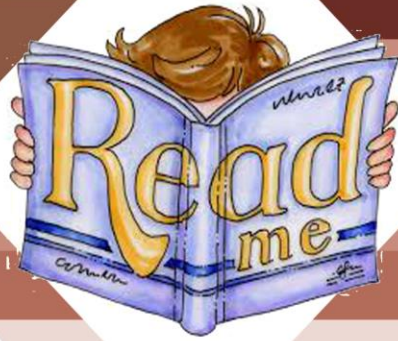


# Syllabus



Course Syllabus



CBSE-i

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## Preface

Biology content for class XI-XII attempts to cover basic concepts as essential for adequate understanding in this domain.

The curriculum intends to

- Acquaint the learner with fundamental concepts and processes associated with the phenomenon of life.
- Relate concepts and develop skill based ability for use in daily life.

The approach is mainly focused to achieve careful observation, promotion of opportunities to formulate conjectures; refutation or acceptance of ideas through stepwise analysis and experimentation and sustained documentation of individual and collaborative work.

Like the previous classes, the extension program called Breakthroughs would familiarize students with present day development in scientific thought process in the form of issues.

All human effort is geared to uncover or discover the mysterious phenomenon of life. There are many ways to understand life; Biology represents one such perspective.

The course is spread over 30 units. The content is developed around general, plant specific, animal specific, technology based and environment specific contexts. The unit on circulation and exchange of gases has been undertaken to connect the cardio-pulmonary system. This range has been identified after much deliberation by experts.

### *Unit 1: Plant Development and Reproduction*

<b>Introduction</b>	Define the terms differentiation, development and growth Relate the processes of differentiation, dedifferentiation and re-differentiation
<b>Growth and development</b>	Measure growth in plants through various methods growth in various parts of plants and graphically represent it. Analyze the data obtained from the observation. Define growth rate in terms of absolute and relative growth Differentiate between different patterns of growth curve in plants. Study growth and development in individual. Compare primary and secondary growth in plants and understand the role of various tissues in the process.
<b>Plant Growth Regulators</b>	Explain the concept of photoperiodism and vernalisation
<b>Reproduction in Plants</b>	Point out the morphological and anatomical changes observed in plants in their transition from vegetative to reproductive phase. Describe the various types of asexual reproduction. Draw and describe the reproductive parts in flowering plants. Understand the process of sporogenesis and gametogenesis. Describe the process of pollination and fertilization. Enlist the steps involved in seed formation and point out the differences between monocot and dicot seed formation. Describe the importance of seed and fruit formation in flowering plants. Explain the concept of Apomixis and polyembryony

### *Unit 2: Animal Development and Reproduction*

<b>Introduction</b>	Recapitulate the differences between asexual and sexual reproduction. Discuss the common modes of asexual reproduction in animals. Describe parthenogenesis as alternative mode of reproduction.
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<b>Human reproductive system</b>	Describe the male and female reproductive systems in humans. Illustrate the internal structure of human testis and ovary Define spermatogenesis and describe stages involved in the process. Illustrate the structure of human sperm. Define oogenesis and describe stages involved in the process. Illustrate the structure of human ovum. Define puberty and discuss associated changes in human male and female. Describe the phases of menstrual cycle and the role of hormones. Define the terms menarche and menopause.
<b>Fertilization and Implantation</b>	Describe key steps involved in the process of fertilization Discuss the mechanisms by which polyspermy is prevented in humans. Discuss the sequence of events from fertilization to implantation including cleavage.
<b>Embryonic Development</b>	Briefly discuss the terms gastrulation, neurulation and organogenesis. List the four extraembryonic membranes and their significance. State the functions of placenta including its role as an endocrine gland. Discuss briefly the process of parturition and lactation.
<b>Reproductive health</b>	Discuss the important aspects of reproductive health and its significance in a society. Discuss the prevent measures against STDs. Suggest reasons for population explosion and methods of contraception and birth control. Briefly describe certain techniques to combat infertility

