

SCO INTERNATIONAL BIOLOGY OLYMPIAD

CLASS 12 OFFICIAL SYLLABUS

Global Biology Learning Pathway

A chapter-wise syllabus document for schools, teachers, parents, and students preparing for the SCO International Biology Olympiad.

- Aligned to senior-secondary Biology concepts and Olympiad-style analytical reasoning
- Includes chapter outcomes, assessment focus, preparation guidance, and application areas
- Supports free SCO learning materials, assignments, and practice resources after registration
- Designed for clear PDF conversion with consistent H2, H3, body, and table formatting

Biology

Reproduction

Genetics

Molecular Biology

Evolution

Health

Food Production

Microbes

Biotechnology

Ecology

Official Syllabus Overview

The SCO International Biology Olympiad Class 12 syllabus is designed to test conceptual clarity, scientific reasoning, data interpretation, current biological applications, and ethical understanding of modern life sciences. The paper may include direct concept questions, assertion-reason items, case studies, applied biotechnology questions, ecological analysis, and higher-order Achievers Section problems.

Exam Format and Assessment Pattern

Component	Question Range	Marks	Skills Tested
Core Concepts	1-30	30	Biology principles, terminology, mechanisms, and current relevance
Case Study	31-35	5	Reading biological contexts, applying concepts, and choosing evidence-based conclusions
Reason & Assertion	36-45	10	Logical evaluation of claims and scientific explanations
Achievers Section	46-50	10	Advanced interdisciplinary reasoning, data use, and real-world biological applications

Chapter-wise Syllabus Map

Chapter	Chapter Name	Core Learning Focus	Olympiad Learning Outcome
1	Reproduction in Organisms	Modes of reproduction, life span, asexual and sexual reproduction, reproductive cycles	Explain biological continuity and compare reproductive strategies in plants and animals.
2	Sexual Reproduction in Flowering Plants	Flower structure, gametogenesis, pollination, double fertilization, seed and fruit formation	Analyse reproductive events in angiosperms and relate them to crop productivity.
3	Human Reproduction	Male and female reproductive systems, gametogenesis, menstrual cycle, fertilization, pregnancy and lactation	Interpret the hormonal and physiological basis of human reproduction.
4	Reproductive Health	Population issues, contraception, ART, STIs, safe health practices	Evaluate reproductive-health decisions using scientific and ethical reasoning.
5	Principles of Inheritance and Variation	Mendelian genetics, linkage, sex-linked inheritance, mutation, pedigree analysis	Solve inheritance problems and interpret genetic variation using probability and evidence.

Chapter	Chapter Name	Core Learning Focus	Olympiad Learning Outcome
6	Molecular Basis of Inheritance	DNA/RNA, replication, transcription, translation, genetic code, regulation, genomics	Connect molecular mechanisms with heredity, gene expression, and modern diagnostics.
7	Evolution	Origin of life, natural selection, genetic drift, speciation, adaptive radiation, human evolution	Use evolutionary evidence to explain biodiversity and population change.
8	Human Health and Disease	Pathogens, immunity, vaccines, cancer, lifestyle disorders, drugs and substance abuse	Apply biology concepts to prevention, diagnosis, immunity, and public health decisions.
9	Strategies for Enhancement in Food Production	Plant breeding, animal husbandry, tissue culture, biofortification, sustainable agriculture	Evaluate scientific strategies that improve yield, quality, and food security.
10	Microbes in Human Welfare	Microbes in food, industry, antibiotics, sewage treatment, biogas, biocontrol, biofertilizers	Explain how microbes are used responsibly in health, agriculture, and industry.
11	Biotechnology: Principles and Processes	Genetic engineering tools, vectors, restriction enzymes, PCR, cloning, bioreactors	Describe biotechnology workflows and interpret experimental design in gene technology.
12	Biotechnology and its Applications	Transgenic organisms, recombinant therapeutics, molecular diagnosis, gene therapy, biosafety	Analyse benefits, risks, and ethical issues in applied biotechnology.
13	Organisms and Populations	Population attributes, adaptations, interactions, growth models, ecological niche	Use ecological models to interpret survival, adaptation, and population dynamics.
14	Ecosystem	Productivity, energy flow, decomposition, nutrient cycles, succession, ecological pyramids	Trace energy and matter through ecosystems and evaluate ecosystem stability.
15	Biodiversity and Conservation	Biodiversity levels, hotspots, extinction, in-situ/ex-situ conservation	Propose conservation solutions using genetic, species, and ecosystem diversity concepts.
16	Environmental Issues	Pollution, climate change, ozone depletion, deforestation, waste, eutrophication	Interpret environmental data and recommend sustainable mitigation strategies.

