Junior category

The syllabus encompasses the whole of SPM Form 4- 5 (equivalent to IGCSE Year 10 and 11) and STPM syllabi (equivalent to A level, IB, UEC, Foundation) as well as the topics stated below.

For subjects besides Maths, Students are expected to have learnt:
Mathematics skills commonly encountered at Form 4 and Form 5 levels such as plotting graphs, calculus and algebra. More advanced mathematics skills, if required, will be included as one of the advanced topics.

Biology

- Cell biology, Microbiology
    - Structure and function of cell organelles
    - Prokaryotic cell organization
- Plant and animals
    - Structure and function of tissues and organs
- Ethology and Ecology
    - Types of innate and learned, foraging, defensive, and mating behaviour
    - Biological rhythms
    - Individual organisms, population, communities and ecosystems
- Genetics and Evolution
    - Variation (mutation and modification)
    - Mendelian inheritance and the Hardy-Weinberg principle
    - Multiple allelism, recombination and sex linkage
    - Mechanisms of evolution (mutation, natural selection, isolation, adaptation)
- Biosystematics
    - Structure and function, evolutionary and ecological relationships
- Biochemistry
    - Reaction pathways between organisms
    - Biogeochemical cycles

Chemistry

- Physical chemistry (encompasses both O-level and SPM), and also
    - ~~Thermochemistry: Hess' law and Gibbs Free Energy (read up from A level textbook)~~
    - Hygroscopicity
- Organic chemistry (encompasses both O-level and SPM), and also
    - ~~Unit cell~~
    - Structural, skeletal and condensed formula
    - Oxidation of alcohols to aldehydes, ketones and carboxylic acids
    - Reduction of aldehydes, ketones and carboxylic acids to alcohols
    - Acidic and basic hydrolysis of esters
- Inorganic chemistry
    - Group 1, 2, 14, 15, 16, 17 chemistry
- Analytical chemistry

Physics

- Mechanics
    - 1D & 2D Kinematics
    - Newton's Laws of Motion
    - Momentum, work and energy
    - Fluid mechanics (including Pascal's, Archimedes' and Bernoulli's principles)
    - Oscillations (equations of motion, frequency, angular frequency and period)
    - Rotational dynamics and kinematics
- Electricity and magnetism
    - Electrostatics and magnetic fields
    - Electromagnetic induction and forces
    - DC Circuits
- Wave and optics
    - Wave properties and propagation (inc. Fermat's principle and Snell's Law)
    - Interference and diffraction
    - Geometrical optics (including reflection, refraction, polarization)
    - Optical devices
- Classical thermodynamics
    - Molecular properties and kinetic theory of ideal gases
    - Isothermal, isobaric and isochoric processes
    - Heat transfer and phase transitions
- Basic Modern Physics
    - Quantum physics (inc. photoelectric effect, Compton scattering, Bohr atomic model)
    - Nuclear physics (inc. decays, mass defect)

Mathematics

- Inequality
- Polynomial
- Sequence
- Vector
- Single Variable Calculus
- Permutations and Combinations
- Extremal combinatorics
- Probability and expected value
- Euclidean Geometry
- Trigonometry
- Divisibility
- Modular Arithmetic
- Functional equation
- Diophantine equation
- Proof writing and logic

Planetary Science

- Meteorology
- Geology
- Oceanography
- Celestial Mechanics (basic knowledge of Kepler's Laws and orbits)
- Celestial Coordinates and the Cosmic Distance Ladder
- Practical Observation

Social Science

- Microeconomics
    - Competition
    - Market failures
    - Government intervention
- Macroeconomics
    - AD/AS model
    - Economic history
    - Fiscal, monetary and supply-side policy
    - Inequality & institutions
    - Currency, exchange rates
    - Trade & protectionism (including Keynesian & Monetarist schools of thought)
- Basic Philosophical Knowledge
    - Ethics (including utilitarianism and deontology)
    - Epistemology (including empiricism and rationalism)
    - Metaphysics
    - Political Philosophy
- Language Characteristic Pattern Analysis
- Logic

Senior category

The syllabus encompasses the whole of STPM Form 6 (equivalent to A level, IB, UEC, Foundation) syllabi as well as the topics stated below.

