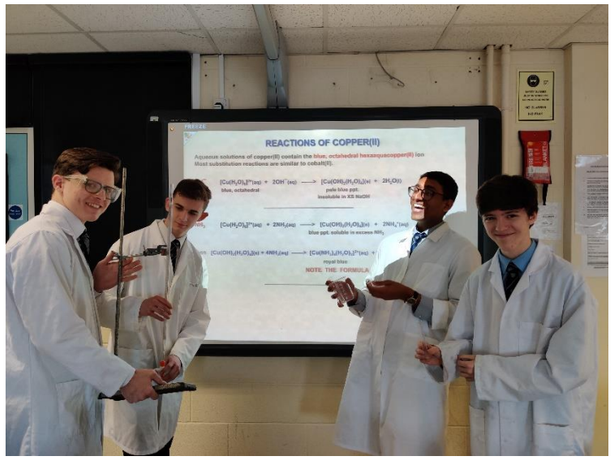
NKS Chemistry Curriculum Map 2022



The purpose of studying Chemistry at NKS is…

The Science Curriculum at NKS ensures that:

- Specialist staff work with students to develop their scientific knowledge and conceptual understanding in Biology, Chemistry and Physics; adding local context and adapting lessons to suit all of our learners.
- Students progressively build knowledge up, and staff confidently use and emphasise specialist vocabulary.
- Students are able to answer relevant scientific questions through enquiry and can competently demonstrate their practical skills
- Science lessons build on prior learning and are founded on pedagogical research.
- Lessons involve a short review of prior learning; ensuring that knowledge is embedded into long term memories
- Staff incorporate targeted questioning, scaffolding, modelling and guided student practice to facilitate mastery.
- Online resources such as TEAMs provide students with the key information to support them in their learning such as Knowledge Organisers

Year 7 Science

Our curriculum builds on and extends this by:

- Throughout Year 7 students will study two Biology (Biology A and B), two Chemistry (Chemistry A and B) and two Physics topics (Physics A and B).
- Each group will rotate through the subjects by studying one unit each. Consequently, the actual teaching order may differ from the one below.
- The programme of study allows students to develop a secure understanding of each block, before moving onto the next. All units include planning investigations, recording and analysing data, writing conclusions and evaluations.
- Students have five lessons a fortnight

Our curriculum builds on and extends this by sequencing units to encourage/allow a deeper appreciation of interrelated concepts.

The GCSE Chemistry AQA SoW begins by building on topics covered at KS3: The Particle Model, Types of Chemical Reactions and Separation Techniques. Chemical principles are embedded throughout using modelling, mathematics and practical investigative work. Required Practical's engage students, embed skills, and enable the linking of application of knowledge to practice and data analysis, whilst respecting safe and ethical working practices.

Good Science includes investigating, observing, experimenting and testing out ideas. These scientific ideas flow through the Schemes of Work and more details of each of the skills can be found on the below links (right click to Open Hyperlink):

Chemistry GCSE Developing Scientific Skills

A Level Chemistry Practical Skills

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Skills and concepts**	Introduction to Science/Primary transition. Organisms and Movement (Biology A) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	The Particle Model and Separating Mixtures (Chemistry A) Working Scientifically Skills : Scientific attitudes, experimental skills, analysis and evaluation.	Circuits and Energy (Physics A) Working Scientifically Skills Scientific attitudes, experimental skills, analysis and evaluation.	Interdependence, Plant reproduction and Variation (Biology B) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Acids and Alkalis and Metals and non-metals (Chemistry B) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Forces; Speed, Gravity and Waves (Physics B) Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.
Assessment	Baseline testing Regular Afl embedded into lessons End of Topic test	Baseline testing Regular Afl embedded into lessons End of Topic test	Baseline testing Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test End of Year exams
Enrichment and extension	○ **Y7 Science club (Term 4 -Term 6)** ○ **Science week activities (March)** ○ **World Space Week Activities (October)**					

NKS Chemistry Curriculum Map 2022

Year 8 Science

Our Y8 curriculum builds on and extends the work done in Y7 by:

