

SCO INTERNATIONAL OLYMPIAD

SCO IBO COMPILED SYLLABUS

Grade 8-12 Biology Olympiad pathway aligned to global IBO-style standards

Designed for Grade 8-12 biology learners globally with chapter-wise syllabus progression, practical reasoning, data interpretation, and IBO-style inquiry-based pedagogy.

- grade-wise chapter notes and learning outcomes for schools, teachers, parents, and students
- global Biology Olympiad alignment across cell biology, plant physiology, animal physiology, genetics, evolution, ecology, ethology, and biosystematics
- online-friendly SCO preparation pathway with reasoning, practical skills, ethical science, and future-ready life-science learning

Cell Biology	Genetics	Ecology	Human Physiology	Practical Skills
Microbes	Biotechnology	Biodiversity	Environment	Research Skills

SCO International Biology Olympiad (SCO IBO)

Compiled Syllabus & Learning Outcomes for Grade 8 to Grade 12

A global, online-ready biology pathway designed for progressive learning, Olympiad-style reasoning, school implementation, and preparation toward international biology standards.

Document Purpose

This syllabus is designed as a visitor-facing, PDF-ready guide for SCO International Biology Olympiad. It presents grade-wise chapters, chapter notes, learning outcomes, and the bridge from school biology to global IBO-style expectations: understanding, application, problem solving, practical interpretation, scientific ethics, and life-science pedagogy.

1. SCO IBO Global Pedagogy and Positioning

SCO IBO is structured as an online Biology Olympiad pathway for Grade 8 to Grade 12 learners. It gives schools and families a clear progression from foundational life-science concepts to advanced topics such as physiology, genetics, molecular biology, biotechnology, evolution, ecology, conservation and practical reasoning. The pathway is designed to be accessible across countries while still reflecting the conceptual demand of global Biology Olympiad preparation.

The official International Biology Olympiad emphasizes the ability to tackle biological problems and experiments, independent thinking, problem solving, creativity and perseverance. SCO IBO uses the same educational spirit but adapts it into a school-friendly, online assessment and preparation model for wider global participation.

SCO IBO Three-Cycle Online Model

SCO IBO is conducted under three major cycles each year: Spring, Summer and Winter. Each cycle can contain multiple official online exam dates so that schools in different countries can select a suitable schedule while maintaining one consistent academic standard.

Exam Year	Cycle	Exam Window	Result / Publish Date	Availability
2026	SPRING	01 Jan 2026 - 31 Mar 2026	30 Apr 2026	Multiple official online dates within the cycle
2026	SUMMER	01 Apr 2026 - 31 Jul 2026	31 Aug 2026	Multiple official online dates within the cycle
2026	WINTER	01 Aug 2026 - 31 Dec 2026	28 Feb 2027	Multiple official online dates within the cycle
2027	SPRING	01 Jan 2027 - 31 Mar 2027	30 Apr 2027	Multiple official online dates within the cycle
2027	SUMMER	01 Apr 2027 - 31 Jul 2027	31 Aug 2027	Multiple official online dates within the cycle
2027	WINTER	01 Aug 2027 - 31 Dec 2027	29 Feb 2028	Multiple official online dates within the cycle

2. Global IBO Standard Alignment

The SCO IBO syllabus is mapped to the broad domain balance used in official IBO-style guidance. Theoretical biology should not be treated as memorisation only; it should test understanding, processing of information and application of biological knowledge. Practical reasoning should focus on observation, measurement, classification, variables, experimental design, graphing, data interpretation and appropriate accuracy.

Global IBO Domain	Indicative Weight	SCO IBO Grade 8-12 Coverage	Pedagogical Focus
Cell Biology, Microbiology & Biotechnology	20%	Cells, membranes, organelles, cell division, biomolecules, microbes, molecular biology, recombinant DNA, applications.	Builds microscopic observation, cellular process reasoning, molecular mechanism interpretation and biotechnology literacy.
Plant Anatomy & Physiology	15%	Plant tissues, morphology, transport, mineral nutrition, photosynthesis, respiration, growth, reproduction in flowering plants.	Develops structure-function thinking in seed plants and links physiology to environment and agriculture.
Animal Anatomy & Physiology	25%	Human and animal systems: digestion, gas exchange, circulation, excretion, movement, neural/endocrine control, health and disease.	Strengthens systems biology, homeostasis, comparative physiology and biomedical interpretation.
Ethology / Behaviour	5%	Behavioural adaptations, communication, responses, social behaviour and ecological significance.	Introduces evidence-based interpretation of animal behaviour and environment-response patterns.
Genetics & Evolution	20%	Inheritance, variation, chromosome theory, molecular genetics, gene expression, evolution, speciation and phylogeny.	Builds data reasoning from crosses, pedigrees, DNA evidence, population change and evolutionary models.
Ecology	10%	Organisms, populations, ecosystems, energy flow, nutrient cycles, conservation, pollution and sustainability.	Connects biology to planetary health, climate, biodiversity, resource management and ethical stewardship.
Biosystematics	5%	Classification, taxonomy, biodiversity, phylogenetic relationships and organismal diversity.	Develops comparative reasoning and modern classification literacy across living systems.