### *Unit 3: Heredity and Variation*

<b>Introduction to Genetics</b>	Define genetics and discuss the emergence of genetics as an important field of Biology. Define <i>inheritance</i> as the transmission of genetic information from generation to generation. Explain the concept of Heredity and Variations.
<b>Mendelian Inheritance</b>	Describe the experiments of Mendel and elucidate the laws of inheritance. Describe the significance of test cross, back cross and. reciprocal cross. Explain the Chromosomal basis of Mendel's Laws. Analyze the significance of Mendel's work. Discuss the role of theory building in science.
<b>Extension and Modification of Mendel's Work</b>	Explain the complex inheritance patterns which do not follow Mendel's laws. Describe incomplete dominance, co-dominance, polygenic inheritance and multiple allelism citing suitable examples. Describe the contribution of Morgan and his research on Drosophila Describe linkage and crossing over. Discuss the implications of sex linked inheritance.
<b>Sex determination</b>	Discuss the basis of sex determination in human beings, birds and insects (honeybee).
<b>Significance of variations</b>	Define variation and enlist the variations seen in living organisms. Draw the link between meiosis and variation. Describe the factors responsible for variation. Compare and contrast continuous and discontinuous variation.
<b>Chromosomal abnormalities in man</b>	Identify and explain the genetic disorders due to change in Chromosome number and structure. Apply the principles of inheritance to study of pedigree analysis in humans

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### ***Unit 4: Molecular Basis of Inheritance***

<b>Introduction</b>	Give experimental evidences to prove that DNA is the genetic material.
<b>Genetic Material</b>	Compare the properties of DNA and RNA as genetic material. Describe the structure of nucleic acids Describe the gene structure in prokaryotes and eukaryotes Present an overview of DNA replication in prokaryotes and eukaryotes.
<b>Regulation of Genes</b>	Discuss the process of transcription and translation.
<b>From Gene to Proteins</b>	Explain the regulation of gene expression in bacteria (lac operon)
<b>Genetic code</b>	Familiarize with the significance of the triplet code Identify the pattern in genetic code Discuss the t-RNA and anticodon on it Write the characteristics of genetic code Discuss translocation in brief Describe human genome project in terms of its goals, features and applications

### ***Unit 5: Evolution***

<b>Origin of Life</b>	Understand and appreciate the origin of earth and life on Earth. Explain biochemical theory of origin of life.
<b>Mechanism of Evolution</b>	Recognize the contribution of Lamarck towards understanding the evolution. Appreciate Darwin's theory of Natural selection.
<b>Evidences in Favour of Evolution</b>	Comprehend the concept of Organic Evolution Explain the significance of Hardy Weinberg principle Differentiate between homologous and analogous organs Explain the morphological, paleontological, embryological, and molecular evidences in favour of organic evolution Trace the evolution of modern human being from its Ancestors.
<b>Origin of Species</b>	Understand the significance of Neo-Darwinism. Explain the sources of variations (gene and chromosomal mutation, recombination, gene flow and genetic drift) Discuss speciation and differentiate between Allopatric and Sympatric speciation with examples. Co-relate the role played by Reproductive Isolation in the origin of new species

### ***Unit 6: Statics and Dynamics of an Ecosystem***

<b>Ecology and Biosphere</b>	Define the terms: environment, ecology, ecosphere, ecosystem and biosphere Co-relate the concept of environment, ecology and biosphere. Discuss the levels of ecological organization. Understand the concept of population and community with respect to the biosphere.
<b>Components of the Environment</b>	List various components of the environment. Differentiate between the biotic and abiotic components Define autotrophs (producers), heterotrophs (consumers), decomposers, scavengers and parasites.
<b>Ecosystem Concepts and Principles</b>	Define and discuss "ecosystem" Discuss the inter-relationship between plants and animals in an aquatic ecosystem and terrestrial ecosystem. Explain the pond ecosystem as an ideal example of an aquatic ecosystem. Explain the concept of ecological succession.

