SCIENCE FACULTY: S1&2 BGE COURSES

Rationale

S1&2 BGE courses are designed to provided clear progression from Level 2 Science studied in Primary to S3 BGE Level 4 courses. As such, whilst the majority of the course is set at level 3, the courses also include elements from National/Level 4 aimed at challenging pupils whilst adequately preparing them for chosen courses in S3 and beyond.

In these courses and their 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.

Structure

S1

Unit 1: Beginning to be a Scientist

- Science safety
- Scientific apparatus
- Science investigations
- Data collection and presentation
- Research task

Unit 2: Beginning to be a Physicist

- Energy changers
- Energy from food
- Alternative energy sources
- Introduction to circuit theory
- Resistance in circuits
- Current and Voltage
- Fruity batteries
- Friction

Unit 3: Beginning to be a Chemist

- States of matter
- Elements and compounds
- The periodic table
- Chemical reactions
- Acids and alkalis

Unit 4: Beginning to be a Biologist

- Microscopes
- Cells – structure and function
- Specialised cells
- Processes of life
- Organs and organ systems
- Monitoring health
- Health technology
- Microorganisms
- The immune system

S2

Unit 5: Being a Physicist

- Waves theory and types of waves
- Investigating Sound
- The Electromagnetic Spectrum
- Investigating heat
    - Heat transfer
    - Heat in the home
- Investigating light
    - Reflection
    - Refraction

Unit 6: Being a Biologist

- DNA, chromosomes and genes
- Extracting DNA
- Reproduction
    - Fertilisation
    - Embryonic development
- Photosynthesis
- Limiting factors
- Respiration
- Ecosystems
- Biodiversity

Unit 7: Being a Chemist

- Our place in the universe
    - The light year
    - Our solar system
    - Life on other planets
    - Gravity
- Structure of the earth
- Rock formation
- Uses of rocks
- Ores
- Extracting metals
- Persuasive writing task
- Properties of metals
- The reactivity series

S2 Assignment

Forensics Week

SCIENCE FACULTY: S3 BGE COURSES

Rationale

S3 BGE courses are designed to provided clear progression from S1 and S2 BGE Units set at Level 3 to Level 4/5 national courses available within the senior phase. As such, whilst a large proportion of the course is set at level 4, the courses also include elements from that National 5 aimed at challenging pupils whilst adequately preparing them for chosen courses in S4-S6.

In these courses, and their 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.

During S3 pupils also take part in the LOST Interdisciplinary Learning Week

Course Outlines:

S3 BGE BIOLOGY

Unit 1 – Life Through a Microscope

- Cell structure
- Transport across cell membranes
- Stem cells
- Producing new cells
- Proteins and enzymes
- DNA, genetics and the production of proteins
- Inheritance
- Respiration
- Genetic Engineering

Unit 2 – Investigating our Ecosystems (LOST IDL)

- Biodiversity and the distribution of life
- Sampling
- Human impact on the environment
- Photosynthesis
- Energy in ecosystems
- Food production
- Adaptation, natural selection and evolution of species
- Reproduction

S3 BGE Chemistry

Unit 1 – Fertilisers

- Enterprise Week (agrochemicals)
- Haber process
- Ostwald process

Unit 2 – Rates of reaction

Unit 3 – Atomic structure and bonding

- Ionic and covalent bonding
- Atomic formulae and equations
- Gram formula mass

Unit 4 - Acids and alkalis

S3 Assignmment

S3 BGE Physics

Unit 1 – Electricity

- Electrical charge
- Electrical circuits and circuit theory
- Measuring voltage and current
- Resistance
- Ohm's law
- Electronics
- Electrical Power
- Energy production and transmission
- Electromagnetism

Unit 2 – Dynamics and Space

- Density and pressure
- Kinetic theory of gases
- Measuring speed
- Accelerations
- Forces and Newton's Laws
- Rocket Theory
- Space exploration
- Cosmology

Unit 3 – Waves and Radiation

- Wave theory
- EM spectrum
- Lenses, reflection and refraction
- Nuclear radiation

SCIENCE FACULTY: SENIOR PHASE COURSES

HUMAN BIOLOGY – HIGHER

Purpose
This course is designed to build on and extend the biological concepts and skills developed at National 5 level.

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 Details
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.

Mandatory Units
- Human Cells (Higher)
- Physiology and Health (Higher)
- Neurobiology and Communication (Higher)
- Immunology and Public Health (Higher)

Course assessment: Two question papers and an assignment.
Paper 1 has objective questions (25 multiple choice marks). Paper 2 contains restricted and extended answer questions (95 marks). The assignment is carried out under supervised open book conditions and is worth 20 marks.