Practical and Data-Skills Thread Across All Grades

Every grade should gradually build laboratory and online-practical reasoning: observing biological structures, interpreting diagrams, reading microscopes and graphs, designing fair tests, identifying variables, using tables, drawing evidence-based conclusions, and presenting numerical results with appropriate accuracy.

3. Grade-wise Compiled Syllabus and Learning Outcomes

The tables below convert the SCO IBO Grade 8-12 syllabus into a global Biology Olympiad learning path. Each chapter note explains the purpose of the topic, while the outcome column defines what a learner should understand, apply or demonstrate.

Class 8 SCO IBO Syllabus

Class 8 Learning Focus

Foundation year: students move from everyday biology to scientific explanation through crops, microbes, cells, reproduction, health and environment.

No.	Chapter Title	Chapter-wise Note	Learning Outcomes and IBO Skill Focus
1	Crop Production and Management	Introduces agriculture as an applied biological system where soil, water, seeds, microbes and human decisions interact.	Explain field preparation, sowing, irrigation, fertilisation and plant protection; compare traditional and modern practices; connect crop yield with sustainability and food security.
2	Microorganisms: Friend and Foe	Builds early microbiology by comparing useful and harmful microorganisms in food, health, industry and ecosystems.	Classify microbes, explain fermentation and decomposition, identify pathogen transmission, and evaluate vaccination, hygiene and preservation as biological control strategies.
3	Conservation of Plants and Animals	Connects biodiversity with habitats, endangered species, sanctuaries, seed banks and ecological responsibility.	Distinguish in-situ and ex-situ conservation, interpret reasons for biodiversity loss, and explain how protected areas and seed banks support long-term survival.
4	Cell Structure and Functions	Provides the first strong bridge to IBO-style cell biology by linking cell types, organelles and functions.	Compare prokaryotic and eukaryotic cells, identify organelles, relate structure to function, and use diagrams to explain cells as units of life.
5	Reproduction in Animals	Introduces continuity of life through life cycles, fertilisation, development and reproductive strategies.	Compare asexual and sexual reproduction, describe fertilisation and development, and interpret life-cycle diagrams with scientific vocabulary.
6	Reaching the Age of Adolescence	Builds age-appropriate human biology with hormonal regulation, puberty and responsible health understanding.	Explain puberty, secondary sexual characteristics and endocrine changes; connect reproductive health with respect, safety and informed decision-making.
7	Pollution of Air and Water	Links biology with environmental chemistry, public health and ecosystem balance.	Identify pollution sources and ecological effects, interpret mitigation strategies, and connect clean air and water to biodiversity and human well-being.

Class 9 SCO IBO Syllabus

Class 9 Learning Focus

Concept-building year: students strengthen cell biology, tissues, classification, disease, natural resources and food production.

No.	Chapter Title	Chapter-wise Note	Learning Outcomes and IBO Skill Focus
1	The Fundamental Unit of Life	Deepens cell theory through microscopy, membranes, organelles, diffusion, osmosis and early cell division concepts.	Use cell theory to explain living systems, compare organelles, interpret microscope-based observations and connect membrane transport with cellular survival.
2	Tissues	Explains how cells specialise into tissues and how structure supports function in plants and animals.	Differentiate plant and animal tissues, compare meristematic and permanent tissues, and relate epithelial, connective, muscular and nervous tissues to function.
3	Diversity in Living Organisms	Builds biosystematics through classification criteria, kingdoms, hierarchy and organismal diversity.	Apply classification principles, compare major groups of organisms, and interpret taxonomy as a method for organising biological diversity.
4	Why Do We Fall Ill?	Introduces disease biology, pathogens, immunity, prevention and public-health reasoning.	Differentiate infectious and non-infectious disease, explain immunity and vaccination, and evaluate hygiene, nutrition and prevention strategies.
5	Natural Resources	Connects biotic and abiotic resources with cycles, sustainability and environmental balance.	Explain resource use, biogeochemical cycles and ecosystem dependence; evaluate sustainable management of air, water, soil and biodiversity.
6	Improvement in Food Resources	Links applied biology with agriculture, animal husbandry, breeding and food production systems.	Explain crop improvement, animal husbandry and single-cell protein; evaluate productivity, nutrition and sustainability in food systems.

