Scotch College

SCIENCE

CHEMICAL SCIENCES

- Solids, liquids & gases
- Non-Newtonian fluids
- Changes in state

- States of matter
- Solutions
- Suspensions & colloids
- Mixtures
- Concentrations
- Pollutants

- States of matter
- Atoms
- Elements
- The Periodic Table
- Physical and chemical change
- Word and chemical equations
- Types of chemical reactions

- Conservation of mass
- Acids and bases
- Reactions and word equations
- Combustion and corrosion
- Exothermic & endothermic reactions

- Atomic structure & properties of elements
- Types and rates of chemical reactions

BIOLOGICAL SCIENCES

- Adaptations
- Biomes
- Invasive Species
- Climate Change

- Classification
- Biodiversity
- Ecosystems

- Cells
- Circulatory System
- Respiratory System
- Digestive System

- Cellular Respiration
- Ecology
- Enzymes
- Nervous & Endocrine Systems
- Metabolism
- Homestasis

- Genetics
- DNA
- Cell Division
- Biotechnology
- Evolution

PHYSICS

- Electrical circuits
- Conductors & insulators
- Sources of electrical energy
- Renewable vs non-renewable energy

- Forces
- Gravity
- Inclined planes

- Energy and its forms
- Conservation of energy
- Heat
- Conduction, convection & radiation
- Energy transfer and transportation
- Potential & kinetic energy

- Sound waves
- The ear
- Light
- Reflection & refraction
- The eye
- Electrical energy transfer
- Currents
- Circuits

- SI units & measurement
- Scalars & vectors
- Distance & displacement
- Velocity & speed
- Acceleration
- Sketching & analysing motion graphs
- Newton's Laws of Motion & Forces
- Car safety designs
- Newton's Laws of Motion & Collisions
- Energy transfers, transformation & conservation
- Cosmology: origin & evolution of the Universe

EARTH & SPACE

- Natural disasters
- Continental drift

- The water cycle
- El Niño & La Niña
- Renewability & sustainability
- Solar system
- Seasons
- Phases of the moon
- Eclipses
- Tides
- Gravity

- Rocks & minerals

- Structure of the Earth
- Plate tectonics
- Continental drift
- Earthquakes & volcanoes [mechanisms]—*extension*

- Earth's spheres
- The Nitrogen Cycle
- The Water Cycle
- The Carbon Cycle
- Greenhouse Effect
- Climate Change
- Human Impacts on the Environment
- The Solar System
- Galaxies and the life cycle of stars
- Big Bang Theory, Cosmology & Indigenous Astronomy

Y6

Y7

Y8

Y9

Y10

YEAR 11 & 12

ATAR

MARINE & MARITIME

SCIENCE UNDERSTANDING

MARINE
- Oceanography
  - Properties of seawater
  - WA marine ecosystems and species classifications
  - Nitrogen, carbon and water cycles
  - Ocean currents and global atmospheric circulation systems
- Environmental and resource management
  - The use of the WA marine environment to obtain salt, seawater, petroleum and gas
  - Australia Exclusive Economic Zone (AEEZ)
  - WA fisheries and aquaculture

MARITIME
- Design
  - Craft and Hull design
- History and archaeology
  - Trade routes
  - Coastal exploration
  - WA shipwrecks

NAUTICAL CONCEPTS AND SKILLS

POWER BOATING
- Trip Planning
- Rules and regulations
- Safety & equipment
- Emergency Situations
- Collision avoidance
- Maintenance

SEAMANSHIP SKILLS
CHARTING SKILLS

EXAMINATION:
School Based Exam

SCIENCE UNDERSTANDING

MARINE
- Oceanography
  - WA ocean currents
  - Production of biomass and energy transfer in WA marine ecosystems
  - Phytoplankton and zooplankton
  - Coral
  - Greenhouse effect
  - Coastal erosion
  - Coastal engineering structures
- Environmental and resource management
  - Major issues affecting WA marine ecosystems
  - Marine pollutants
  - Managing marine biodiversity
  - Ecotourism and ethical management

MARITIME
- History and archaeology
  - Locating shipwrecks
  - Formation and decay
  - Underwater wreck site excavation
  - Conservation techniques
  - The Batavia shipwreck