Progression
This course or its units may provide progression to:
Advanced Higher Biology
other qualifications in Biology or related areas
further study, employment and/or training

BIOLOGY – NATIONAL 5

Purpose
This course is designed to build on and extend the biological concepts and skills developed through National 4 level.

Recommended Entry
Candidates are expected to have achieved a pass at National 4 Biology. Candidates are also expected to have National 4 Maths.

Course Details
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.

Mandatory Units
Cell Biology (National 5)
Multicellular Organisms (National 5)
Life on Earth (National 5)

Course Assessment: Question paper and an assignment externally marked
Question Paper (100 marks)
Assignment (20 marks) - research task carried followed by write up carried out under supervised open book conditions

Progression
This course or its units may provide progression to:
Higher Human Biology
other qualifications in Biology or related areas
further study, employment and/or training

BIOLOGY – NATIONAL 4

Purpose
This course is designed to build on and extend the biological concepts and skills developed through National 3 level.

Recommended Entry
Candidates are expected to have achieved a pass at National 3 Biology. Candidates are also expected to have National 3 Maths.

Course Details
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.
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.
This course is internally assessed.

Mandatory Units
Cell Biology (National 4)
Multicellular Organisms (National 4)
Life on Earth (National 4)
Added Value Unit:
Biology Assignment (National 4)

Progression
This course or its units may provide progression to:
National 5 Biology
other qualifications in Biology or related areas
further study, employment and/or training

CHEMISTRY – HIGHER

Purpose
This course is designed to build on and extend the concepts and skills developed at National 5 level.

Recommended Entry
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.
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.

Course Details
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.
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.

Mandatory Units
Chemical Changes and Structure (Higher)
Researching Chemistry (Higher)
Nature's Chemistry (Higher)
Chemistry in Society (Higher)

Course assessment will be two question papers and an assignment.
Paper 1 has objective questions (25 multiple choice marks). Paper 2 contains restricted and extended answer questions (95 marks). The assignment is carried out under supervised open book conditions and is worth 20 marks.

Progression
This course or its units may provide progression to:
Advanced Higher Chemistry
other qualifications in Chemistry or related areas
further study, employment and/or training

CHEMISTRY – NATIONAL 5

Purpose
This course is designed to build on and extend the concepts and skills developed through National 4 level.

Recommended Entry
Candidates are expected to have achieved a pass at National 4 Chemistry. Candidates are also expected to have National 4 Maths.

Course Details
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.
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.

Mandatory Units
Chemical Changes and Structure (National 5)
Nature's Chemistry (National 5)
Chemistry in Society (National 5)
Units: Internally assessed: pass/fail – rigorous external verification by SQA

Course Assessment: Question Paper (100 marks) Assignment (20 marks), externally marked.
Assignment:

- Research task carried followed by write up carried out under supervised open book conditions

Progression
This course or its units may provide progression to:
Higher Chemistry
other qualifications in Chemistry or related areas
further study, employment and/or training

CHEMISTRY – NATIONAL 4

Purpose
This course is designed to build on and extend the concepts and skills developed through National 3 level.

Recommended Entry
Candidates are expected to have achieved a pass at National 3 Chemistry. Candidates are also expected to have National 4 Maths.

Course Details
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.
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.
This course is internally assessed.

Mandatory Units
Chemical Changes and Structure (National 4)
Nature's Chemistry (National 4)
Chemistry in Society (National 4)
Added Value Unit:
Chemistry Assignment (National 4)

Progression
This course or its units may provide progression to:
National 5 Chemistry
other qualifications in Chemistry or related areas
further study, employment and/or training

PHYSICS – HIGHER

Purpose
The course builds on the student's knowledge of the subject from N5. An A or B pass in National 5 Physics is preferred for entry to this course. A grade A or B at N5 Mathematics is strongly recommended, and students are normally studying H Mathematics.

Course Details
The course comprises two 40 hour units and two 20 hour units.

Unit - Title, Length and Brief Description
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.
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.

Electricity: 20 hours
Content outline: monitoring & measuring a.c. circuitry, electrical sources & internal resistance, capacitors, semiconductors.

Course assessment
Course assessment will be two question papers and an assignment.
Paper 1 has objective questions (25 multiple choice marks). Paper 2 contains restricted and extended answer questions (130 marks). The assignment is carried out under supervised open book conditions and is worth 20 marks.

PHYSICS – NATIONAL 5

Course outline

The aims of the course are to:

- 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

The course content includes:

- Electricity
- Properties of Matter
- Waves
- Radiation
- Dynamics
- Space

Skills for life, learning and work are developed throughout the course

Assessment

Units: Internally assessed: pass/fail – rigorous external verification by SQA

Course Assessment: Question Paper (135 marks) Assignment (20 marks), externally marked.