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<b>Nutrient and Energy Flow in Ecosystem</b>	Explain food chain and food web with examples Draw a relationship between food chain, food web, different trophic levels and energy flow Explain the significance of food chain and food web. Trace the path of energy flow in a food chain. Appreciate the importance of various trophic levels in and Ecosystem. Explain the concept and types of ecological pyramids. Discuss the significance of studying ecological pyramids.
<b>Biogeochemical cycles</b>	Describe the various biogeochemical cycles. Appreciate the cycling of minerals in nature citing the examples of carbon and phosphorus.
<b>Adaptation</b>	Discuss the concept of ecological adaptations. Relate the concept of ecological adaptation with the organism's habitat Justify the role of adaptation in the living world Describe the concept of habitat and niche

### ***Unit 7: Statics and Dynamics of Organisms and Population***

<b>Adaptive Responses of organisms</b>	Discuss the mechanisms of homeostasis such as regulation, conformation, migration and suspension Describe the concept of adaptation in reference to different abiotic factors.
<b>Population and its Regulation</b>	Discuss the concept of population. Define Natality, Mortality, Immigration, Emigration and dispersal. Explain the signification of S-shaped and J-shaped curve. List the various factors that can control population growth. Discuss the phenomena of population explosion.
<b>Population Interaction</b>	Explain population interaction, mutualism, commensalism, symbiosis, amensalism, predation, parasitism, and competition with examples.

### ***Unit 8: Neurons and Nervous System***

<b>Primitive Nervous System</b>	State a brief account of the nervous system of organisms such as hydra, planaria and cockroach.
<b>Neurons and Functioning of the Nervous System in Humans</b>	Describe the parts of the human nervous system. Describe briefly the transmission of an impulse through a nerve fiber. Explain the significance of the neurotransmitters in conduction of the nerve impulse in a chemical synapse. Explain the structure and function of human brain and spinal cord. Describe and illustrate the process of reflex action. Enumerate structural and functional differences between the sympathetic and parasympathetic nervous systems. Describe the structure and function of human eye and ear

### ***Unit 9: Hormones and Hormonal Control***

<b>Introduction</b>	Justify the need of chemical coordination in human body. Compare neural and chemical coordination. Explain the coordination between neural and chemical/hormonal system to ensure smooth and continuous activity of various organ systems.
<b>Endocrine Glands</b>	Differentiate between endocrine and exocrine glands. Categorize endocrine glands according to their location, secretion and function. Tabulate hormones of endocrine glands and their specific functions. Appreciate the role of endocrine glands in maintaining homeostasis.
<b>Hormones</b>	Define the term „hormones“. Classify hormones on the basis of their site of

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	secretion and mode of action (trophic and non trophic) Describe the role of hypothalamus and its secretion in functioning of pituitary /master gland. Discuss the feedback mechanism of hormonal action.
<b>Disorders of Endocrine glands</b>	Describe the symptoms of the disorders caused by under and over production of various endocrine hormones

### **Unit 10: Conservation and Restoration Ecology: Issues and Concerns**

<b>Introduction</b>	Describe biodiversity and discuss the magnitude of global bio diversity. Describe the importance of conservation of biodiversity.
<b>Biodiversity hotspots</b>	Map the biodiversity hotspots identified all over the world and discuss the importance.
<b>Extinction of species</b>	Discuss the reason for extinction of species by natural and anthropogenic actions. Sensitize of the learner about the need of conservation of species hence Biodiversity. Analyze the implication of introduction of exotic species and its impact on the ecosystem
<b>Conservation of Biodiversity</b>	Describe the initiatives taken for conservation of biodiversity. Differentiate between <i>in situ</i> and <i>ex situ</i> conservation. Discuss case studies of some of the above mentioned initiatives. Discuss the latest research on wild life conservation. Enlist at least ten endangered species and the significance of the red data book
<b>Restoration Ecology</b>	Differentiate between restoration and regeneration. Appreciate the emergence of restoration as an importance field in ecology by citing suitable examples. Emphasizes the role of local people as protectors of their environment.
<b>Pollution</b>	Define and describe air, water, land and noise pollution the effects of air, water, noise and land pollution on organisms. Suggest possible ways to reduce pollution of air, water, noise and land. Describe various control measures to be used for air pollution such as electrostatic precipitators the Euro –IV norms and use of alternate fuels to control pollution. Explain the terms eutrophication, bioaccumulation and biomagnifications. Discuss the concept of waste management.
<b>Global Warming and Ozone Depletion</b>	Discuss the effects of global warming and ozone depletion