- Throughout Year 8 students will study two Biology (Biology C and D), two Chemistry (Chemistry A and B) and two Physics topics (Physics A and B).
- Each group will rotate through the subjects by studying one unit each. Consequently, the actual teaching order may differ from the one below.
- Units are sequenced to allow students to develop a secure understanding of each block, before moving onto the next. All units include planning investigations, recording and analysing data, writing conclusions and evaluations.
- Students have five lessons a fortnight

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding	Breathing and Nutrients (Biology C)	An introduction to the Periodic Table and Representing Chemical reactions (Chemistry C)	Contact Forces, Pressure and Work (Physics C)	Photosynthesis and Evolution (Biology D)	Types of Chemical reaction and an introduction to Chemical Energy and The Earth (Chemistry D)	Electromagnets, Waves and Space (Physics D)
Skills and concepts	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills: Scientific attitudes, experimental skills, analysis and evaluation.	Working Scientifically Skills Scientific attitudes, experimental skills, analysis and evaluation.
Assessment	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test	Regular Afl embedded into lessons End of Topic test
Enrichment and extension	○ Science and Technology Challenge ○ World Space Week (October)					

NKS Chemistry Curriculum Map 2022

Year 9

The GCSE Chemistry SoW places the emphasis on the key elements (Structure and Bonding, Periodic Table and Chemical Changes) in Year 9 which underpins the rest of the course. Students build upon the key chemical principles which are covered at KS3; Matter, Chemical compounds and their reactions. Throughout the rest of the course these key topics are continually revisited, and this knowledge and these skills are embedded using modelling, mathematics as well as investigative work. AQA Unit 3; Quantitative Chemistry, is deliberately placed in Year 10; as more Chemistry teaching hours are allocated here.

Throughout the three years a large emphasis is placed on practical work, with students becoming proficient in practical applications and through the use of the Required Practical workbooks/sheets, in the planning, write-up and evaluation of work.

The use of analytical thinking and analysis of data are key to this subject and students develop these skills. This will inevitably help students if A Level Chemistry is chosen.

Our Y9 curriculum builds on and extends the work done in Y8.

- Unit 1 builds on previous knowledge of organisation of elements on the Periodic Table. To understand the historical development of the Periodic Table
- Unit 2 builds on understanding of elements and compounds developed in KS3 in order to use and explain physical and chemical properties of materials. How do scientists use this information to engineer new materials?
- Unit 3: Further development of how metal react from KS3. Students also build on previous understanding of reactions involving acids and are introduced to electrolysis. Students draw on knowledge of ionic compounds and half equations developed in Unit 2.
- Unit 4 (Quantitative Chemistry) is sequenced after Unit 3 and placed in Y10 as more lesson time is required to introduce challenging ideas such as 'moles'

Triple Chemistry Students have 4 lessons a fortnight and Combined Students have 3 lessons a fortnight

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding *Triple Only content* **Skills and concepts**	Unit 1:Development and use of the Periodic Table and Atomic Structure Working Scientifically Chemistry GCSE Developing Scientific Skills: 1.1, 1.2, 1.4, 1.6, 4.1 AT6, AT4 **Maths Skills** – see Appendix 1 for code definitions: S 1a,1c,4a,5b	Unit 1:Development and use of the Periodic Table and Atomic Structure *Properties of Transition Metals* Working Scientifically 1.1, 1.2, 1.4, 1.6,4.1 AT6, AT2 Maths Skills 1a,1c,4a,5b	Unit 2:Bonding and Structure to explain physical properties Working Scientifically 1.3, 1.2, 1.4, 1.5,4.1,4.2,4.3,4.4,4.5 AT1 Maths Skills 1a,1c,4a,5b,5c	Unit 2:Bonding and Structure to explain physical properties *Bulk and surface properties, nanoparticles* Working Scientifically 1.3, 1.2, 1.4, 1.5,4.1,4.2,4.3,4.4,4.5 AT1 Maths Skills 1a,1c,4a,5b,5c	Unit 3:Chemical Changes **Required Practical Making Salts** Working Scientifically 1.3, 1.2, 1.4, 1.5,4.1 AT1, AT4, AT3, AT8 Maths Skills 1a,1c,4a,5b	Unit 3: Chemical Changes **Required Practical Electrolysis** Working Scientifically 1.3, 1.2, 1.4, 1.5,4.1,3.8 AT1, AT4, AT3, AT8 Maths Skills 1a,1c,4a,5b
Assessment	Regular Afl embedded into lessons Unit 1 interim marked test	Regular Afl embedded into lessons Unit 1 End of topic test	Regular Afl embedded into lessons Unit 2 interim test	Regular Afl embedded into lessons Unit 2 End of topic test	Regular Afl embedded into lessons. Synoptic U1-3 assessment	Regular Afl embedded into lessons End of Unit 3 assessment
Enrichment and extension	- **Kent Science and Technology Challenge competition Term 4-6**					

