

Gleniffer High School Science Faculty
Senior Phase Course Rationales

Subject	Biology
Level	National 4
Course outline	<p>Throughout this course, pupils will develop their knowledge and understanding from the Broad General Education in Biology.</p> <p>Pupils will cover these areas throughout the course:</p> <p>Cell Biology The pupils will look at key areas such as - cell division, growth and repair, DNA, genes and chromosomes. Pupils will also look into the medical uses of cells and the use of cells in industry. This unit also covers cellular processes such as photosynthesis, respiration and the factors that affect these processes.</p> <p>Multicellular organisms The pupils will look at key areas such as - reproduction, genetics, growth and development of different organisms and how to maintain stable body conditions. This unit also covers growing plants, commercial use of plants.</p> <p>Life on Earth The pupils will look at key areas such as - how animal and plant species depend on each other, impact of natural hazards on all species and the impact of fertilisers on the environment. Pupils will also explore adaptations of different species and the importance of these.</p> <p>Skills for life, learning and work Pupils will develop their knowledge and understanding of Biological concepts, and be able to apply this knowledge in a problem solving context. They will also work on developing skills in scientific enquiry and investigation, this will involve practical technique, analytical thinking and presenting.</p>
Assessment	This course will be internally assessed and will be based on assessing both knowledge and skills from each unit. This course will also include an added value assessment in the form of an assignment carried out under supervision and open book conditions.
Progression from S4 to S5	This course will provide progression into National 5 Biology

Subject	Biology
Level	National 5
Course outline	<p>Throughout this course, pupils will develop their knowledge and understanding from the Broad General Education in Biology.</p> <p>Pupils will cover these areas throughout the course:</p> <p>Cell Biology The pupils will look at key areas such as - cell structure, transport of materials into and out of the cell, cell division, DNA (structure, replication and production of proteins e.g. hormones) and Genetic engineering (medical and industrial uses). This unit also covers cellular processes such as photosynthesis, respiration and the factors that affect these processes.</p> <p>Multicellular organisms The pupils will look at key areas such as - tissues in the body, organs, stem cells and growth. Pupils will also look at how cells are controlled and their communication in the body. This unit also covers reproduction and genetics (inheritance).</p> <p>Life on Earth The pupils will look at key areas such as - biodiversity and the distribution of life, energy in ecosystems and measurement of abiotic and biotic factors. Pupils will also explore the process of Natural selection and the evolution of species, as well as human impact on the environment.</p> <p>Skills for life, learning and work Pupils will develop their knowledge and understanding of Biological concepts, and be able to apply this knowledge in a problem solving context. They will also work on developing skills in scientific enquiry and investigation. This will involve practical technique, analytical thinking and presenting.</p>
Assessment	For pupils to gain a course award, they must pass an external course assessment. The external course assessment comprises a question paper and an added value assignment. In the added value assignment, learners will be assessed on their skills of scientific inquiry, their ability to use related knowledge, their skill in carrying out a meaningful and appropriately challenging task in biology and their communication skills.
Progression from S4 to S5	This course will provide progression into Higher Biology

Subject	Human Biology
Level	Higher
Recommended Entry	Candidates are expected to have a grade A or upper band B at National 5 Biology. Candidates are also expected to have

	National 5 Maths. Pupils who have achieved an A in Chemistry and Physics at Higher level, may take crash Higher Human in S6.
Course Aims and Purpose	This course is designed to build on and extend the biological concepts and skills developed at National 5 level.
Course Outline	<p>In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.</p> <p>Mandatory Units Human Cells (Higher) 6 SCQF credit points Physiology and Health (Higher) 6 SCQF credit points Neurobiology and Communication (Higher) 3 SCQF credit points Immunology and Public Health (Higher) 3 SCQF credit points Course assessment 6 SCQF credit points</p>

