Weavers Academy
SCIENCE
KS5 Curriculum Maps

BIOLOGY

Year 12: Curriculum Map

Term	Content Covered
Autumn 1	**Foundations in Biology** • Cell structure • Cell cycle and division
Autumn 2	**Foundations in Biology** • Biological molecules • Nucleic acids • Enzymes • Biological membranes
Spring 1	**Exchange and Transport** • Exchange surfaces
Spring 2	**Exchange and Transport** • Transport in animals • Transport in plants
Summer 1	**Biodiversity, evolution and disease** • Communicable diseases • Biodiversity
Summer 2	**Biodiversity, evolution and disease** • Classification

BIOLOGY

Year 13: Curriculum Map

Term	Content Covered
Autumn 1	Communication, Homeostasis, and Energy Communication and homeostasis • The need for communication • Homeostasis • Temperature regulation in endo and ectotherms Excretion as an example of homeostatic control • Excretion • Liver structure and function • Kidney structure and function • Osmoregulation • Kidney failure Neuronal control • Roles of sensory receptors • Structure and function of neurones • Nerve impulses • Synapses Hormonal control • Endocrine communication • Adrenal glands • The pancreas and insulin • Regulation of blood sugar levels • Diabetes

Autumn 2	**Plant and Animal responses** • Plant responses to the environment • Plant growth • Tropisms • Commercial use of plant hormones • Mammalian nervous system • The brain • Reflex actions • Coordinating response • Controlling the heart • Muscles and muscular contraction. **Photosynthesis** • Relationship between photosynthesis and respiration • Chloroplasts and photosynthetic pigments • Light independent stage • Light dependent stage • Factors affecting photosynthesis **Respiration** • The need for cellular respiration • Glycolysis • Structure of mitochondria • Link reaction and Kreb's cycle • Oxidative phosphorylation and chemiosmotic theory • Anaerobic respiration in eukaryotes • Factors affecting the rate of respiration **Respiratory substrates**
Spring 1	**Genetics and Ecosystems Cellular control** • Gene mutations and regulation of gene expression • Genetic control of body plan

	Patterns of inheritance • Genetic variation • Mono and Dihybrid inheritance • Multiple alleles and sex linkage • Codominance • Autosomal linkage • Epistasis • Chi-squared • Continuous and discontinuous data • Factors effecting evolution • Hardy-Weinberg • Isolation mechanisms • Artificial selection **Manipulating Genomes** • DNA sequencing • Applications of gene sequencing • DNA profiling • The PCR • Electrophoresis • Genetic engineering • Issues relating to genetic manipulation • Gene therapy **Cloning and Biotechnology** • Natural clones • Clones in plants • Artificial clones in animals • Biotech and food • Microorganism cultures and Population growth • Immobilised enzymes
Spring 2	**Ecosystems** • Ecosystems • Transfer and manipulation of biomass • Succession

	Populations and sustainability • What determins population size • Interactions between populations • Conservation and preservation • Sustainable management • Balancing the conflict between conservation and human needs • Controlling the effects of human activiesi
Summer 1	Revision

CHEMISTRY

Year 12: Curriculum Map

Term	Content Covered
Autumn 1	**Atomic Structure, Atoms and Reactions** • The development of the atomic model and the associated chronology • Atomic structure and isotopes • The importance of quantification Chemistry in the real world • Composition of balanced symbol equations (including ionic equations) • Mr, Mass, Mole calculations to include gas volumes and concentrations • % yield and atom economy calculations • Titration calculations • Acids, bases, and neutralisation • Oxidation numbers and Redox reactions
Autumn 2	**Electrons, Bonding and Structure** • Energy levels, shells, sub-shells, atomic orbitals, electron configuration • Ionic Bonding • Covalent Bonding • Composition of Dot and Cross Diagrams • Metallic Bonding • Electronegativity and bond polarity • Intermolecular forces • Shapes of Molecules
Spring 1	**The Periodic Table** • The structure of the Periodic Table and the 'story' of how it evolved • Periodic trend in electron configuration and ionisation energy • Periodic trend in structure and melting point and boiling points

