chaseterraceacademy

Curriculum Intent Statement for Science – Biology

At Chase Terrace Academy we aspire for all of our students to achieve greater things than they ever thought possible.

We pride ourselves on being a warm and welcoming school that places community at the heart of everything we do. Our ambitious curriculum is enriching and inclusive, providing challenge and breadth for all. This empowers our students to become compassionate, confident and creative individuals who are resilient, respectful and equipped with a desire to take up a fulfilling role in society and the wider world.

In Science, we want to encourage our students to understand and value different cultures, countries, and people. To develop an appreciation of how the world works and to enable them to understand science in the media, which can often be misinterpreted.

We aspire for our students to retain a sense of wonder about our vast and complex Universe. Future generations should be aware of how scientific and technological progress is changing the world, and to help the wider public understand it.

It is important to ensure that these changes are heading in the right direction. In a democratic society, this means that everyone needs to have a basic understanding of science to make informed, responsible decisions about the future.

We provide the opportunity for those students with a particular passion for science to study single sciences. This gives students the scope to further broaden and deepen their scientific knowledge in preparation for study at A-level and beyond.

'Curriculum is designed to be ambitious & meet the needs' 'Develops skills for future learning & employment'

Outcomes: For competitive statistics and outcomes in-line and beyond National averages for KS4 courses – particularly Grade 7 & beyond. Destination figures which show student's passion for the subject.

Students to have a 'deeper' knowledge: teaching is designed to help students to remember in the long term the content they have been taught and to integrate new knowledge into larger concepts. Students confident to debate and discuss their knowledge of topics and respond to feedback in a way that is progressive.

Curriculum, implementation – How and what we do

Schemes of learning

- Revised curriculum at KS3 – mastery and deeper learning embedded into lessons including key command words working across the JTMAT.
- Literacy and numeracy activities incorporated into lessons and all schemes of learning as well as within our assessments particularly graphs and data.
- Science in the news built is incorporated into lessons as and when.
- Curriculum at KS4 is appropriate and engaging to students. Content is relevant to all learners and diverse.
- Transition unit completed in Year 9 to help prepare students for the KS4 course.
- Revision is woven into SOW to ensure content is retained in the long-term.
- Assessments are reviewed and amended where necessary to support outcomes and to ensure the 'deeper learning' approach.
- Knowledge organisers are updated every year in line with latest assessments and feedback from exam boards and examiners

Quality of marking and feedback

- Clear expectations and routines for student response to feedback (e.g. purple pens and QLA)
- Standardisation activities for mock assessments and book trawls carried out on a termly basis.
- Informal learning walks.
- Use of open-door policy.

Extra-curricular and intervention

- Quality first teaching to ensure gap is narrowed.

- Year 11 intervention held after school in line with the intervention programme.
- Year 10 intervention held afterschool in line towards the end of Y10 when capacity allows.

Science Curriculum Implementation Plan

Science Overall Big Picture			
	Term 1	Term 2	Term 3
Year 7	• Lab Safety ↓ • Organisms 1 – Movement & Cells ↓ • Matter 1 – Particle Model ↓ • Forces 1 – Speed & Gravity ↓ • Assess / DIRT / RETEACH →	• Genes 1 – Variation ↓ • Matter 1 – Separating Mixtures ↓ • Energy 1 – Energy Costs & Transfer ↓ • Assess / DIRT / RETEACH →	• JTMAT End of Year 7 Exam ↓ • Genes 1 – Human Reproduction ↓ • Reactions 1 – Acids & Bases ↓ • Earth 1 – Earth Structure & Universe
Year 8	• Matter 2 – Periodic Table & Elements ↓ • Waves 1 – Light & Sound ↓ • Organisms 2 – Breathing & Digestion ↓ • Assess / DIRT / RETEACH →	• Earth 2 – Earth's Resources & Climate ↓ • Forces 2 – Contact Forces & Pressure ↓ • Genes 2 – Evolution & Inheritance ↓ • Assess / DIRT / RETEACH →	• JTMAT End of Year 8 Exam ↓ • Reactions 2 – Types of Reaction ↓ • Energy 2 – Heating & Cooling ↓ • Electromagnets 1 – Voltage, Current & Resistance and then magnets
Year 9	• Ecosystem 1 – Interdependence & Plant Reproduction ↓ • Energy 2 – Work ↓	• Atomic Structure & The Periodic Table ↓ • Energy ↓ • Cell Biology	• JTMAT End of Year 9 Exam ↓ • Energy Changes ↓ • Electricity ↓