Subject	Chemistry
Level	National 4
Course outline	<p>Pupils will develop their knowledge and understanding of chemical concepts, in addition to developing skills for learning life and work such as problem solving, scientific enquiry and investigation, practical technique, analytical thinking and presenting.</p> <p>Chemical Changes and Structure In this Unit, learners will investigate through practical experience, rates of reaction, energy changes of chemical reaction, and the reactions of acids and bases and their impact on the environment. Focusing on these reactions, learners will work towards the concept of chemical equations. Learners will research atomic structure and bonding related to properties of materials.</p> <p>Nature's Chemistry In this Unit, learners will research the Earth's rich supply of natural resources which are used by each and every one of us. Learners will investigate how fossil fuels are extracted and processed for use. They will investigate: the chemistry of using fuels, their effect on the environment and the impact that renewable energy sources can have on this; plants as a source of fuels, carbohydrates and consumer products; and how chemists use plants in the development of products associated with everyday life.</p> <p>Chemistry in Society In this Unit, learners will focus on the chemical reactions, properties and applications of metal and alloys. The chemistry of metals in chemical cells is explored. Through research, learners will compare and contrast the properties and applications of plastics and new materials. Learners will investigate the use of</p>

	fertilisers, the formation of elements, and the presence of background radiation, and will research the use of chemical analysis for monitoring the environment.
Assessment	This course will be internally assessed and will be based on assessing both knowledge and skills from each unit. For pupils to gain a course award, they must pass a unit assessment for all three units, in addition to an added value assessment. The added value assessment will take the form of an in-depth investigation on an unfamiliar and/or integrated context. This will be assessed in the form of an assignment carried out under supervision and open book conditions.
Progression from S4 to S5	This course will provide progression into National 5 Chemistry.

Subject	Chemistry
Level	National 5
Course outline	<p>Pupils will develop their knowledge and understanding of chemical concepts, in addition to developing skills for learning life and work such as problem solving, scientific enquiry and investigation, practical technique, analytical thinking and presenting.</p> <p>Chemical Changes and Structure</p> <p>In this Unit, learners will develop scientific skills and knowledge of the chemical reactions in our world. Through practical experience, learners will investigate average rates of reaction and the chemistry of neutralisation reactions. Focusing on these reactions, learners will work towards the concept of balanced chemical equations. Learners will explore the mole concept, formulae and reaction quantities. The connection between bonding and chemical properties of materials is investigated.</p> <p>Nature's Chemistry</p> <p>The Earth has a rich supply of natural resources which are used by all of us. In this Unit, learners will investigate the physical and chemical properties of cycloalkanes, branched chain alkanes and alkenes, and straight chain alcohols and carboxylic acids. They will explore their chemical reactions and their uses in everyday consumer products. Learners will investigate the comparison of energy from different fuels.</p> <p>Chemistry in Society</p> <p>In this Unit, learners will develop skills and carry out practical investigations related to the chemistry of materials. Learners will focus on the chemistry of metals and their bonding, reactions and uses. The connection between bonding in plastics, their physical properties and their uses is investigated. Learners will investigate the chemical reactions and processes used to manufacture fertilisers. They will research the use and effect of different types</p>

	of nuclear of radiation. Learners will investigate chemical analysis techniques used for monitoring the environment.
Assessment	For pupils to gain a course award, they must pass an external course assessment. The external course assessment comprises a question paper and an added value assignment. In the added value assignment, learners will be assessed on their skills of scientific inquiry, their ability to use related knowledge, their skill in carrying out a meaningful and appropriately challenging task in Chemistry and their communication skills.
Progression from S4 to S5	This course will provide progression into Higher Chemistry.

Subject	Chemistry
Level	Higher
Recommended Entry	<p>Candidates are expected to have a grade A or upper band B at National 5 Chemistry. Candidates are also expected to have an A or B at National 5 Maths.</p> <p>In order to be presented for crash Higher Chemistry, a B pass at Higher Maths and A passes in the other Science subjects are essential.</p>
Course Aims and Purpose	This course is designed to build on and extend the concepts and skills developed at National 5 level.
Course Outline	<p>In this Course, and its component Units, there will be an emphasis on skills development and the application of those skills. Assessment approaches will be proportionate, fit for purpose and will promote best practice, enabling learners to achieve the highest standards they can.</p> <p>This Course provides learners with opportunities to continue to acquire and develop the attributes and capabilities of the four capacities as well as skills for learning, skills for life and skills for work.</p> <p>Mandatory Units Chemical Changes and Structure (Higher) 3 SCQF credit points Researching Chemistry (Higher) 3 SCQF credit points Nature's Chemistry (Higher) 6 SCQF credit points Chemistry in Society (Higher) 6 SCQF credit points Course assessment 6 SCQF credit points This Course includes six SCQF credit points to allow additional time for preparation for Course assessment. The Course assessment covers the added value of the Course.</p>

