryotic cells
  Cell specialism and organisation
- 2.2.2 Structure Prokaryotic cells, bacteria & viruses
- 3.2.3 Methods of studying cells
  Microscopic measurements and calculations
  The electron microscope

2.2 All cells arise from other cells
The cell cycle
Mitosis
Binary fission in bacteria
How viruses reproduce
Required practical 2 – Mitosis
2.3 Transport across membranes
- Structure of the cell surface membrane
- Diffusion
- Osmosis
- Active transport
- Co-transport

Required practical 3 – Osmosis
Required practical 4 – Membrane structure
3.3 Cell recognition and response
- Antibodies & antigens
- Phagocytosis
- T-Lymphocytes & cell mediated immunity
- B-Lymphocytes & humoral immunity
- Vaccination
- Monoclonal antibodies, Elisa tests
- Human Immunodeficiency virus (HIV)

Section 4 Genetic Information, variation and relationships and Genes

4.1 DNA, genes and chromosomes
4.2 DNA and protein synthesis
- The structure of RNA – mRNA & tRNA
- Protein synthesis – transcription & splicing
- Protein synthesis – translation

4.3 Genetic diversity can arise as a result of mutation or during meiosis
4.4 Genetic diversity and adaptation
- Types of selection
- Adaptation & Natural selection

Required practical 6 – Antibiotic resistance
4.5 Species and taxonomy
4.6 Biodiversity within a community
4.7 Investigating diversity

Year 13 – Paper 2

Section 6 Organisms respond to changes in their internal and external environments

6.1 Stimuli, both internal and external, are detected and lead to a response
• 6.1.1 Survival and response
Required practical 10 – Woodlice response
• 6.1.2 Receptors
• 6.1.3 Control of heart rate
6.2 Nervous coordination
• 6.2.1 Nerve impulses
• 6.2.2 Synaptic transmission
6.3 Skeletal muscles are stimulated to contract by nerves and act as effectors
• Structure of muscles
• Sliding filament theory
• Fast and slow twitch

6.4 Homeostasis
• 6.4.1 Principles of homeostasis and negative feedback
• 6.4.2 Control of blood glucose concentration
• 6.4.3 Control of blood water potential
Required practical 11 – Glucose concentration

Section 7 Genetics, populations, evolution and ecosystems

7.1 Inheritance
• Genetic crosses
• Chi squared test

7.2 **Populations**
• Gene frequency
• Hardy–Weinberg

7.3 Evolution may lead to speciation
• Variation in population size due to competition, predation & disease
• Selection types & genetic drift
• Adaptation, natural selection & evolution
• Allopatric and sympatric speciation.

7.4 Evolution, speciation & population
Sampling techniques
• Effect of biotic and abiotic factors
• Sampling techniques
• T-Test
• Succession
• Conservation of habitats

Required practical 12 – Investigation into the effect of a named environmental factor on the distribution of a given species.

Section 5 Energy transfers in and between organisms

• 5.1 Photosynthesis
Required practical 7 – Chromatography
Required practical 8 - Photosynthesis
• 5.2 Respiration
Required practical 9 - Respiration
• 5.3 Energy and ecosystems
• 5.4 Nutrient cycles
  - Nitrogen
  - Phosphorous cycle
  - Eutrophication
  - Use of natural and artificial fertilisers
  - Impact of farming practices

Section 8 The control of gene expression

8.1 Alteration of the sequence of bases in DNA can alter the structure of proteins - mutations
8.2 Gene expression is controlled by a number of features
8.2.1 Most of a cell's DNA is not translated – stem cells
8.2.2 Regulation of transcription and translation
- Epigenetics
- Acetylation and methylation
- Transcription factors eg oestrogen
- Interference RNA

8.23 Gene expression and cancer
8.3 Using genome project
DNA sequencing & human genome project
8.4 Using genome projects
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
Section
8.4.1 Recombinant DNA technology
- Genetic engineering
- PCR reaction

8.4.2 Differences in DNA between individuals of the same species can be exploited for identification and diagnosis of heritable conditions
Genetic screening & counselling
8.4.3 Genetic fingerprinting

PAC Tracker Matching Lab Books – Extra CPACs

		1. Investigation into the effect of a named variable on the rate of an enzyme-controlled reaction	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	3. Production of a dilution series of a solute to produce a calibration curve with which to identify the water potential of plant tissue	4. Investigation into the effect of a named variable on the permeability of cell-surface membranes	5. Dissection of animal or plant gas exchange or mass transport system or of organ within such a system	6. Use of aseptic techniques to investigate the effect of antimicrobial substances on microbial growth	7. 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	8. Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts	9. Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms	10. Investigation into the effect of an environmental variable on the movement of an animal using either a choice chamber or a	11. Production of a dilution series of a glucose solution and use of colorimetric techniques to produce a calibration curve	12 Investigation into the effect of a named environmental factor on the distribution of a given species	Total opportunities	Total opportunities passed
1. Follows written procedures	1a	X	X			X		X				X		5	
2. Applies investigative approaches and methods when using instruments and equipment	2a			X		X		x				X	x	5	
	2b	X	x			X		X				x	x	6	
	2c				x				x	x			X	4	
	2d				x				x	x			x	4	
3. Safely uses a range of practical equipment and materials	3a	x	X			x	x		x	x			X	7	
	3b	x	X			X	X		X	X			x	7	
4. Makes and records observations	4a	X	X	x			X		x	x	x	X	x	9	
	4b			x			x		X	X	X	x	x	7	
5. Researches, references and reports	5a				X		X		x	x			X	5	
	5b				X		X		x	x			X	5	

Year 12 - A Level Biology Student Tracking Sheet

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Working Average %						
Working at grade						

Unit / Topic	% and grade	What I need to work on
Bridging Test 1		
Bridging test 2		
Biological molecules		
Cell biology		
Gas exchange		
Transport across membranes		
Digestion & absorption		
Nucleic acids, protein synthesis & mutations		
Mass transport		
Cell recognition & immune response		
Variation & relationships		
End Yr. 12 Exam		

Year 13 - A Level Biology Student Tracking Sheet

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Working Average %						
Working at grade						

Unit / Topic	% and grade	What I need to work on
Response to stimuli		
Population Genetics		
Mock Exam Yr 13		
nervous system & muscles		
Respiration & Photosynthesis		
Cycles & Energy		
Homeostasis		
PPE Exam Yr 13		
Gene Technologies		
Genetics		
Exam s Easter		