BSc. (Hons.) Zoology

Learning Outcomes

SEMESTER -I

DSE 1: NONCHORDATA-PROTISTS TO PSEUDOCOELOMATES

Learning Objectives

The course would provide an insight to the learner about the existence of different life forms on the earth and appreciate the diversity of animal life. It will help the students to understand the features of non-chordates and their systematic organization based on evolutionary relationships, structural and functional affinities. The course will also make the students aware about the characteristic morphological and anatomical features of diverse animals; the economic, ecological, and medical significance of various animals in human life; and will create interest among them to explore the animal diversity in nature.

Learning outcomes

Upon completion of the course, students should be able to:

Learn about the importance of systematics, taxonomy, and structural organization of non-chordates.

- Appreciate the diversity of non-chordates living in varied habits and habitats
- Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
- Critically analyse the organization, complexity and characteristic features of nonchordates.
- Recognize the life functions and the ecological roles of the animals belonging to different phyla.
- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

DSE 2: BIOLOGY OF CELL: STRUCTURE AND FUNCTION

Learning Objectives

The objective of the course is to help the students to learn and develop an understanding of a cell as a basic unit of life. This course is designed to enable them to understand the functions of cellular organelles and how a cell carries out and regulates cellular functions.

Learning outcomes

Upon completion of the course, students should be able to:

- Understand the fundamental principles of cell biology.
- Explain the structure and functions of cell organelles involved in diverse cellular processes.
- Appreciate how cells grow, divide, survive, die, and regulate these important processes.
- Comprehend the process of cell signaling and its role in cellular functions.
- Have an insight into how defects in the functioning of cell organelles and regulation of cellular processes can develop into diseases. Learn the advances made in the field of cell biology and their applications.

DSE 3: CONCEPT OF ECOLOGY

Learning Objectives

The primary aim of this course is to develop a scientific understanding of the diverse aspects of the field of ecology. The students will be familiarized with the interactions between the organisms and their physical environment. Additionally, various attributes of populations and communities with help of theoretical concepts and field examples will be discussed. It provides a platform to understand the varied forces that lead to variations among populations of a species.

Learning Outcomes

Upon completion of the course, the students should be able to:

- Demonstrate an understanding of the basic concepts of the subject
- Explain the characteristics, dynamics, and growth of populations
- Understand the characteristics of the community, ecosystem development and climax theories
- Gain knowledge about the relationship of the evolution of various species and the environment they live in.
- Design basic field studies, collect data and interpret it
- Carry out population and community studies

GE: NATURE AND WILD STUDIES

Learning Objectives:

- The course is designed to acquaint students with varied aspects of wildlife conservation, including its importance, major threats, and management of habitats and populations. The emphasis will be on developing interest and invoking a sense of responsibility among students towards wildlife conservation.

Learning Outcomes

- The course also explores different techniques, perspectives, and approaches to both identify and achieve wildlife management goals. Further, students will be motivated to pursue careers in the field of wildlife conservation and management

SEMESTER -II

DSE 4: NON-CHORDATA II: COELOMATES

Upon completing the course, students should be able to:

- Learn about the importance of systematics, taxonomy and structural organisation of animals. Appreciate the diversity of non
- chordates living in diverse habits and habitats.
- Understand evolutionary history and relationships of different non-chordates through functional and structural affinities. Critically
- think about the organisation, complexity and characteristic features of non-chordates.
- Getting familiarised with the morphology and anatomy of representatives of various animal phyla.
- Comprehend the economic importance of non-chordates, their interaction with the environment and their role in the ecosystem.
- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments and projects.

DSE 5: FUNDAMENTALS OF BIOMOLECULES

Learning Objectives

The learning objectives of this course are as follows:

- To provide fundamental and precise knowledge of biomolecules that play a crucial role in all processes of life and the development of diseases.
- To make the students understand the fundamental building blocks of living organisms that include carbohydrates, proteins, lipids, nucleic acids

- To apprise the students of the various functions of the molecules like providing structural integrity to the tissue-engineered constructs.
- Through this course, the students would be able to understand the physiological importance of these biomolecules.
- The enzymatic study would enable them to understand the various metabolic pathways and physiological reactions.