NAUTICAL CONCEPTS AND SKILLS

SNORKELLING AND DIVING

EXAMINATION:
3hr WACE examination

HUMAN BIOLOGY

THE FUNCTIONING HUMAN BODY
- Cells and Tissues
- Metabolism
- Respiratory system
- Circulatory system
- Digestive system
- Musculoskeletal system
- Excretory system

REPRODUCTION & INHERITANCE
- DNA
- Cell Production
- Human Reproduction
- Types of Inheritance

EXAMINATION:
School Based Exam

HOMEOSTASIS & DISEASE
- Endocrine system
- Central & Peripheral Nervous systems
- Homeostasis
- Response to infection

HUMAN VARIATION & EVOLUTION
- Mutations
- Gene pools
- Evidence for evolution
- Hominid evolutionary trends

EXCURSION:
Harry Perkins BioDiscovery Centre

EXAMINATION:
3hr WACE examination

BIOLOGY

ECOSYSTEMS & BIODIVERSITY
- Describing biodiversity
  - Classification systems
  - Habitats
  - Species interactions
  - Abiotic and biotic factors
- Ecosystem dynamics
  - Energy transfer
  - Population dynamics
  - Fire
  - Human impact
  - Conservation strategies
  - Models of ecosystem interactions

SINGLE CELL TO MULTICELLULAR ORGANISMS
- Cells as the basis of life
  - Eukaryotic and Prokaryotic cells
  - Metabolism
  - Movement across a membrane
  - Enzymes
  - Photosynthesis
  - Cellular respiration
- Multicellular organisms
  - Plant and animal gas exchange
  - Animal digestion
  - Animal excretion
  - Water and mineral transport in plants

EXAMINATION:
School Based Exam

CONTINUITY OF SPECIES
- Heredity
  - DNA
  - Genes
  - Genetic variation and mutation
  - Proteins and protein synthesis
  - Phenotypes and genotypes
  - DNA sequencing
  - Biotechnology
- Continuity of life on Earth
  - Theory of evolution
  - Phylogenetic trees
  - Mutation
  - Natural selection
  - Speciation
  - Selection pressures

SURVIVING IN A CHANGING
- Homeostasis
  - Thermoregulatory mechanisms
  - Nitrogenous waste
  - Animal adaptations
  - Xerophytes and halophytes
- Infectious disease
  - Pathogens and their life cycles
  - Organisms that cause disease
  - Transmission and spread of disease
  - Management strategies

EXAMINATION:
3hr WACE examination

CHEMISTRY

CHEMICAL FUNDAMENTALS
- Properties and structure of atoms and materials
- Chemical reactions: reactants, products and energy change

MOLECULAR INTERACTIONS & REACTIONS
- Intermolecular forces and gases
- Aqueous solutions and acidity
- Rates of chemical reactions

EXAMINATION:
School Based Exam

EQUILIBRIUM, ACIDS AND BASES AND REDOX REACTIONS
- Acids and bases
- Oxidation and reduction

ORGANIC CHEMISTRY AND CHEMICAL SYNTHESIS
- Properties and structure of organic materials
- Chemical synthesis

EXAMINATION:
3hr WACE examination

PHYSICS

MOTION FORCES & ENERGY
- Motion and forces
- Thermal energy
- Mechanical energy

WAVES, NUCLEAR & ELECTRICAL PHYSICS
- Waves
- Ionising radiation
- Nuclear reactions
- Electrical forces and energy

EXAMINATION:
School Based Exam

GRAVITY AND RELATIVITY
- Gravity and motion
- Static equilibrium and centre of mass
- Circular motion in horizontal and vertical planes
- Relativity

ELECTROMAGNETISM AND MODERN PHYSICS
- Electromagnetism
- Particle accelerators
- Wave particle duality and the quantum theory
- Cosmology

EXAMINATION:
3hr WACE examination

GENERAL

MARINE & MARITIME

SCIENCE UNDERSTANDING

MARINE
- Oceanography
  - Properties of seawater
  - Wind formation
  - Tides, waves and ocean currents
  - Ocean zones and food webs
  - Marine organism adaptations and classification
- Environmental and resource management
  - WA fisheries: rules, regulations and issues
  - Protection of marine environments
  - WA resource management