NKS Chemistry Curriculum Map 2022

Year 10

Our Y10 curriculum builds on and extends the work done in Y9 by… e.g. Units are sequenced to encourage/allow…

- Unit 4 builds on KS3 atoms, elements, mixtures and solubility as well as Unit 1 atomic structure
- Unit 5 builds on KS3 Energy and allows students to explore the applications of heating and cooling effects
- Unit 6 also links energy and rates from KS3
- Unit 7 introduces new knowledge of Organic Chemistry, building upon Unit 2 structure and Bonding. This work also links to the work covered in Biology on DNA looking at natural polymers

Year 10 Triple Chemistry students have 5 lessons a fortnight and Combined Science students have 3 lessons a fortnight

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding *Triple Only content*	Unit 4:Quantitative Chemistry to determine formula, equations and monitor yield *Concentration of solutions, calculating yield and atom economy, molar gas volume*	Unit 4:Quantitative Chemistry to determine formula, equations and monitor yield **Required Practical Neutralisation (Chemistry only)**	Unit 5:Energy Changes and their applications **Required Practical Temperature Changes** *Electrochemical cells and the Hydrogen Fuel Cell*	Unit 6:Rate and extent of chemical change to control yields **Required Practical Rates of Reaction**	Unit 6:Rate and extent of chemical change to control yields **Required Practical Rates of Reaction**	Unit 7:Organic Chemistry- an introduction to the reactions of organic compounds *Reactions of alkenes, alcohols, synthetic and naturally occurring polymers*
Skills and concepts	Working Scientifically: 1.2,3.4,4.1,4.2,4.3,4.5,4.6 AT 1, AT2, AT6 Maths Skills: 1a, 1b, 1c, 1d, 2a, 2b, 3b, 3c,	Working Scientifically 1.2,3.4,4.1,4.2,4.3,4.5,4.6,3.7 AT 1, AT2, AT6 Maths Skills 1a, 1b, 1c, 1d, 2a, 2b, 3b, 3c,	AT5 Maths Skills 2h	Working Scientifically 1.2,3.4,4.1,4.2,4.3,4.5,3.6, AT 1, AT2, AT6, AT3 Maths Skills 1a, 1b, 1c, 1d, 2a, 2b, 4a,4b,4c,4d,4e	Working Scientifically 1.2,3.4,4.1,4.2,4.3,4.5,3.6, AT 1, AT3, AT6, AT2 Maths Skills 1a, 1b, 1c, 1d, 2a, 2b, 4a,4b,4c,4d,4e	Working Scientifically 1.2,3.4,4.1,4.2,4.3,4.5,3.6, AT 6, AT8, AT2, AT5 Maths Skills 5b,2a,1d,
Assessment	Regular Afl embedded into lessons Unit 4 interim marked test	Regular Afl embedded into lessons Unit 4 end of topic test	Regular Afl embedded into lessons Unit 5 and 2 synoptic marked end of topic test	Regular Afl embedded into lessons Y10 PPE Paper 1	Regular Afl embedded into lessons Unit 6 marked test	Regular Afl embedded into lessons Unit 7 end of topic marked test
Enrichment and extension	○ RSC Top of the Bench Competition Term 2 onwards					

NKS Chemistry Curriculum Map 2022

Year 11

Our Y11 curriculum builds on and extends the work done in Y10 by… e.g. Units are sequenced to encourage/allow…