	• Identifying the bonding and structure in given compounds by applying rules associated with the types of atoms present • Redox reactions and reactivity of Group 2 metals • Reactions of Group 2 compounds • Characteristic physical properties of the Halogens • Characteristic reactions of halide ions • Tests for ions
Spring 2	**Energy** • Construction of Energy profile diagrams • Enthalpy changes: ΔH of reaction, formation, combustion and neutralisation • Measurement of temperature • Determination of Enthalpy changes of neutralisation and combustion • Bond enthalpies and associated calculations • Hess' law and enthalpy cycles • Collision Theory • Catalysis • The Boltzmann Distribution • Dynamic equilibrium and le Chatelier's principle • The equilibrium constant, Kc
Summer 1	**Basic Organic Concepts and Hydrocarbons** • Naming and representing the formulae of organic compounds • Functional groups • Application of IUPAC rules in developing a systematic framework for chemical nomenclature • Use of the general formula of a homologous series to predict the formula of any member of the series • Use of the 'curly arrow' model to demonstrate electron flow in organic reactions • Use of Cahn–Ingold–Prelog (CIP) priority rules to identify the E and Z stereoisomers • Use of Markownikof's rule to predict formation of a major organic product in addition reactions of H–X to nsymmetrical alkenes • Isomerism • Properties of alkanes • Reactions of alkanes • Properties of alkenes • Stereoisomerism in alkenes

	• Addition reactions of alkenes • Polymers from alkenes • Waste polymers and alternatives
Summer 2	**Alcohols, Haloalkanes and Analysis** • Properties of alcohols • Reactions of alcohols • Substitution reactions of haloalkanes • Free radical equations • Environmental concerns from use of organo-halogen compounds • Synthetic routes • Infrared spectroscopy • Mass spectrometry • Combined analytical techniques

CHEMISTRY

Year 13: Curriculum Map

Term	Content Covered
Autumn 1	**Rates, Equilibrium and pH** • Orders, rate equations and rate constants • Rate graphs and orders • Rate-determining step • Effect of temperature on rate constants • Equilibrium • Brønsted–Lowry acids and bases • pH and [H+(aq)] • Buffers: action, uses and calculations • Neutralisation
Autumn 2	**Energy** • Lattice enthalpy • Born–Haber and related enthalpy cycles • Entropy • Free energy • Redox • Electrode potentials and Electrochemical Cells • Storage and fuel cells **Transition Metals** • Transition metal properties • Ligands and complex ions • Ligand substitution • Precipitation reactions • Redox reactions

Spring 1	**Organic Chemistry** • Benzene and aromatic compounds • Electrophilic substitution • Phenols • Reactions of carbonyl compounds • Characteristic tests for carbonyl compounds • Properties of carboxylic acids • Esters • Acyl chlorides • Basicity and preparation of amines • Reactions of amino acids • Amides • Chirality • Condensation polymers • Extending carbon chain length • Stereoisomerism • Synthetic routes
Spring 2	**Analysis** • Types of chromatography • Tests for organic functional groups • Tests for organic functional groups • GC and TLC • (FT-)IR • Proton and Carbon-13 NMR Spectroscopy • Combined techniques: deduction of the structures of organic compounds from different analytical data
Summer 1	Revision

PHYSICS

Year 12: Curriculum Map

Term	Content Covered
Autumn 1	**Motion** • Kinematics • graphs of motion • SUVAT • projectile motion • stopping distances **Charge and current** • Circuit components • current and charge • electron drift • velocity **Energy and power** • PD and emf • Ohm's law • Resistivity and temperature • Power **Cost of electricity**
Autumn 2	**Forces in action** • Newtons • Dynamics • Equilibrium • Turning forces • Centre of mass • Density

	• Pressure **Electric circuits** • Kirchoff's laws • Series and parallel circuits • Potential dividers • Internal resistance • Circuit analysis
Spring 1	**Work, energy power** • Work and the joule • Conservation of energy • Potential and kinetic energy • Power and the Watt • Efficiency **Materials** • Deformation of materials • The Young Modulus • Categorisation of materials **Newtons laws** • Newton's 1st, 2nd and 3rd law • Momentum • Force & Impulse • Elastic and inelastic collisions **Wave motion** • Wave terminology • Wave speed and wave equation • Properties of waves **Wave superposition** • Interference • Young double-slit experiment • Diffraction gratings

Spring 2	**Electromagnetic waves** • EM waves • Polarisation • Refraction • TIR **Stationary waves** • Stationary waves • Experiments with SW **Stationary longitudinal waves**
Summer 1	**Quantum physics** • The photon • The electronvolt • The photoelectric effect • Wave-particle duality
Summer 2	**Nuclear and particle physics** • Nuclear atom • strong nuclear force • nuclear density **Astrophysics** • Structure of the universe • Star life cycle • EM radiation from stars • Wien's and Stefan's law, Astronomical distances • Doppler effect • CMBR • Expansion of the Universe • Dark matter and dark energy