Class 10 SCO IBO Syllabus

Class 10 Learning Focus

Bridge year: students connect life processes, control systems, reproduction, genetics, evolution and ecosystem management.

No.	Chapter Title	Chapter-wise Note	Learning Outcomes and IBO Skill Focus
1	Life Processes	Builds systems biology through nutrition, respiration, transport and excretion across organisms.	Explain major life processes, compare autotrophic and heterotrophic nutrition, trace transport pathways and connect organ systems to homeostasis.
2	Control and Coordination	Explains how organisms respond through nervous and endocrine coordination.	Compare neural and hormonal control, explain reflex actions, identify plant responses and apply feedback thinking to biological regulation.
3	How Do Organisms Reproduce	Develops reproductive biology across organisms, including strategies, organs and development.	Compare sexual and asexual reproduction, explain reproductive structures, interpret fertilisation and development, and connect variation with reproduction.
4	Heredity and Evolution	Introduces genetics and evolutionary reasoning as central IBO domains.	Apply Mendelian inheritance, explain variation and natural selection, interpret simple genetic crosses and connect evidence to evolutionary change.
5	Our Environment	Builds ecology through food chains, trophic levels, ecosystem balance and human impact.	Interpret food webs, explain energy flow and biomagnification, and evaluate how habitat disturbance affects organisms and ecosystems.
6	Management of Natural Resources	Connects biology education with conservation policy, local resource use and community responsibility.	Analyse resource-management practices, compare conservation approaches and propose sustainable solutions for water, forests, wildlife and energy use.

Class 11 SCO IBO Syllabus

Class 11 Learning Focus

Advanced systems year: students build deep organismal, cellular, biochemical, plant and animal physiology foundations.

No.	Chapter Title	Chapter-wise Note	Learning Outcomes and IBO Skill Focus
1	The Living World	Frames biology as the science of diversity, life processes and systematic naming.	Explain taxonomy, binomial nomenclature and classification hierarchy; connect naming systems to global scientific communication.
2	Biological Classification	Develops classification logic through kingdoms, microbial groups and evolutionary relationships.	Compare five-kingdom classification, identify major characteristics of groups and interpret classification as evidence-based organisation.
3	Plant Kingdom	Builds plant diversity from algae to angiosperms with life cycles and evolutionary progression.	Compare plant divisions, interpret alternation of generations and identify adaptations that support terrestrial plant life.
4	Animal Kingdom	Introduces comparative zoology through body plans, symmetry, coelom, segmentation and phyla.	Classify animals using structural features, compare phyla and relate body organisation to evolution and habitat.
5	Morphology of Flowering Plants	Links external plant structures with adaptation, identification and reproductive success.	Describe roots, stems, leaves, flowers and inflorescences; use morphology for plant comparison and functional interpretation.
6	Anatomy of Flowering Plants	Connects tissues and vascular organisation with plant function.	Identify tissue systems, vascular bundles and secondary growth; relate anatomy to transport, support and survival.
7	Structural Organisation in Animals	Builds from tissues to organs and organ systems using representative animal examples.	Explain epithelial, connective, muscular and nervous tissues; connect tissue organisation with organ-level function.
8	Cell: The Unit of Life	Deepens cell ultrastructure, membrane dynamics and organelle function for IBO-style cell biology.	Interpret cell diagrams, explain membrane transport and organelle roles, and compare prokaryotic and eukaryotic organisation.
9	Biomolecules	Introduces biochemical foundations of life: carbohydrates, proteins, lipids, enzymes and nucleic acids.	Classify biomolecules, explain enzyme action and connect molecular structure with biological function.
10	Cell Cycle and Cell Division	Explains continuity, growth and variation through mitosis, meiosis and regulation.	Compare mitosis and meiosis, interpret cell-cycle stages and explain chromosome behaviour in inheritance and development.
11	Transport in Plants	Builds plant physiology through water, mineral and food transport mechanisms.	Explain xylem and phloem transport, transpiration pull and translocation; interpret experiments on plant transport.
12	Mineral Nutrients	Connects plant growth with macro/micronutrients, deficiency symptoms and nitrogen metabolism.	Identify essential nutrients, explain deficiency effects and connect mineral nutrition with agriculture and ecology.
13	Photosynthesis in Higher Plants	Develops energy transformation through light reactions, carbon fixation and limiting factors.	Explain photosynthetic pigments, light and dark reactions, C ₃ /C ₄ pathways and experimental variables affecting photosynthesis.
14	Respiration in Plants	Builds biochemical pathway reasoning through glycolysis, Krebs cycle and electron transport.	Trace respiration stages, compare aerobic and anaerobic pathways and connect ATP production with cellular energy needs.
15	Plant Growth and Development	Links hormones, growth responses and environmental cues.	Explain plant growth regulators, photoperiodism and vernalisation; connect development with adaptation and agriculture.

