1. Cell biology

Weeks 1–4

细胞生物学

They should be able to

1. Describe plant, animal and bacterial cells, naming structures and their functions.
2. Relate specialised cells' structures to their functions.
3. Explain the importance of cell differentiation.
4. Calculate magnification, real size and image size, with standard form and prefixes.
5. Describe aseptic technique with reasons, bacterial division counts and zone areas (biology only).
6. Describe chromosomes and their pairing in body cells.
7. Describe the cell cycle including the three overall stages and mitosis.
8. Describe stem cell function in embryos, adult animals and plant meristems.
9. Evaluate stem cell use in medicine and plant cloning, including risks and ethical objections.
10. Define diffusion, osmosis and active transport with examples and the energy distinction.
11. Explain factors affecting the rate of diffusion.
12. Calculate and compare surface area to volume ratios; explain exchange-surface adaptations.
13. Investigate the effect of solute concentration on plant tissue mass and calculate percentage change (RP3).

Stage	Use	Your notes
Starter 10 min · retrieval practice	Topic quiz 01 (10 questions, answers on sheet 2)	
Teach the new content	Handout 01 Slide deck 01 Vocabulary list 01	
Practice guided then independent	Exercise sheets 1.1, 1.2, 1.3 Past-paper sheets 1.1, 1.2, 1.3	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	

2. Organisation

Weeks 5–9

组织结构

They should be able to

1. Order cells, tissues, organs, organ systems and organisms.
2. Describe enzyme nature and lock-and-key action; relate activity to temperature and pH.
3. Recall sites and actions of amylase, proteases and lipases, with word equations.
4. Explain bile's two functions; test foods (RP4) and investigate pH on amylase (RP5).
5. Describe the heart and double circulation with the five named vessels and the pacemaker cells.
6. Relate artery, vein and capillary structure to function.
7. Know plasma, red cells, white cells and platelets with their adaptations.
8. Explain CHD and evaluate stents, statins, valves, transplants and artificial hearts.
9. Define health and describe interactions between diseases and other factors.
10. State risk factors with proven causal mechanisms for non-communicable diseases.
11. Distinguish benign and malignant tumours and describe secondary tumours.
12. Interpret risk-factor data, distinguishing correlation from causation.
13. Relate plant tissues (epidermis, palisade, spongy, xylem, phloem, meristem, guard cells) to functions.
14. Explain root hair, xylem and phloem adaptations and the processes of transpiration and translocation.
15. Explain the effects of temperature, humidity, air movement and light intensity on transpiration rate.

Stage	Use	Your notes
Starter 10 min · retrieval practice	*nothing in the Library for this stage yet*	
Teach the new content	Handout 02 Slide deck 02 Vocabulary list 02	
Practice guided then independent	Exercise sheets 2.1, 2.2, 2.3, 2.4 Past-paper sheets 2.1, 2.2, 2.3, 2.4	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	

3. Infection and response

Weeks 10–12

感染与免疫反应

They should be able to

1. Explain how viruses, bacteria, protists and fungi spread in animals and plants, and how spread is reduced.
2. Recall measles, HIV, TMV, Salmonella, gonorrhoea, rose black spot and malaria with pathogen type, spread, symptoms and control.
3. Describe the non-specific defence systems and the three white blood cell actions.
4. Explain vaccination in the individual and its population effect.
5. Distinguish antibiotics from painkillers; explain why antibiotics cannot treat viruses; describe resistance.
6. Describe drug discovery sources and the preclinical/clinical testing stages including double-blind trials.
7. Describe hybridoma production of monoclonal antibodies.
8. Describe uses in diagnosis, measurement, research and cancer treatment.
9. Detect plant disease from signs and identify it by manual, laboratory or monoclonal tests.
10. Explain nitrate and magnesium ion deficiencies.
11. Describe physical, chemical and mechanical plant defence responses.

Stage	Use	Your notes
Starter 10 min · retrieval practice	*nothing in the Library for this stage yet*	
Teach the new content	Handout 03 Slide deck 03 Vocabulary list 03	
Practice guided then independent	Exercise sheets 3.1, 3.2, 3.3, 3.4 Past-paper sheets 3.1, 3.2, 3.3, 3.4	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	

4. Bioenergetics

Weeks 13–15

生物能量学

They should be able to

1. Write the photosynthesis word and symbol equations, and describe it as endothermic.
2. Explain how light intensity, CO2 concentration and temperature limit the rate of photosynthesis, including interpreting limiting-factor graphs.
3. (HT) Use the inverse-square relation between light intensity and distance, and reasons for greenhouse economics.
4. Describe RP6: light intensity and the rate of photosynthesis with pondweed, its controls and the rate calculation.
5. Name five uses of glucose from photosynthesis.
6. Compare aerobic and anaerobic respiration in muscle and yeast, with word equations, and fermentation's economic importance.
7. Explain the body's response to exercise and (HT) oxygen debt and the liver's role.
8. Define metabolism and list the reactions it includes.