	• Ecosystems 2 – Respiration & Photosynthesis ↓ • Assess / DIRT / RETEACH	↓	• Applied Science Skills 1 ↓ • GCSE
Year 10	• **Biology** – Organisation → Infection & Response → Bioenergetics → Review of Cells → Ecology • **Chemistry** – Review of atomic structure → Structure & bonding → Quantitative chemistry → Chemical changes → Energy changes review → Organic chemistry → Chemistry of the atmosphere • **Physics** – Electricity → Particle model of matter → Atomic structure & radiation → Forces • Required practical revision if needed		
Year 11	• **Biology** – Homeostasis → Inheritance → Review → **Exams** • **Chemistry** – Organic review → Rate & Extent of chemical change → Chemical analysis → Using resources → Review → **Exams** • **Physics** – Forces review → Waves → Electromagnetism → Static electricity → Space (single only) → Review → **Exams**		
Year 12	**Biology** • Biological molecules → Cells → Organisms exchange substances with their environment → Genetic information, variation and relationships between organisms → Energy transfers in and between organisms (photosynthesis only) **Chemistry** • **Physical** – Atomic structure → Amount of substance → Bonding → Energetics → Kinetics → Equilibria → Redox → Kinetics → Equilibria • **Inorganic** – Periodicity → Group 2 → Group 7 • **Organic** – Nomenclature → Isomerism → Alkanes → Halogenoalkanes → Alkenes → Alcohols → Organic analysis **Physics** • Measurements and their errors → Particles and radiation → Mechanics and materials • Waves → Electricity •		
Year 13	**Biology**		

	• Energy transfers in and between organisms (respiration only and energy in ecosystems only) → Organisms respond to changes in their internal and external environment→ Genetics, populations, evolution and ecosystems → The control of gene expression → Essay writing → **Revision & Exams** **<u>Chemistry</u>** • **Physical** – Thermodynamics → Rate equations → Equilibrium constants → Electrode potentials → Acids & Bases → **Revision & Exams** • **Inorganic** – Properties of period 3 → Transition metals → Reaction of ions in aqueous solution → **Revision & Exams** • **Organic** – Optical isomerism → Aldehydes & ketones → Acids & their derivatives → Aromatic chemistry → Amines → Polymers → Amino acids, proteins & DNA → Organic synthesis → Nuclear magnetic resonance → Chromatography → **Revision & Exams** **<u>Physics</u>** • Further mechanics → Thermal physics → Nuclear physics → **Revision & Exams** • Fields and their consequences → Medical physics → **Revision & Exams**

<u>Biology Curriculum Implementation Plan</u>

Biology			
	Term 1	Term 2	Term 3
Year 7	• Lab Safety • Organisms 1 – Movement & Cells	• Genes 1 - Variation	• Genes 1 – Human Reproduction
Year 8	• Organisms 2 – Breathing & Digestion	• Genes 2 – Evolution & Inheritance	• Genes 1 – Human Reproduction
Year 9	• Ecosystem 1 – Interdependence & Plant Reproduction • Ecosystems 2 – Respiration & Photosynthesis	• Cell Biology • Applied science skills	
Year 10	• Organisation • Infection & Response	• Bioenergetics	• Ecology
Year 11	• Homeostasis	• Inheritance • Revision	• Revision and exam preparation
Year 12	• Monomers and polymers • Carbohydrates	• Transport across cell membranes • Surface area: volume ratio	• Mass transport • Species and taxonomy

	• Lipids • Proteins and Enzymes • Nucleic acid • ATP, water and inorganic ions • Cell structure • All cells arise from other cells • Transport across cell membranes	• Gas exchange • Mass transport • Cell recognition and the immune system • DNA, gene and chromosomes • DNA and protein synthesis • Genetic diversity and adaptions • Species and taxonomy	• Biodiversity within a community • Investigating diversity • Photosynthesis (A-Level)
Year 13	• Energy in ecosystems • Inheritance • Populations and evolution • Populations and ecosystems • Photosynthesis and respiration • Response to stimuli • Nervous coordination and muscles	• Gene expression • DNA technology • Nervous coordination and muscles • Skeletal muscle • Homeostasis	• Examination preparation • Essay writing

Biology Curriculum Implementation Plan

Biology				
Knowledge and Skills – Students will be taught to…	Reading, Oracy, Literacy and Numeracy	Formative Assessment	Summative Assessment	Link to GCSE Content
Throughout their Biology journey students will learn to analyse patterns, draw conclusions, present data, read, understand and respond to information, justify opinions, collect data, plan variables, test hypotheses, estimate and minimise risks, examine consequences, review theories and interrogate sources of information. **Intro into Science** • Lab safety & hazards • The scientific method **Organisms 1 – Movement & Cells** • Structure & function of cells /using microscopes. • Movement of materials in & between cells • Unicellular organisms • Organisation of multicellular organisms • The human skeleton, muscles & biomechanics **Genes 1 – Ecosystems and Populations**	**Reading:** • Regular use of on screen sources and science news articles in lessons. • Research and online reading • Science revision guides **Recommended reading:** Frozen Planet – Alistair Fothergill Horrible Science (collection of books) – Nick Arnold Longitude – Dava Sobel Nightwatch – Terence Dickinson Planet Earth – Alistair Fothergill The Planets – Dava Sobel Science: The Definitive Visual Guide – Adam Hart Davis (Dorling Kingsley) Wonders of the Universe - Brian Cox WOW: The Visual	Questioning in lessons Whole class feedback during lessons Regular verbal feedback Peer and self-assessment of written work Low stakes quizzing Exit strategies	4 end of unit assessments based on all previous work which continues to build on ideas from previous topics completed in the academic year to inform reports. At the end of each year students will sit an end of year exam covering all the key ideas from the current year and some topics from previous years	Most of the topics in year 7&8 are designed to maintain student's natural curiosity, develop practical skills and also to provide solid foundations of the concepts they will meet at GCSE In year 9 students revisit and build upon some of the key ideas in science (e.g. cells, particles and energy) to provide a solid foundation for the concepts they will meet in year 10 & 11 (e.g. cells, particles, chemical reactions, energy & forces). All set questions are GCSE style. Range of language based skills to prepare for GCSE.

