



*Inspiring excellence, empowering global minds*



## Course Outline

### *Biology Year 13 (A level Edexcel)*

## Overview

The Biology Syllabus at GEMS Wesgreen International Secondary School aims to develop well rounded biologists who can not only explain complex theoretical concepts but can investigate them practically for themselves. Investigative skills and techniques are at the heart of biology at Wesgreen International and we have embedded frequent opportunities for our learners to develop these at all stages of the curriculum. Throughout the year we will build upon prior knowledge and challenge students to work independently and autonomously, be resilient and have the confidence and determination to overcome significant challenges.

## Learning Outcomes

The aims of the Biology Syllabus are to:

- arouse learners' curiosity in biology and by extension the natural world enabling them to use scientific ideas to explain physical phenomena, fostering a deeper understanding and appreciation of biology in their everyday lives.
- Develop student scientific knowledge by building progression atop core ideas from KS2 throughout KS3 & KS4 via logical sequencing of the curriculum.
- Provide students the opportunities to work scientifically through experimentation, data analysis, making inferences and drawing conclusions in line with results.
- Develop students critical thinking skills enabling them to make logical and informed decisions based on information presented to them.
- Develop student understanding of the relationship between mathematical concepts and scientific ideas.
- Develop independent, resilient, and reflective learners through self-study, adequate challenge, and personalized feedback.
- To equip learners with the skills and understanding they need to be scientifically literate citizens and to pursue the study of chemical sciences at higher levels should they so wish.

## Topic Overviews

### Term 1

#### Unit 4: Energy, Environment, Microbiology and Immunity

##### Topic 5 – Energy Flow, Ecosystems and the Environment

Approximate length: 40 hours

- the need for energy in living organisms
- relative energy values of carbohydrates, lipids, and proteins as respiratory substrates
- simple respirometers investigation
- glycolysis and Krebs' cycle
- role of NAD and FAD in transferring hydrogen to carriers in the inner mitochondrial membrane
- oxidative phosphorylation.
- anaerobic respiration
- investigations using redox indicators, including DCPIP and methylene blue
- investigations to determine the effect of temperature on the rate of respiration.
- structure of chloroplasts
- absorption spectrum
- investigation for effect of light intensity, light wavelength, temperature and availability of carbon dioxide on the rate of photosynthesis using a suitable aquatic plant
- relation between NPP, GPP and R
- population, community, habitat and ecosystem
- using quadrats and transects
- factors leading to climate change
- investigating effect of temperature on growth of organism
- allopatric and sympatric speciation

##### Topic 6 – Microbiology, Immunity and Forensics

Approximate length: 25 hours

- culturing of microorganisms
- growth rate of microorganisms
- infection cycle of M.Tb and HIV
- specific and non-specific body responses to pathogens
- role of microorganisms in decomposition
- gel electrophoresis for separating DNA fragments

## Term 2

### Unit 5: Respiration, Internal Environment, Coordination and Gene Technology

#### Topic 7 - Respiration, Muscles and the Internal Environment

Approximate length: 45 hours

- enzymatic reaction of respiration
- Krebs' cycle
- investigation for respiration in yeast
- structure of mammalian skeletal muscle
- cardiac muscles - myogenic nature
- cardiac output
- investigating effect of exercise on tidal volume, breathing rate, respiratory minute ventilation, and oxygen consumption using data from spirometer traces
- structure of mammalian kidney
- DNA transcription

## Term 3

### Unit 5: Respiration, Internal Environment, Coordination and Gene Technology

#### Topic 8 - Topic 8 - Coordination, Response and Gene Technology

Approximate length: 15 hours

- structure and function of neurones
- spinal cord, reflex arc, synapse, acetylcholine neurotransmitter transmission
- effect of drug on neurotransmitter transmission
- investigating habituation of a stimulus
- coordination in animals through nerves and hormones
- parts of the brain
- MRI, PET, CT scans
- DNA production and role of DNA ligases
- Bioinformatics

Following the conclusion of all the above topics, for the remainder of the academic year prior to the Edexcel GCSE examinations, students will be revising content from throughout the biology syllabus, the sequence will be determined by highlighting any gaps in knowledge and misconceptions identified during lessons and the mock examination series.

## Assessment

**Formative:** Throughout the chapters, the students will complete end of chapter assessments, quizzes and problem-solving activities which will allow the teacher to assess the students' progress and inform their planning.

**Summative:** At the end of each term, we will complete internal assessments which will be based on certain chapters.