

A-Level Chemistry learning journey

Next Steps:

- **University**
 - Chemistry, medicine, dentistry, vet science, chemical engineer, forensic science, pharmacy, pharmacology
- **Apprenticeship**
 - Engineering, Jaguar Landover
- **Future Careers**
 - NHS carers
 - Research Scientist
 - Drug synthesis
 - Forensics
 - Teacher

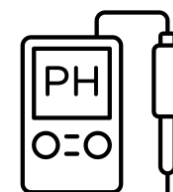
Terminal Assessment - 3 Exams and Practical Endorsement

Module 6

Organic chemistry and analysis

- Aromatic compounds
- Carbonyl compounds
- Carboxylic acids and esters
- Nitrogen compounds
- Polymers
- Organic synthesis
- Chromatography and spectroscopy (NMR)

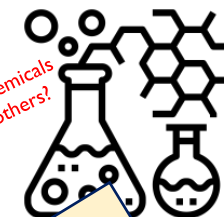
How do we synthesise specific drugs?



Physical chemistry and transition elements

- Reaction rates and equilibrium
- pH and buffers
- Enthalpy, entropy and free energy
- Redox and electrode potentials
- Transition elements

Why do certain chemicals react faster than others?



Chemistry open evenings/days at university

Year 13

How can we analyse a chemical?

Periodic table and energy

- Periodic table
- Group 2 elements
- Enthalpy
- Hess' law
- Equilibrium

Why do all chemical reactions not go to completion?

Module 3

Module 4

Core organic Chemistry

- Alkanes
- Alkenes
- Alcohols
- Haloalkanes
- Spectroscopy

Nuffield Placements Available – work with a real science research group

Foundations in Chemistry

- Atomic structure
- Calculations
- Acids and Bases
- Titrations
- Bonding and structure

How can we find a unknown concentration of a chemical?

Module 2

Module 1

Practical endorsement – developing practical skills that will help you in further study and throughout your a-Level

How do I use key practical equipment in a lab?



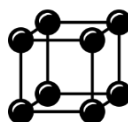
Chemistry university competition— Lets have some friendly competition!



Year 12

Wider Reading: All available from school and Halton library

- Robert Winston, All about Chemistry
- Periodic Tales: The Curious lives of Elements: Hugh Aldersey-Williams 2012



Prior Learning:

KS4 Science including GCSE Physics or Combine Science.

Including knowledge of:

- **Key Concepts in Chemistry**
 - Scientific method, safe practical procedures, SI units and unit prefixes and standard form.
- **Bonding and Structure**
 - Ionic, covalent and metallic
- **Acids and Alkalis**
 - Acids, metal carbonates, pH and strength of acids
- **Quantitative Chemistry**
 - Moles, empirical formula, % yield, atom economy
- **Electrolysis and extracting metals**
 - Electrolysis, ores, reactivity series, equilibrium
- **Groups and rates**
 - Group 1, 7 and 0, rates of reaction
- **Hydrocarbons and the atmosphere**
 - Alkanes, Fractional distillation, early atmosphere, greenhouse gases

A-Level Biology learning journey

Next Steps:

- **University**
 - Biology, medicine, dentistry, vet science, biochemistry, forensic science, pharmacy, pharmacology, zoology, life sciences, ecology
- **Apprenticeship**
- **Future Careers**
 - NHS careers
 - Research Scientist
 - Drug synthesis
 - Forensics
 - Teacher
 - Zoologist
 - Ecologist
 - Pharmacist
 - Midwife



EXAM

Module 6

Genetics, evolution and ecosystems

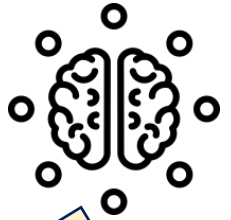
- Cellular control
- Patterns of inheritance
- Manipulating genomes
- Cloning and biotechnology
- Ecosystems
- Populations and sustainability.



Why do organisms need to keep conditions constant?

Communication, homeostasis and energy

- Communication and homeostasis
- Excretion as an example of homeostatic control
- Neuronal communication
- Hormonal communication
- Plant and animal responses
- Photosynthesis



Biology open evenings/days at university

How does variation occur and how do mutations impact this?

How do substances get from one place to another, what adaptations are in place to allow this?

Exchange and transport

- Exchange surfaces
- Transport in animals
- Transport in plants

Module 3

Biological science review magazines are helpful wider reading!

Module 4

How do diseases affect organisms and what prevention methods have developed?