Subject	Physics
Level	National 4
Course outline	<p>The aims of the course are to:</p> <ul style="list-style-type: none"> ▪ develop and apply knowledge and understanding of physics ▪ develop an understanding of the role of physics in scientific issues and relevant applications of physics in society and the environment ▪ develop scientific inquiry and investigative skills ▪ develop scientific analytical thinking skills in a physics context ▪ develop the use of technology, equipment and materials, safely, in practical scientific activities ▪ develop problem solving skills in a physics context ▪ use and understand scientific literacy, in everyday contexts, to communicate ideas and issues ▪ develop the knowledge and skills for more advanced learning in physics <p>The course content includes:</p> <ul style="list-style-type: none"> ▪ Electricity and Energy – generation of electricity; electrical power; electromagnetism; practical circuits; gas laws & kinetic theory ▪ Waves and Radiation – wave characteristics; sound; electromagnetic spectrum; nuclear radiation ▪ Dynamics and Space – speed & acceleration; forces, motion & energy; satellites; cosmology <p>Skills for life, learning and work which will be developed throughout the course are:</p> <ul style="list-style-type: none"> ▪ Numeracy ▪ Thinking Skills – applying knowledge to solve problems in a different context; analysing results and drawing valid conclusions ▪ Literacy – listening and reading, research skills, report writing, presentations ▪ Working with others – during practical activities in pairs/groups ▪ Creativity – planning/designing experiments/investigations ▪ Citizenship - the applications of physics on our lives, including environmental and ethical implications
Assessment	<p>Units: Internally assessed: pass/fail – rigorous external verification by SQA</p> <ul style="list-style-type: none"> ▪ set of questions to cover Outcome 2 ▪ Scientific Report on an experiment or practical investigation ▪ Report of a research task <p>Added Value Unit (AVU):</p> <ul style="list-style-type: none"> ▪ Research task carried out in about 8 hours ▪ Can be presented in a variety of formats ▪ Assignment carried out under supervised open book conditions

Progression from S4 to S5	Progression to: <ul style="list-style-type: none"> ▪ National 5 Physics ▪ National 4 or 5 in another science subject ▪ Skills for Work Courses
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Subject	Physics
Level	National 5
Course outline	<p>The aims of the course are to:</p> <ul style="list-style-type: none"> ▪ develop and apply knowledge and understanding of physics ▪ develop an understanding of the role of physics in scientific issues and relevant applications of physics, including the impact these could make on society and the environment ▪ develop scientific inquiry and investigative skills ▪ develop scientific analytical thinking skills in a physics context ▪ develop the use of technology, equipment and materials, safely, in practical scientific activities ▪ develop planning skills ▪ develop problem solving skills in a physics context ▪ use and understand scientific literacy, in everyday contexts, to communicate ideas and issues to make scientifically informed choices ▪ develop the knowledge and skills for more advanced learning in physics ▪ develop skills of independent working <p>The course content includes:</p> <ul style="list-style-type: none"> ▪ Electricity and Energy – conservation of energy; electrical charge carriers & electric fields; potential difference(voltage); practical circuits; Ohm’s law; electrical power; specific heat capacity; gas laws & kinetic model ▪ Waves and Radiation – wave parameters & behaviour; light; electromagnetic spectrum; nuclear radiation ▪ Dynamics and Space – velocity & displacement; vectors & scalars; velocity/time graphs; acceleration; Newton’s Laws; projectile motion; space exploration; cosmology <p>Skills for life, learning and work which will be developed throughout the course are:</p> <ul style="list-style-type: none"> ▪ Numeracy ▪ Thinking Skills – applying knowledge to solve problems in a different context; analysing results and drawing valid conclusions ▪ Literacy – listening and reading, research skills (gathering and processing information), report writing, presentations ▪ Working with others – during practical activities in pairs/groups ▪ Creativity – planning/designing experiments/investigations ▪ Citizenship - the applications of physics on our lives, including environmental and ethical implications