Class 11 SCO IBO Syllabus (continued)

Class 11 Human Physiology Focus

This continuation completes Class 11 with core human physiology: digestion, respiration, circulation, excretion, movement, neural control and endocrine regulation.

No.	Chapter Title	Chapter-wise Note	Learning Outcomes and IBO Skill Focus
16	Digestion and Absorption	Introduces human physiology through digestive organs, enzymes and absorption.	Describe digestion, enzyme action and nutrient absorption; interpret disorders and nutritional implications.
17	Breathing and Exchange of Gases	Explains gas exchange, breathing mechanics and transport of respiratory gases.	Trace air movement, explain haemoglobin transport and interpret respiratory volumes and exchange surfaces.
18	Body Fluids and Circulation	Develops cardiovascular and lymphatic system understanding.	Explain blood components, heart structure, circulation pathways and lymph; connect circulation with homeostasis and immunity.
19	Excretory Products and Elimination	Connects nitrogenous waste removal with kidney structure and osmoregulation.	Explain nephron function, urine formation and excretory disorders; interpret homeostatic regulation of water and salts.
20	Locomotion and Movement	Builds musculoskeletal biology through bones, muscles, joints and movement mechanisms.	Describe skeletal and muscular systems, explain muscle contraction basics and identify movement-related disorders.
21	Neural Control and Coordination	Develops nervous-system reasoning through neurons, synapses and reflex pathways.	Explain nerve impulse transmission, reflex arcs and sensory processing; connect neural control with behaviour and response.
22	Chemical Coordination and Integration	Completes physiological control through endocrine glands and hormones.	Identify major endocrine glands, explain hormone functions and compare endocrine regulation with neural coordination.

Class 12 SCO IBO Syllabus

Class 12 Learning Focus

Olympiad consolidation year: students integrate reproduction, genetics, molecular biology, biotechnology, evolution, health and ecology.