Assignment:

- Research task carried followed by write up carried out under supervised open book conditions

Progression to:

- Higher Physics
- National 5 in another science subject
- Skills for Work Courses

PHYSICS – NATIONAL 4

Course Outline

The aims of the course are to:

- 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

The course content includes:

- Electricity and Energy Waves and Radiation
- Dynamics and Space

Skills for life, learning and work are developed throughout the course.

Assessment

Units: Internally assessed: pass/fail – rigorous external verification by SQA

- set of questions to cover KU and Skills
- Scientific Report on an experiment or practical investigation
- Report of a research task

Added Value Unit (AVU):

- Research task followed by write up carried out under supervised open book conditions

Progression to:

- National 5 Physics
- National 4 or 5 in another science subject
- Skills for Work Courses

LABORATORY SKILLS - NATIONAL 4/5

SCQF: Level 4 (24 SCQF credit points)
Level 5 (6 SCQF credit points)

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.

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.

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

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

Added Value Unit: Science Assignment (National 4)

Laboratory Science: Practical Skills (National 5)
This Unit provides candidates with the opportunity to learn and develop the skills most commonly used in laboratories.

Recommended entry
Learners would normally be expected to have attained the skills and knowledge required by one or more of the following or by equivalent qualifications and/or experience:

- National 3 Science/Biology/Chemistry/Physics Course or relevant component Units
- In addition progression from National 4 Biology, Chemistry, Environmental Science, or Physics Courses where there is no clear progression to National 5
- In terms of prior learning and experience, relevant experiences and outcomes (e.g. from the Broad General Education) may also provide an appropriate basis for doing this Course.

Progression
This Course or its Units may provide progression to:

- other qualifications in science or related areas at National 4/5 Level.
- further study, employment or training

ENVIRONMENTAL SCIENCE – HIGHER

Purpose
This course is designed to build on and extend the environmental concepts and skills developed at National 5 level.

Recommended Entry
Candidates should have achieved the National 5 Environmental Science course or equivalent qualifications and/or experience prior to starting this course.

Course Details
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.

Mandatory Units

Living environment
- investigating ecosystems and biodiversity
- interdependence
- human influences on biodiversity

Earth's resources
- the geosphere
- the hydrosphere
- the biosphere
- the atmosphere

Sustainability
- global challenges
- food
- water
- energy
- waste management
- anthropogenic climate change

Course assessment: Two question papers and an assignment.
Paper 1 has objective questions (20 multiple choice marks). Paper 2 contains restricted and extended answer questions (100 marks). The assignment is carried out under supervised open book conditions and is worth 20 marks.

Progression
This course or its units may provide progression to other qualifications in related areas, further study, employment and/or training

ENVIRONMENTAL SCIENCE – NATIONAL 5

Purpose
This course is designed to build on and extend the concepts and skills developed through National 4 level.

Recommended Entry
Candidates are expected to have achieved a pass at National 4 Environmental Science or other relevant Science. Candidates are also expected to have National 4 Maths.

Course Details
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.
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.

Mandatory Units
Living environment
- investigating ecosystems and biodiversity
- interdependence
- human influences on biodiversity

Earth's resources
- an overview of Earth systems and their interactions
- the geosphere
- the hydrosphere
- the biosphere
- the atmosphere

Sustainability
- an introduction to sustainability
- food
- water
- energy
- waste management

Course Assessment: Question Paper (100 marks) Assignment (20 marks), externally marked.
Assignment:
- Research task carried followed by write up carried out under supervised open book conditions

Progression
This course or its units may provide progression to:
Higher Environmental Science, other qualifications in Environmental Science or related areas further study, employment and/or training

ENVIRONMENTAL SCIENCE – NATIONAL 4

Purpose
This course is designed to build on and extend the concepts and skills developed through National 3 Environmental Science and/or S1-S3 BGE Science.

Recommended Entry
Candidates are expected to have achieved a pass at National 3 Environmental Science or other relevant Science and/or National 3 Geography. Candidates are expected to have achieved or working towards a National 4 Maths award.

Course Details
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.
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.

Mandatory Units
- Living environment
- Sustainability
- Earth's resources

Added Value Unit

Assessment
Units: Internally assessed: pass/fail – rigorous external verification by SQA
- set of questions to cover KU and Skills
- Scientific Report on an experiment or practical investigation
- Report of a research task

Added Value Unit (AVU):
- Research task followed by write up carried out under supervised open book conditions

Progression
This course or its units may provide progression to:
National 5 Environmental Science, other qualifications in Environmental Science or related areas further study, employment and/or training