Assessment	<p>Course Assessment: Question Paper plus Assignment – all externally marked by SQA</p> <p>Assignment:</p> <ul style="list-style-type: none"> ▪ Research task carried out in about 7 hours ▪ Assignment carried out under supervised open book conditions
Progression from S4 to S5	<p>Progression to:</p> <ul style="list-style-type: none"> ▪ Higher Physics ▪ National 5 in another science subject ▪ Skills for Work Courses

Subject	Physics
Level	Higher
Recommended Entry	An A or B pass in National 5 Physics is preferred for entry to this course. A grade A or B at N 5 Mathematics is strongly recommended and students are normally studying H Mathematics.
Course Aims and Purpose	The course builds on the student's knowledge of the subject at National 5.
Course Outline	<p>Our Dynamic Universe: 40 hours Content outline: equations of motion, motion-time graphs, Newton's Laws, energy, momentum and impulse, projectiles and satellite motion, special relativity, Doppler effect, Hubble's Law and the expanding Universe, Big Bang theory.</p> <p>Particles and Waves: 40 hours Content outline: Standard model of particles, electric & magnetic fields, particle accelerators, nuclear reactions, wave particle duality, interference and diffraction, refraction, irradiance, light spectra.</p> <p>Electricity: 20 hours Content outline: monitoring & measuring a.c. circuitry, electrical sources & internal resistance, capacitors, semiconductors.</p> <p>Researching Physics: 20 hours Content outline: Pupils research the physics underlying a topical issue, they will plan and carry out investigative practical work related to this issue and prepare a scientific communication which presents the aim, results and conclusions from this investigation.</p> <p>Course assessment Course assessment will be a question paper and an assignment. The question paper has two sections. Section 1 is objective questions (20 marks). Section 2 contains restricted and extended answer questions and is scaled to 80 marks. The assignment is carried out under supervised open book conditions and is worth 20 marks.</p>

Subject	Practical Electronics
Level	National 4, National 5
Course Aims and Purpose	<p>The aims of the course are to develop:</p> <ul style="list-style-type: none"> ▪ knowledge and understanding of key concepts in electronics and apply these in a range of contexts ▪ a range of practical skills in electronics, including skills in analysis and problem solving, design skills, skills in the safe use of tools and equipment, and skills in evaluating products and systems ▪ awareness of the importance of safe working practices in electronics ▪ an understanding of the role and impact of electronics in changing and influencing society and the environment.
Course Outline	<p>The course content includes:</p> <ul style="list-style-type: none"> ▪ Circuit Design: provides an understanding of key electrical concepts and electronic components. Learners will analyse electronic problems, design solutions to these problems and explore issues relating electronics to society and the environment. ▪ Circuit Simulation: the learner will use simulation software to assist in the design, construction and testing of circuits and systems and to investigate their behaviour. ▪ Circuit Construction: provides experience in assembling a range of electronic circuits, using permanent and non-permanent methods. Skills in practical wiring and assembly techniques will be developed and testing and fault-finding carried out. <p>Skills for life, learning and work are developed throughout the course</p> <p>Assessment N4/5 Units: Internally assessed: pass/fail – rigorous external verification by SQA N4 AVU Developing an Electronic Solution N5 Course Assessment: Practical Activity (80 marks) Assignment (20 marks), internally marked.</p> <p>Assignment:</p> <ul style="list-style-type: none"> ▪ Research task carried followed by write up carried out under supervised open book conditions.

Subject	Laboratory Skills
Level	National 4, National 5
Course Aims and Purpose	<p>This course provides opportunities for learners to recognise the impact Science makes on developing sustainability, and its effects on the environment, on society and on the lives of themselves and others.</p>

Course Outline	<p>Science: Fragile Earth (National 4) Learners will focus on two choices from the following four: energy, metals, water and food. They will investigate these resources through activities related to their source, origin, production and/or extraction.</p> <p>Science: Human Health (National 4) In this Unit, learners develop an understanding of factors which contribute to a healthy lifestyle, through a personal, community-based and global approach</p> <p>Applications of Science (National 4) In this Unit, learners explore science's contribution to communication technologies and the impact that these have had on the environment/society</p> <p>Added Value Unit: Science Assignment (National 4)</p> <p>Laboratory Science: Practical Skills (National 5) This Unit provides candidates with the opportunity to learn and develop the skills most commonly used in laboratories.</p>
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