No.	Chapter Title	Chapter-wise Note	Learning Outcomes and IBO Skill Focus
1	Reproduction in Organisms	Establishes reproductive strategies, life cycles and continuity across organisms.	Compare reproductive modes, explain alternation of generations and evaluate adaptations for successful reproduction.
2	Sexual Reproduction in Flowering Plants	Deepens plant reproductive biology with pollination, fertilisation and seed formation.	Explain flower structure, double fertilisation, fruit/seed formation and reproductive adaptations in angiosperms.
3	Human Reproduction	Covers anatomy, gametogenesis, fertilisation, pregnancy and development.	Describe reproductive systems, gamete formation and embryonic development; connect structure, function and reproductive health.
4	Reproductive Health	Links biology with public health, ethics and informed decision-making.	Explain contraception, STIs, assisted reproductive technologies and reproductive-health strategies with scientific sensitivity.
5	Principles of Inheritance and Variation	Develops advanced genetics through chromosomes, gene interactions and inheritance patterns.	Apply chromosomal theory, interpret crosses and pedigrees, and explain linkage, recombination and variation.
6	Molecular Basis of Inheritance	Core IBO molecular biology: DNA, RNA, replication, transcription, translation and regulation.	Explain DNA structure, gene expression, genetic code and regulation; interpret molecular evidence and experimental data.
7	Evolution	Connects genetics, populations, phylogeny and biodiversity through evolutionary mechanisms.	Explain natural selection, speciation, adaptive radiation and phylogenetics; interpret evidence for evolutionary relationships.
8	Human Health and Disease	Develops biomedical reasoning through immunity, pathogens, epidemiology and disorders.	Explain immune response, vaccination, infectious disease, cancer and lifestyle disorders; interpret public-health data.
9	Strategies for Enhancement in Food Production	Connects applied genetics, biotechnology and agriculture.	Explain breeding, tissue culture, animal improvement and GM organisms; evaluate productivity and ethical concerns.
10	Microbes in Human Welfare	Highlights beneficial microbes in food, medicine, waste treatment and environment.	Explain fermentation, antibiotics, biogas, bioremediation and microbial industrial applications.
11	Biotechnology: Principles and Processes	Introduces modern laboratory biotechnology and recombinant DNA workflows.	Explain vectors, restriction enzymes, PCR, cloning and transformation; interpret biotechnology process diagrams.
12	Biotechnology and Its Applications	Applies biotechnology to medicine, agriculture, industry and diagnostics.	Evaluate applications such as insulin, vaccines, gene therapy, transgenic crops and molecular diagnosis.
13	Organisms and Populations	Develops population ecology through interactions, adaptations and growth models.	Interpret population growth curves, limiting factors, competition, predation, parasitism and adaptation.
14	Ecosystem	Builds ecosystem-level understanding of energy flow, productivity and nutrient cycling.	Explain trophic structure, ecological pyramids, succession and nutrient cycles; interpret ecosystem data.
15	Biodiversity and Conservation	Frames conservation biology through threats, hotspots and protected-area strategies.	Evaluate biodiversity loss, extinction risk, conservation approaches and ethical stewardship of life systems.
16	Environmental Issues	Integrates pollution, climate change, ozone depletion, waste and sustainable development.	Analyse environmental problems using biological evidence and propose science-based mitigation strategies.

4. Grade 8-12 Progression Pathway

Grade Band	Learning Stage	Expected Development
Grade 8	Observation and foundation	Cells, microbes, organisms, reproduction, agriculture and environment.
Grade 9	Concept organisation	Cell theory, tissues, classification, health, resources and food systems.
Grade 10	Systems and reasoning bridge	Life processes, control, reproduction, heredity, evolution and ecosystems.
Grade 11	Advanced biological mechanisms	Diversity, cell biology, biomolecules, plant physiology and human physiology.
Grade 12	Global Olympiad readiness	Molecular genetics, biotechnology, evolution, health, ecology, conservation and data-based problem solving.

5. Guidance for Schools, Teachers, Parents and Students

For Schools

Use SCO IBO as a structured enrichment pathway across the academic year. Schools can align class teaching with Olympiad cycles, run preparation clubs, analyse performance reports and encourage science communication through diagrams, models, data charts and case-based discussions.

For Teachers

Teach every chapter through concept maps, diagrams, experiments, simulations, data interpretation, comparison tables and case-based questions. Encourage students to explain biological mechanisms rather than memorise definitions only.

For Parents

Support students with a regular routine: reading, visual revision, practice tests, explanation writing, and curiosity-based discussion on health, environment, biotechnology, agriculture and biodiversity.

For Students

Prepare with three habits: understand the mechanism, practise applying the concept to new situations, and learn to interpret diagrams, graphs, tables and biological evidence. Higher grades should connect chapters across cell biology, physiology, genetics and ecology.

6. Research and Alignment References

1. International Biology Olympiad (IBO) Operational Guidelines v.6.0: emphasizes biological problem solving, practical tasks, safety, theoretical understanding, topic proportions and result moderation.
2. IBO 2025 official information: theoretical exams test understanding, processing and application of biological knowledge; practical exams evaluate ability to solve biological problems using common laboratory skills.
3. IBO host-country guidance: theory questions are grouped across cell biology, plant anatomy and physiology, animal anatomy and physiology, ethology, genetics and evolution, ecology and biosystematics, with cross-domain questions encouraged.

Note: SCO IBO is an SCO International Olympiad academic pathway aligned to global Biology Olympiad expectations. It is presented as a preparation and assessment pathway and should not be represented as the official IBO competition unless a formal official affiliation exists.