For subjects besides Maths, Students are expected to have learnt:
Mathematics skills commonly encountered at Pre-U level such as plotting graphs, calculus and algebra. More advanced mathematics skills, if required, will be included as one of the advanced topics.

Biology

- Cell biology, Microbiology
  - Structure and function of cell organelles
  - Prokaryotic cell organization
- Plant and animals
  - Structure and function of tissues and organs
- Ethology and Ecology
  - Method of ethology
  - Types of innate and learned, foraging, defensive, and mating behaviour
  - Biological rhythms
  - Individual organisms, population, communities and ecosystems
- Genetics and Evolution
  - Variation (mutation and modification)
  - Mendelian inheritance and the Hardy-Weinberg principle
  - Multiple allelism, recombination and sex linkage
  - Mechanisms of evolution (mutation, natural selection, isolation, adaptation)
- Biosystematics
  - Structure and function, evolutionary and ecological relationships
- Biochemistry
  - Reaction pathways between organisms
  - Biogeochemical cycles

Chemistry

- Physical chemistry (encompasses both A-level and Form 6), and also
  - Gibbs free energy
- Organic chemistry
  - Infrared (IR) spectroscopy
  - Stereochemistry (R/S and E/Z configurations)
  - Organic synthesis (encompasses both A-level & Form 6 and some concepts from Organic Chemistry by Clayden)
- Inorganic chemistry
  - ~~Solid state structure~~
  - Mass spectroscopy
  - Group 1, 2, 14, 15, 16, 17 and Transition elements chemistry
  - Stereochemistry (cis/trans, mer/fac)
  - Crystal Field Theory (CFT) - Calculation aspect will not be tested
- Analytical chemistry
  - Potentiometric titration

Physics

- Mechanics
    - 1D & 2D Kinematics
    - Newton's Laws of Motion
    - Momentum, work and energy
    - Fluid mechanics (including Pascal's, Archimedes' and Bernoulli's principles)
    - Oscillations (equations of motion, frequency, angular frequency and period)
    - Rotational dynamics and kinematics
- Electricity and magnetism
    - Electrostatics and magnetic fields
    - Electromagnetic induction and forces
    - DC Circuits
- Wave and optics
    - Wave properties and propagation (inc. Fermat's principle and Snell's Law)
    - Interference and diffraction
    - Geometrical optics (including reflection, refraction, polarization)
    - Optical devices
- Classical thermodynamics
    - Molecular properties and kinetic theory of ideal gases
    - Isothermal, isobaric and isochoric processes
    - Heat engines and efficiencies (including Carnot engine)
    - Heat transfer and phase transitions
- Basic Modern Physics
    - Quantum physics (inc. photoelectric effect, Compton scattering, Bohr atomic model)
    - Nuclear physics (inc. decays, mass defect)
    - Special relativity (inc. Lorentz transformations, Minkowski diagrams, relativistic Doppler effect)

Mathematics

- All topics from the Junior syllabus
- Multivariable calculus
- Statistics
- Ellipse
- Set theory
- 3D-Vector
- Linear algebra
- Order and primitive roots
- Multiplicative number theory
- p-adic valuation
- Complex numbers
- Analysis
- Graph theory

Planetary Science

- Meteorology
- Geology
- Oceanography
- Radiation
- Celestial Timekeeping
- Practical Observation
- Basic Spherical Trigonometry and Celestial Coordinate systems
- Astrodynamics (Kepler's Laws, Conservation of Energy and Angular Momentum, Orbits)
- Applied optical systems (telescopes and cameras)

Social Science

- Microeconomics
    - Competition
    - Market failures
    - Government intervention
    - Game theory
- Macroeconomics
    - AD/AS model
    - Fiscal, monetary and supply-side policy
    - Inequality & institutions
    - Currency, exchange rates
    - Trade & protectionism
    - Economic history (inc. Keynesian & Monetarist schools of thought)
- Basic Philosophical Knowledge
    - Ethics (including utilitarianism and deontology)
    - Epistemology (including empiricism and rationalism)
    - Metaphysics
    - Political Philosophy
- Language Characteristic Pattern Analysis
- Logic