Detailed Chapter Learning Outcomes

Chapter 1: Reproduction in Organisms

Core Concepts: Modes of reproduction, life span, asexual and sexual reproduction, reproductive cycles.

- Explain biological continuity and compare reproductive strategies in plants and animals.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 2: Sexual Reproduction in Flowering Plants

Core Concepts: Flower structure, gametogenesis, pollination, double fertilization, seed and fruit formation.

- Analyse reproductive events in angiosperms and relate them to crop productivity.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 3: Human Reproduction

Core Concepts: Male and female reproductive systems, gametogenesis, menstrual cycle, fertilization, pregnancy and lactation.

- Interpret the hormonal and physiological basis of human reproduction.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 4: Reproductive Health

Core Concepts: Population issues, contraception, ART, STIs, safe health practices.

- Evaluate reproductive-health decisions using scientific and ethical reasoning.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 5: Principles of Inheritance and Variation

Core Concepts: Mendelian genetics, linkage, sex-linked inheritance, mutation, pedigree analysis.

- Solve inheritance problems and interpret genetic variation using probability and evidence.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 6: Molecular Basis of Inheritance

Core Concepts: DNA/RNA, replication, transcription, translation, genetic code, regulation, genomics.

- Connect molecular mechanisms with heredity, gene expression, and modern diagnostics.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 7: Evolution

Core Concepts: Origin of life, natural selection, genetic drift, speciation, adaptive radiation, human evolution.

- Use evolutionary evidence to explain biodiversity and population change.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 8: Human Health and Disease

Core Concepts: Pathogens, immunity, vaccines, cancer, lifestyle disorders, drugs and substance abuse.

- Apply biology concepts to prevention, diagnosis, immunity, and public health decisions.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 9: Strategies for Enhancement in Food Production

Core Concepts: Plant breeding, animal husbandry, tissue culture, biofortification, sustainable agriculture.

- Evaluate scientific strategies that improve yield, quality, and food security.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 10: Microbes in Human Welfare

Core Concepts: Microbes in food, industry, antibiotics, sewage treatment, biogas, biocontrol, biofertilizers.

- Explain how microbes are used responsibly in health, agriculture, and industry.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 11: Biotechnology: Principles and Processes

Core Concepts: Genetic engineering tools, vectors, restriction enzymes, PCR, cloning, bioreactors.

- Describe biotechnology workflows and interpret experimental design in gene technology.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 12: Biotechnology and its Applications

Core Concepts: Transgenic organisms, recombinant therapeutics, molecular diagnosis, gene therapy, biosafety.

- Analyse benefits, risks, and ethical issues in applied biotechnology.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 13: Organisms and Populations

Core Concepts: Population attributes, adaptations, interactions, growth models, ecological niche.

- Use ecological models to interpret survival, adaptation, and population dynamics.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 14: Ecosystem

Core Concepts: Productivity, energy flow, decomposition, nutrient cycles, succession, ecological pyramids.

- Trace energy and matter through ecosystems and evaluate ecosystem stability.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 15: Biodiversity and Conservation

Core Concepts: Biodiversity levels, hotspots, extinction, in-situ/ex-situ conservation.

- Propose conservation solutions using genetic, species, and ecosystem diversity concepts.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Chapter 16: Environmental Issues

Core Concepts: Pollution, climate change, ozone depletion, deforestation, waste, eutrophication.

- Interpret environmental data and recommend sustainable mitigation strategies.
- Use diagrams, biological terms, and evidence-based reasoning to explain processes accurately.
- Practise MCQs that require comparison, interpretation of experimental observations, and application to real-life Biology contexts.
- Connect the chapter with current applications such as public health, conservation, biotechnology, agriculture, or environmental sustainability where relevant.

Preparation Guidance for Students

- Study each chapter by understanding mechanisms first, then practising MCQs, assertion-reason questions, and case-study items.
- Maintain a biology vocabulary notebook for key terms, examples, discoveries, enzymes, hormones, pathways, and ecological models.
- Practise data-based questions involving genetic ratios, Hardy-Weinberg calculations, biotechnology workflows, population graphs, and environmental indicators.
- Use SCO learning materials and assignments regularly after registration to build consistency before attempting mock tests and official exams.
- Revise diagrams and processes such as flowering plant reproduction, human reproduction, DNA replication, gene expression, PCR, cloning, immunity, energy flow, and conservation strategies.

Academic Integrity and Proctoring Note

SCO International Olympiad exams are designed for fair, independent academic performance. Students should follow the official exam instructions, avoid unauthorized help, and respect online or offline proctoring rules. The Biology Olympiad encourages scientific curiosity, accuracy, ethical learning, and responsible use of technology.