Scheme of work for Option D, *Evolution*

Syllabus section	Content	Time required	Outline of lessons	Coursebook resources	Worksheets	Teacher's resources / Teaching ideas
D1	Origin of life on Earth	4 lessons	• Describe the four processes needed for the spontaneous origin of life on Earth and describe the experiments of Miller and Urey • Discuss possible locations where organic compounds might have been synthesized • Outline the properties of RNA that make it an important molecule in the origin of life; discuss protobionts, and the contribution of prokaryotes to the creation of an oxygen-rich atmosphere • Discuss the endosymbiosis theory for the origin of eukaryotes	p360–366 TOK p361, p363 Short-answer Qs p366	Support: Q1 Extension: Q1	Practical activity: geological maps and location of potential sites for organic material to form
D2	Species and speciation	5–6 lessons	• Discuss the definition of 'species' and the fact that evolution involves a change in allele frequency; define 'gene pool' • Describe three barriers between gene pools – for example, geographical isolation, hybrid sterility, temporal and behavioural isolation • Explain how polyploidy can lead to speciation • Compare allopatric and sympatric speciation • Outline adaptive radiation and compare convergent and divergent evolution • Discuss the pace of evolution – gradualism versus punctuated equilibrium • Describe transient polymorphisms (for example, industrial melanism) and sickle-cell anemia as an example of balanced polymorphism	p366–377 Short-answer Qs p377 End-of-chapter Qs p395–401: Q7	Support: Q2	Practical activities: comparison of limbs and other homologous structures; comparison of bird and insect wings

D3	Human evolution	4–5 lessons	• Discuss the use of radioisotopes in dating material, define 'half-life' and deduce the age of materials based on a decay curve for a radioisotope • Describe the anatomical features of humans that define them as primates; outline the trends in fossils of hominid ancestors; state that several species of hominid may have coexisted • Discuss the incompleteness of the fossil record • Discuss the correlation between diet and brain size in hominid evolution • Discuss the importance of genetic and cultural evolution in recent human evolution	p377–383 TOK p379, p381 Short-answer Qs p383 End-of-chapter Qs p395–401: Q8	Support: Q3, Q4	Link to ICT: fossil ancestors and their reconstruction Link to TOK: the importance of cultural and genetic evolution
D4 (HL)	The Hardy–Weinberg principle	2 lessons	• Explain the derivation of the Hardy–Weinberg equation and the assumptions made when using it • Calculate allele, genotype and phenotype frequencies for two alleles using the Hardy–Weinberg equation	p383–387 Worked examples p385–p387 End-of-chapter Qs p395–401: Q1, Q2, Q3, Q4	Extension: Q2	Link to ICT: Hardy–Weinberg calculations using spreadsheets

D5 (HL)	Phylogeny and systematics	5 lessons	• Outline the value of classifying organisms; explain the biochemical evidence provided by DNA and proteins to indicate common ancestry and how specific molecules can indicate phylogeny • Discuss how biochemical variation can give an indication of evolutionary time • Outline the methods used to construct cladograms and how they are used; outline the difference between homologous and analogous structures • Construct a simple cladogram using morphological or biochemical data and analyse cladograms in terms of phylogenetic relationships • Discuss the relationship between cladograms and other classifications of organisms	p388–394 Short-answer Qs p394 End-of-chapter Qs p395–401: Q5, Q6, Q9, Q10, Q11, Q12	Extension: Q3	Practical activity: research project into the value of classification Link to TOK: biochemistry as an evolutionary clock

Note: 1 lesson = approximately 40 minutes