- Unit 8 builds on KS3 mixtures and solubility as well as Unit 1 atomic structure.
- Unit 9 develops ideas from KS3 The Environment,, Energy as well as Rates of reaction
- Unit 10 draws on ideas from all units.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding *Triple only content*	Chemical analysis **Required Practical Chromatography** *Identification of ions by chemical and spectroscopic means*	Chemical analysis **Required Practical Identifying Ions (Chemistry only)**	Chemistry of the atmosphere and how it changes	Chemistry of the atmosphere and how it changes	Using Resources to manufacture useful products **Required Practical Water Purification** *The Haber process and the use of NPK fertilisers*	Exam Period
Skills and concepts	Working Scientifically 2.2,4.1,1.4,2.2,3.1,3.6 AT8, Maths Skills 1a,1c,1d,2a,4a	Working Scientifically 2.2,4.1,1.4,2.2,3.1,3.6 AT8, Maths Skills 1a,1c,1d,2a,4a	Working Scientifically 1.1,1.2,1.3,3.5,3.6,4.1,1.6,1.51.4 AT8, Maths Skills 1a,1c	Working Scientifically 1.1,1.2,1.3,3.5,3.6,4.1,1.6,1.51.4 AT8, Maths Skills 1a,1c	Working Scientifically 3.2,1.3,4,5,2.2,7,3.5 AT4, Maths Skills 2c,4a,2h,1a,1c,1d,	
Assessment	Regular Afl embedded into lessons Unit 8 End of Topic test	Regular Afl embedded into lessons Paper 1 PPE	Regular Afl embedded into lessons End of Unit 9 test	Regular Afl embedded into lessons Paper 2 PPE	Regular Afl embedded into lessons End of Unit 10 test	
Enrichment and extension	○ **IR Spectroscopy workshop**					

Appendix 1

Mathematical requirements

Students will be required to demonstrate the following mathematics skills in GCSE Biology assessments.

Questions will target maths skills at a level of demand appropriate to each subject. In Foundation Tier papers questions assessing maths requirements will not be lower than that expected at Key Stage 3 (as outlined in Mathematics Programmes of Study: Key Stage 3, by the DfE, document reference DFE00179-2013). In Higher Tier papers questions assessing maths requirements will not be lower than that of questions and tasks in assessments for the Foundation Tier in a GCSE qualification in mathematics.

1 Arithmetic and numerical computation
a Recognise and use expressions in decimal form
b Recognise and use expressions in standard form
c Use ratios, fractions and percentages
d Make estimates of the results of simple calculations

2 Handling data
a Use an appropriate number of significant figures
b Find arithmetic means
c Construct and interpret frequency tables and diagrams, bar charts and histograms
d Understand the principles of sampling as applied to scientific data
e Understand simple probability
f Understand the terms mean, mode and median
g Use a scatter diagram to identify a correlation between two variables
h Make order of magnitude calculations

3 Algebra
a Understand and use the symbols: =, <, <<, >>, >, ∝ , ~
d Solve simple algebraic equations

4 Graphs
a Translate information between graphical and numeric form
b Understand that y = mx + c represents a linear relationship
c Plot two variables from experimental or other data
d Determine the slope and intercept of a linear graph

5 Geometry and trigonometry
c Calculate areas of triangles and rectangles, surface areas and volumes of cubes

Mathematical skills references are taken from the DfE subject criteria.

NKS Chemistry Curriculum Map 2022

Year 12

Prior to commencing A Level students will have studied…

- **Atomic Structure**
- **Bonding, Structure and properties of matter**
- **Quantitative Chemistry**
- **Chemical Changes**
- **Energy changes**
- **The Rate and extent of chemical change**
- **Organic Chemistry**
- **Chemical Analysis**
- **Chemistry of the Atmosphere**
- **Using Resources**

An understanding of students' starting points is achieved by looking at GCSE grades, specifications as well as Baseline testing

At A level, students follow the OCR A course; this offers the students a challenging scheme but remains accessible to the majority. The structure of the course is linear and therefore we don't deviate from the prescribed route. This allows the move of students from A Level to AS only entry if necessary. The Year 12 course starts with GCSE transition tasks and the teaching of Module 2: Foundations of Chemistry. This unit is split equally and taught by both teachers and continually revisited throughout the two year course. In a similar way to GCSE we use the required practical activities to back up theoretical concepts. This allows students to have a more inquiry led experience.