• Interdependence of organisms in an ecosystem, including food webs and insect pollinated crops • Importance of plant reproduction in food security • Variation, adaptation and natural selection **Ecosystem 1 – Plant Reproduction** • Structure of plants and flowers • Reproduction in plants • Function of the male and female reproductive plant parts • Variation **Organisms 2 – Breathing & Digestion** • What makes a healthy diet? • Calculations of energy requirements in a healthy daily diet • Consequences of imbalances in the diet, deficiency diseases • The human digestive system • Importance of bacteria in the digestive system • Structure and functions of the gas exchange system in humans • Lungs and our breathing, measuring lung volume • Impact of exercise, asthma and smoking **Genes 2 – Evolution & Inheritance**	Encyclopaedia – Dorling Kingsley Oxygen – Nick Lane **Numeracy:** • Standard form (not in yr7&8) this is introduced in year 9 to set a basis for GCSE ideas they meet in yr 10 & 11. • Graphing & scales • Averages • The idea of uncertainties is met in year that build on the ideas of averages met in Yr 7 & KS2 • Formula & balancing equations • Using and rearranging equations is briefly met in yr 8 and built upon in the following years **Literacy & Oracy:** • Encourage group discussion and debate. • Communicate ideas clearly & effectively. • Make sure spelling and punctuation is accurate			

• Variation • Darwin • Natural Selection • DNA / Chromosomes / Genes • Genetic traits **Genes 1 – Human Reproduction** • Reproduction in humans (gametes, fertilisation, gestation and birth) • Structure and function of the male and female reproductive systems • Menstrual cycle **Maths & Science Skills 1** • Averages & Uncertainties • Significant figures & precision • Standard form • Units & conversions • Ratios & percentages • HSW terms • ISA investigation 1 **Cells** • Eukaryotes & prokaryotes • Microscopes • Measuring cells • Culturing microbes • Stem cells • Mitosis and the cell cycle • Diffusion **Applied Science Skills 1**				

• Averages • Writing methods • Graph skills • Data analysis • Conclusions & evaluations **Transport in cells** • Diffusion • Osmosis • Active transport • Plant tissues • Plant transport systems **Applied Science Skills 2** • Averages • Writing methods • Graph skills • Data analysis • Conclusions & evaluations **Organisation** • Principles of organisation • The properties of enzymes • Human digestive system and enzymes • Food Tests • Heart and blood vessels • CHD • Health and non-communicable diseases • Cancer				

Infection & Response • Communicable diseases • Viral diseases • Malaria • Human defence systems • Vaccination • Treating disease and antibiotics • New drugs • Culturing microorganisms and preventing bacterial growth (Bio only) • Plant diseases (Bio only) • Detection and identification of plant deficiencies (Bio only) • Uses of monoclonal antibodies (Bio only) **Bioenergetics** • Photosynthesis • Respiration • Metabolism **Homeostasis & Response** • Human nervous system • Endocrine system • Blood glucose • Menstrual cycle • Contraception • Treating infertility • Negative feedback • The brain (Bio only) • The eye (Bio only) • Water and nitrogen balance (Bio only)				

• Kidney function and kidney failure (Bio only) • Plant hormones (Bio only) **Inheritance, Variation & Evolution** • Reproduction • Meiosis • DNA structure and Mendel (Bio only) • Genetic inheritance • Inherited disorders • Sex determination • Variation and evolution • The development of understanding of genetics and evolution • Cloning (Bio only) • Theories of evolution (Bio only) • Speciation (Bio only) **Ecology** • Classification of living organisms • Communities • Abiotic & Biotic factors • Adaptations • Levels of organisation • Trophic levels and pyramids of biomass (Bio only) • How materials are cycled • Decomposition (Bio only) • Biodiversity • Waste management • Land use • Deforestation				

• Global warming • Maintaining biodiversity • Factors affecting food security (Bio only) • Farming techniques (Bio only) • Sustainable fisheries (Bio only) • Role of biotechnologies (Bio only)				