PHYSICS

Year 13: Curriculum Map

Term	Content Covered
Autumn 1	**Thermal physics** • Temperature • Solids, liquids and gases • Internal energy • Brownian motion • Specific heat capacity • Specific latent heat • Kinetic theory • Investigating gases • Ideal gas equation • The Boltzmann constant **Circular motion** • Kinematics • Centripetal force **Oscillations** • SHM • Equations of SHM • Graphical analysis of SHM • Simple harmonic oscillator • Damping
Autumn 2	**Gravitational fields** • Newton's law of gravitation • Motion of planets and satellites • Gravitational potential and GPE

	Capacitors • Capacitors in series and parallel circuits • Energy, Charging and discharging **Electric fields** • Coulomb's law • Uniform electric fields • Electric potential and EPE **Electromagnetism** • Magnetic fields • Magnetic flux density • Forces on current-carrying wires • Motion of a charged particle in E and B fields • Electromagnetic induction • Faraday's and Lenz's laws • AC generators • Transformers
Spring 1	**Nuclear and particle physics** • Fundamental particles • Radioactivity • Radioactive decay • Half-life • Radioactive dating • Mass-energy conservation • Nuclear fission • Nuclear fusion **Medical imaging** • X-rays • Attenuation of X-rays • CAT scans • Gamma camera • PET scanning • Ultrasound • Acoustic impedance

	• Doppler effect
Spring 2	Revision
Summer 1	Revision

MEDICAL SCIENCES

Year 12: Curriculum Map

Term	Content Covered
Autumn 1	**Classes of biological molecules** • Carbohydrates • Lipids • Proteins and enzymes • Mechanisms of action • Nucleotides • Nucleic acids **Factors affecting enzyme reactions** **Lifestyle and Health**
Autumn 2	**Human cellular structure** • Plasma membrane • Nucleus • Nucleolus • Endoplasmic reticulum • Golgi apparatus • Mitochondria • Nuclear envelope **Movement into and out of cells** • Simple diffusion • Osmosis • Facilitated diffusion • Active transport • Endo/exocytosis

	DNA mechanisms • Semi conservative replication • Transcription • Translation
Spring 1	**Human Physiological Systems** • Describe structure of human physiological systems • Explain function of human physiological systems • Explain principles of physiological measurement tests • Describe limitations of physiological measurement testing
Spring 2	**Infection and Response** • Explain how pathogens can affect body systems • Explain how non-infectious diseases affect body systems
Summer 1	Revision Unit 1
Summer 2	**Medicines and Treatment Options** • Explain factors to be considering when prescribing medicines • Strategies to improve adherence of patients taking prescriptions • Compare options for administering medicines • Explain the molecular basis of the action of medicines • Explain how medicines affect body systems • Explain how medicines affect causative agents of infectious disease • Explain why medicines may lose their effectiveness • Compare the effects of the interaction of medicines • Explain how factors affect the distribution of medicines in the body • Explain how adverse reactions to medicines can occur • Explain fate of medicines in the body • Describe what is meant by the term cancer • Explain the genetic basis of cancer • Describe possible treatment options for cancer • Assess the potential impact of new treatments for cancer

MEDICAL SCIENCES

Year 13: Curriculum Map

Term	Content Covered
Autumn 1	**Clinical Laboratory Techniques and Assessment of Biological samples using clinical tests** • Explain factors that affect clinical test results • Plan tests • Record results from tests • Be able to process data from clinical tests • Use graphs to process data • Use numerical methods to process data • Interpret data from clinical tests • Communicate information to an audience
Autumn 2	**Clinical Laboratory Techniques and Assessment of Biological samples using clinical tests** • Explain factors that affect clinical test results • Plan tests • Record results from tests • Be able to process data from clinical tests • Use graphs to process data • Use numerical methods to process data • Interpret data from clinical tests • Communicate information to an audience
Spring 1	**Physiological Measurements, Diagnosis, Treatment and Medical Research** • Understand physiological information presented within case studies • Understand how physiological measurement techniques can be used to support diagnosis and treatment • Understand how medical research can help support diagnosis and treatment

Spring 2	**Physiological Measurements, Diagnosis, Treatment and Medical Research** • Understand ways in which medical treatments can be used to treat diseases and disorders • Understand ways in which clinical measurement techniques can be used to support diagnosis and treatment
Summer 1	Revision for assessment