	Term 1	**Term 2**	**Term 3**	**Term 4**	**Term 5**	**Term 6**
Content – Knowledge and Understanding **Skills and concepts**	Foundations in Chemistry: • Atoms, ions, compounds • Amount of substance • Acids and Redox • Electrons and Bonding • Shapes of Molecules and Intermolecular Forces **A Level Chemistry Practical Skills** PAG 1 PAG 2	Periodic table and energy: • Enthalpy Core Organic Chemistry and analysis: • Basic Concepts of Organic Chemistry • Alkenes and their reactions PAG 3	Periodic table and energy: • Enthalpy • Reaction Rates and Equilibrium Core Organic Chemistry and analysis: • Alcohols and their reactions • Halo alkanes and their reactions PAG 3 PAG 5	Periodic table and energy: • Explaining reactivity trends • PPE preparation Organic synthesis and Spectroscopy • Mass Spec • IR PAG 4	Periodic table and energy: • Periodicity Physical Chemistry: • Transition Elements Organic Chemistry and Analysis: • Carbonyl compounds PAG 9 PAG 10	Physical Chemistry: • Transition elements Organic Chemistry and Analysis: • Carbonyl compounds
Assessment	Baseline Test Regular Afl embedded into lessons	Module 2 test Regular Afl embedded into lessons	Enthalpy end of topic Test Hydrocarbons end of topic test Regular Afl embedded into lessons	Regular Afl embedded into lessons AS paper Breadth in Chemistry AS paper Depth in Chemistry	Regular Afl embedded into lessons Organic Chemistry and Analysis End of Topic Test	Regular Afl embedded into lessons
Enrichment and extension	○ IR Spectroscopy in a Suitcase workshop ○ UKC lectures					

NKS Chemistry Curriculum Map 2022

Year 13

Our Y13 curriculum builds on and extends the work done in Y12 by…

At A level, students follow the OCR A course; this offers the students a challenging scheme but remains accessible to the majority. The structure of the course is linear and therefore we don't deviate from the prescribed route. This allows the move of students from A Level to AS only entry if necessary. The Year 12 course starts with GCSE transition tasks and the teaching of Module 2: Foundations of Chemistry. This unit is split equally and taught by both teachers and continually revisited throughout the two-year course. In a similar way to GCSE we use the required practical activities to back up theoretical concepts. This allows students to have a more inquiry led experience.

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Content – Knowledge and Understanding **Skills and concepts**	Physical Chemistry: • Further Kinetics Organic Chemistry and Analysis: • Aromatic Chemistry PAG 11	Physical Chemistry: • Acids, Bases and Buffers Organic Chemistry and Analysis: • Amines, Amino Acids and Proteins PAG 11	Physical Chemistry: • Further enthalpy and an introduction to entropy Organic Chemistry and Analysis: • Organic Synthesis routes PAG 7	Physical Chemistry: • Redox and electrode Cell Potential Organic Chemistry and Analysis: • Organic Synthesis routes PAG 8	Physical Chemistry: • Transition elements Organic Chemistry and Analysis: • Chromatography and Spectroscopy PAG 12	Exam Period
Assessment	Regular Afl embedded into lessons Further Kinetics End of Topic Test	Regular Afl embedded into lessons Acids, Bases, Buffers End of Topic test Aromatic Chemistry end of topic test	Regular Afl embedded into lessons Year 13 PPE Paper 1 and 2 Paper 1 Inorganic Paper 2 Organic	Regular Afl embedded into lessons Redox and Electrode Cell Potential End of Unit test	Regular Afl embedded into lessons Paper 3 Unified Chemsitry	
Enrichment and extension	○ RSC Chemistry Olympiad ○ University of Greenwich Analytical Taster Day					