### **Unit 11: Biology and Human Health**

<b>Introduction</b>	Prepare a concept web relating health and its various aspects. Discuss the role of immune system in fighting diseases. Enlist the types of communicable diseases, the causative pathogens and methods of prevention and treatment Autoimmunediseases
<b>Medicinal Field</b>	Discuss the role of Antibiotics in controlling bacterial Diseases. Enlist the various non communicable diseases and their Treatment. Explain the concept of allergy and immunodeficiency. Discuss the latest diagnostic techniques in field of medicine. Describe the advancements made in stem cell therapy for treatment of diseases. Explain the effects of alcohol and drug abuse

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### **Unit 12: Role of Biology in Human Welfare**

<b>Introduction</b>	Understanding the link between the study of biology and its real life applications. Identify the fields in which biology has made significant contribution.
<b>Animal Husbandry</b>	Discuss the importance of Livestock wealth of a nation. Describe the processes involved in animal husbandry. Role of Poultry for supplying egg protein. Describe the importance of animal breeding. Discuss the role of Apiculture, Pisciculture and Aquaculture as careers in enhancing the economic development of a nation as well as fulfilling the food
<b>Crop Improvement</b>	Discuss the importance of food production and food Security Analyse various strategies to enhance the food production of a nation on the basis of its food crops produce Enlist the major food crops of their respective nation. Discuss the traditional method and modern techniques of crop improvement citing suitable methods. Describe and explain Biofortification. Describe the strategies apart from crop hybridisation in improvement of crop production like pest control, application of manures and fertilizers, irrigation facilities etc. Appreciate the role of Integrated pest Management as a strategy to improve crop production.
<b>Microbes in human welfare</b>	Describe the role of Single Cell Protein in enhancing food production. Explain the role of microbes and plants in reducing Environment pollution. Discuss the role of microbes as bio control agents and as biofertilisers. Discuss the role of microbes in manufacture of Dairy and Bakery products and alcoholic beverages. Discuss the role of microbes in manufacture of food supplements such as amino acids, proteins, vitamins etc. discuss the role of microbes and plants in production of fuels.
<b>Forensic Science</b>	Discuss the role of Biology in various fields of forensics

### **Unit 13: Biotechnology and its Application**

<b>Introduction to Biotechnology</b>	Define Biotechnology. Recognise biotechnology as an interdisciplinary science
<b>Recombinant DNA Techniques</b>	Define restriction enzymes, ligase, cloning vectors (pBR322) and describe their significance in recombinant DNA Technology. Explain the application of Recombinant DNA Technology to generate recombinant DNA molecule. Explain the use of polymerase Chain reaction (PCR) to amplify DNA in vitro. Describe various methods of Transformation.
<b>Applications of Biotechnology</b>	Discuss the use of Genetic Engineering to create transgenic micro-organisms, plants and animals (GMOs) Explain the importance of stem cells and their applications. Describe the principle, procedure and application of DNA finger printing. Discuss the application of Biotechnology in agriculture and medicine with suitable examples. Describe the procedure for obtaining foreign gene product
<b>Safety and Ethical Issues</b>	Discuss the safety and ethical issues related to Biotechnology
<b>Scope of Biology</b>	Identify the various career options in Biology