Biodiversity, evolution and disease

- Communicable diseases, disease prevention and the immune system
- Biodiversity
- Classification and evolution



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Year 13

How does cell structure relate to function and what are the factors that affect this?

Module 2

Foundations in Biology

- Cell structure
- Biological molecules
- Nucleotides and nucleic acids
- Enzymes
- Biological membranes
- Cell division, cell diversity and cellular organisation

Biology Olympiad– Lets have some friendly competition!

Module 1

How do I use key equipment in a practical lab?

Practical endorsement – developing practical skills that will help you in further study and throughout your a-Level



Year 12

Prior Learning:

KS4 Science including GCSE Biology or Combine Science.

Including knowledge of:

- **Key Concepts in Biology**
 - Scientific method, safe practical procedures, SI units and unit prefixes and standard form.
- **Health and Disease**
 - Microorganisms, barriers, vaccines
- **Evolution**
 - Darwin's theory, fossils, natural selection and genetic engineering
- **Plants and photosynthesis**
 - Leaf structure, factors affecting photosynthesis and transport in plants
- **Circulatory system**
 - Diffusion, blood, vessels and the structure of the heart
- **Hormones**
 - Endocrine glands, homeostasis and regulation of blood levels
- **Biological molecules**
 - Enzymes, proteins, carbohydrates and the digestive system
- **Ecology**
 - Sampling techniques, investigating the environment

A-Level Physics learning journey

Next Steps:

- **University**
 - Physics, engineering, medicine, economics, mathematics, architecture, computer science.
- **Apprenticeship**
 - Accounting, engineering, RAF, Army electrician, technician.
- **Future Careers**
 - Finance/Business
 - Engineer
 - Research Scientist
 - NHS – Clinical Scientist
 - Astronaut!

Terminal Assessment - 3 Exams and Practical Endorsement

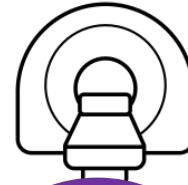
Module 6 -

Particles and medical physics

- Capacitors
- Electric fields
- Electromagnetism
- Nuclear and particle physics
- Medical imaging

What are the advantages of CT Scans over ultrasound?

What are quarks?

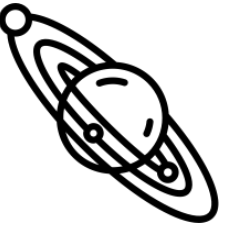


Module 5

Newtonian world and astrophysics

- Thermal physics
- Circular motion
- Oscillations
- Gravitational fields
- Astrophysics and cosmology

How much fuel do I need to power a rocket to Mars?



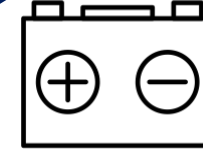
How old is the universe?

Year 13

Why do bubbles look so colourful?

Electrons, waves and photons

- Charge and current
- Energy, power and resistance
- Electrical circuits
- Waves
- Quantum physics



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Module 4

How should the world generate electricity?



Forces and motion

- Motion
- Forces in action
- Work, energy and power
- Materials
- Newton's laws of motion and momentum

Module 3

How certain is an experiment?

What happens in an explosion?

Foundations in Physics

- Physical quantities and units
- Making measurements and analysing data
- Nature of quantities

Module 2

Is acceleration due to gravity 9.81 m/s^2 ?

Module 1

Why do we make aircraft from aluminium?

Practical endorsement – developing practical skills that will help you in further study and throughout your a-Level

How do I use a micrometre?

Physics Olympics – Lets have some friendly competition!

Year 12

What's the Scientific Method?



Prior Learning:

KS4 Science including GCSE Physics or Combine Science.

Including knowledge of:

- **Key Concepts in Physics**
 - Scientific method, safe practical procedures, SI units and unit prefixes and standard form.
- **Motion and forces**
 - Vectors, Acceleration, Momentum, Newton's laws
- **Energy**
 - Stores and pathways, efficiency, power, work
- **Waves**
 - EM spectrum, reflection, refraction, diffraction, wave speed
- **Radioactivity**
 - Subatomic structure, radioactive decay
- **Electricity**
 - Current, potential difference, resistance, safety
- **Magnetism**
 - Electro magnets, motor effect, transformers
- **Particle Model**
 - State changes, density, pressure.

Wider Reading: All available from school and Halton library

- Bill Bryson, A short history of everything
- Richard P. Feynman, Surely You're Joking Mr. Feynman
- Marcus Chown, We Need to Talk About Kelvin