Stage	Use	Your notes
Starter 10 min · retrieval practice	*nothing in the Library for this stage yet*	
Teach the new content	Handout 04 Slide deck 04 Vocabulary list 04	
Practice guided then independent	Exercise sheets 4.1, 4.2 Past-paper sheets 4.1, 4.2	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	

5. Homeostasis and response

Weeks 16–20

稳态与响应

They should be able to

1. Define homeostasis and name the three conditions the body controls.
2. Describe receptors, coordination centres and effectors, and the stimulus-receptor-coordinator-effector-response pathway.
3. Explain the reflex arc, including sensory neurone, synapse, relay neurone and motor neurone, and why reflexes are automatic and rapid.
4. Describe RP7: the effect of a factor on human reaction time, with controls and data handling.
5. Identify cerebral cortex, cerebellum and medulla with their functions, and (HT) difficulties of investigating and treating the brain.
6. Relate eye structures to functions and explain accommodation for near and distant objects.
7. Explain myopia and hyperopia and their correction with lenses and new technologies.
8. Explain how vasodilation, sweating, vasoconstriction and shivering control body temperature (HT in context).
9. Describe the endocrine system: glands, hormones, target organs, and the six named glands.
10. Explain insulin control of blood glucose, (HT) glucagon and negative feedback, and compare Type 1 and Type 2 diabetes.
11. (Bio) Describe water and nitrogen balance: kidneys, filtration and selective reabsorption, (HT) ADH, and dialysis vs transplant.
12. (HT) Explain FSH, LH, oestrogen and progesterone interactions in the menstrual cycle, contraception methods and IVF.
13. (HT) Explain adrenaline and thyroxine, with negative feedback.
14. Explain phototropism and gravitropism by unequal auxin distribution in shoots and roots.
15. Describe RP8: the effect of light or gravity on newly germinated seedlings, with length measurements and labelled drawings.
16. (HT) Describe uses of auxins, gibberellins and ethene in agriculture, horticulture and the food industry.

Stage	Use	Your notes
Starter 10 min · retrieval practice	*nothing in the Library for this stage yet*	
Teach the new content	Handout 05 Slide deck 05 Vocabulary list 05	
Practice guided then independent	Exercise sheets 5.1, 5.2, 5.3, 5.4 Past-paper sheets 5.1, 5.2, 5.3, 5.4	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	

6. Inheritance, variation and evolution

Weeks 21–25

遗传、变异与进化

They should be able to

1. Compare sexual and asexual reproduction, with the named organisms that use both.
2. Explain how meiosis halves the chromosome number and fertilisation restores it, and trace embryo development.
3. Describe DNA, genes and the genome, and discuss the importance of the human genome.
4. (Bio) Describe DNA's nucleotide structure and the base code; (HT) protein synthesis and the effect of mutations.
5. Define gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous, genotype and phenotype.
6. Complete and interpret Punnett squares and family trees, with ratios and probabilities.
7. Explain polydactyly and cystic fibrosis inheritance and judge embryo screening issues.
8. Determine sex with the XX/XY cross, including ratios.
9. Describe the genome-environment interaction and the three causes of variation, and the role of mutation.
10. Explain evolution by natural selection and the formation of new species.
11. Describe selective breeding, its uses and the inbreeding risk.
12. Describe genetic engineering with (HT) its main steps, benefits, risks and objections.
13. (Bio) Describe tissue culture, cuttings, embryo transplants and adult cell cloning.
14. Describe Darwin's theory, why it was accepted only gradually, and Lamarck's theory.
15. Describe Wallace's and Mendel's contributions and the growth of genetics.
16. Explain fossils and their formation, why the record is incomplete, extinction causes and evolutionary trees.
17. Explain antibiotic-resistant bacteria and how to slow resistance.
18. Describe the Linnaean system and binomial naming.
19. Describe the three-domain system of Woese and what drove it.
20. Interpret evolutionary trees using classification and fossil data.

Stage	Use	Your notes
Starter 10 min · retrieval practice	*nothing in the Library for this stage yet*	
Teach the new content	Handout 06 Slide deck 06 Vocabulary list 06	
Practice guided then independent	Exercise sheets 6.1, 6.2, 6.3, 6.4, 6.5 Past-paper sheets 6.1, 6.2, 6.3, 6.4, 6.5	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	

7. Ecology

Weeks 26–30

生态学

They should be able to

1. Describe the levels of organisation in an ecosystem and define ecosystem, community, biotic and abiotic.
2. Suggest the factors for which plants and animals compete, and explain interdependence.
3. Explain how given abiotic and biotic factor changes affect a community.
4. Explain structural, behavioural and functional adaptations, and extremophiles.
5. Use food-chain vocabulary from producer to tertiary consumer and interpret predator-prey cycles.
6. Describe RP9 sampling with transects and quadrats, with mean, mode and median.
7. Explain the carbon and water cycles and the role of microorganisms.
8. (Bio) Explain how temperature, water and oxygen affect decay rate, with RP10 and biogas.
9. Define biodiversity and explain why it stabilises ecosystems.
10. Explain how waste, land use, deforestation and global warming reduce biodiversity.
11. Describe programmes that maintain biodiversity.
12. Name the trophic levels, describe decomposers and construct pyramids of biomass.
13. Explain biomass loss between levels and calculate transfer efficiency.
14. Describe the biological factors threatening food security.
15. Evaluate farming techniques, sustainable fisheries and the role of biotechnology.

Stage	Use	Your notes
Starter 10 min · retrieval practice	*nothing in the Library for this stage yet*	
Teach the new content	Handout 07 Slide deck 07 Vocabulary list 07	
Practice guided then independent	Exercise sheets 7.1, 7.2, 7.3, 7.4 Past-paper sheets 7.1, 7.2, 7.3, 7.4	
Check before they leave	*nothing in the Library for this stage yet*	
Homework set from the Library	Any unused exercise sheet above	