MARITIME
- Design
  - Design and construction
  - Materials
- Small craft
  - Buoyancy and stability
  - Pulley systems
  - Propulsion

NAUTICAL CONCEPTS AND SKILLS

SNORKELLING AND DIVING OR SAILING

SCIENCE UNDERSTANDING

MARINE
- Oceanography
  - WA marine ecosystems and species classifications
  - Food chains and webs
  - Mangrove ecosystem adaptations
  - Measuring abiotic and biotic features
  - Global surface ocean currents and global atmospheric circulation
  - Climate change
  - Coastal erosion and coastal engineering structures
  - Artificial reefs, ports and canals
- Environmental and resource management
  - WA aquaculture and key species farmed
  - Marine tourism in WA

MARITIME
- Design
  - Characteristics of marine construction material
  - Maritime equipment, marine or water craft, design and construction; (surfboards, boat hulls and anchors)
  - Repair and maintenance of fibreglass craft
  - Construction material protection and their side effects
- Small craft
  - Types of motors
  - Features of small craft systems
  - Equipment care and maintenance
  - Fuel and ignition
  - Cooling system
  - Engine diagnostics and management of engine failure

NAUTICAL CONCEPTS AND SKILLS

POWER BOATING
- Trip Planning
- Rules and regulations
- Safety & equipment
- Emergency Situations
- Collision avoidance
- Maintenance

IB DIPLOMA [2 Year]

BIOLOGY

UNITY & DIVERSITY
- Water
- Nucleic acids
- Origins of cells
- Cell structure
- Viruses
- Diversity of organisms
- Classification and cladistics
- Evolution and speciation
- Conservation of biodiversity

FORM & FUNCTION
- Carbohydrates and lipids
- Proteins
- Membranes and membrane transport
- Organelles and compartmentalization
- Cell specialization
- Gas exchange
- Transport
- Muscle and motility
- Adaptation to environment
- Ecological niches

INTERACTION & INTERDEPENDANT
- Enzymes and metabolism
- Cell respiration
- Photosynthesis
- Chemical signalling
- Neural signalling
- Integration of body systems
- Defence against disease
- Populations and communities
- Transfer of energy and matter

CONTINUITY & CHANGE
- DNA replication
- Protein synthesis
- Mutations and gene editing
- Cell and nuclear division
- Gene expression
- Water potential
- Reproduction
- Inheritance
- Homeostasis
- Natural selection
- Sustainability and change
- Climate change

CHEMISTRY

MODELS OF THE PARTICULATE NATURE OF MATTER
- Introduction to the particulate nature of matter
- The nuclear atom
- Electron configurations
- Counting particles by mass: The mole
- Ideal gases

MODELS OF BONDING & STRUCTURE
- The ionic model
- The covalent model
- The metallic model
- From models to materials

CLASSIFICATION OF MATTER
- The periodic table: Classification of elements
- Functional groups: Classification of organic compounds

WHAT DRIVES CHEMICAL REACTIONS?
- Measuring enthalpy change
- Energy cycles in reactions
- Energy from fuels
- Entropy and spontaneity

HOW MUCH, HOW FAST & HOW FAR?
- How much? The amount of chemical change
- How fast? The rate of chemical change
- How far? The extent of chemical change

WHAT ARE THE MECHANISMS OF CHEMICAL CHANGE?
- Proton transfer reactions
- Electron transfer reactions
- Electron sharing reactions
- Electron-pair sharing reactions

PHYSICS

SPACE, TIME AND MOTION
- Kinematics
- Forces and momentum
- Work, energy and power
- Rigid body mechanics
- Galilean and special relativity

THE PARTICULATE NATURE OF MATTER
- Thermal energy transfers
- Greenhouse effect
- Gas laws
- Thermodynamics
- Current and circuits

WAVE BEHAVIOUR
- Simple harmonic motion
- Wave model
- Wave phenomena
- Standing waves and resonance
- Doppler effect

FIELDS
- Gravitational fields
- Electric and magnetic fields
- Motion in electromagnetic fields
- Induction

NUCLEAR AND QUANTUM PHYSICS
- Structure of the atom
- Quantum physics
- Radioactive decay
- Fission
- Fusion and stars