Learning Outcomes

By studying this course, students will be able to

- Interpret the structure-functional relationships of carbohydrates, proteins, lipids and nucleic acids.
- Understand the qualitative analysis of functional groups
- Understand the properties of various biomolecules.
- Appreciate the action of the enzyme and the various factors that affect their action detail.

DSE 6: HUMAN PHYSIOLOGY-CONTROL AND COORDINATION SYSTEMS

Learning Objectives

The learning objectives of this course are as follows:

- The course will provide a thorough understanding of the normal body function and helps to determine the cause of disease.
- It will enable the development of new and more effective treatments and guidelines for maintaining good health.
- It will equip the students with an ability to pursue career in medical and healthcare sector, pharmaceuticals and other related areas.
- It will help in understanding how these systems interact among themselves to maintain stability or homeostasis.

Learning Outcomes

By studying this course, students will be able to:

- Appreciate human physiology and have its enhanced knowledge.
- Recognize and identify principal tissue structures and functions
- Understand the functions of important physiological systems including the nervous system, muscular system, endocrine and reproductive system
- Learn an integrative approach to understand how these separate systems interact to yield integrated physiological responses to maintain homeostasis in the body along with feedback mechanisms.
- Synthesize ideas to make the connection between knowledge of physiology and real-world situations, including healthy lifestyle decisions and problems faced due to homeostatic imbalances
- Perform, analyze and report on experiments and observations in physiology
- Know the fundamentals and understand advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue an advanced degree.

GE: LIFESTYLE DISORDERS

Learning Objectives

The learning objectives of this course are as follows:

- The course aims to introduce the students to the concept of health, nutrition, and the factors affecting it.
- It will apprise students of the prevalence of emerging health issues affecting the quality of life. The course will facilitate the understanding of different physical and psychological associated disorders and their management for a healthy lifestyle.

- It highlights the important lifestyle-related disorders and describes the risks and remedies in relation to adopting a better life.

Learning Outcomes

By studying this course, students will be able to

- Have a better understanding of lifestyle choices and the diseases associated with them.
- Have an in-depth understanding of making better lifestyle decisions.
- Learn about various techniques for preliminary diagnosis of lifestyle disorders

Life Sciences

LS CORE II: COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES

Learning Objectives

Upon completion of this course, students should be able to:

- Know about the levels of organization among different groups of vertebrates.
- Understand that different organs and organ systems integrate with each other to impart proper regulation of a particular function.
- Understand how the various organs evolved during the course of evolution through succession.
- Know the evolution of different concepts in developmental biology.
- Be able to understand the process of gamete formation from stem cell population to mature ova and sperm.
- Be able to comprehend the sequence of steps leading to the formation of gametes and development of embryo.
- Learn the mechanisms underpinning cellular diversity and specificity in animals.

- Study the methods and tools related to developmental biology which help to understand different processes of embryogenesis.

Life Sciences

DSE-6: CELL AND DEVELOPMENTAL BIOLOGY OF ANIMALS

Learning Objectives

The learning objectives of this course are as follows:

- The course will help the students to learn and develop an understanding of a cell as a basic unit of life.
- The course will enable them to understand the functions of cellular organelles and howa cell carries out and regulates cellular functions.
- The course will provide the students a complete comprehension about the essential vertebrate developmental biology
- The course will help the students to understand the conundrum of **the different levels of biological complexity** by tracing them back to events at the level of genes and genomes**.**

Learning Outcomes

By studying this course, students will be able to

- Explain the structure and functions of cell organelles involved in diverse cellular processes.
- Know the evolution of different concepts in developmental biology.
- Be able to understand the process of gamete formation from stem cell population to mature ova and sperm. The students will know the differences between Spermatogenesis and Oogenesis.
- Be able to comprehend the sequence of steps leading to the fusion of gametes andlearn the contribution of sperm and ova to zygote formation

- Be able to understand how polyspermy is avoided in animal kingdom.
- Learn the mechanisms underpinning cellular diversity and specificity in animals.
- Learn the methods and tools related to developmental biology help to understand different processes of embryogenesis.

SEMESTER -III

DSE-7: DIVERSITY OF CHORDATES

Learning Objectives

The learning objectives of this course are as follows:

- The course aims to impart in-depth knowledge about the diverse life forms from the taxonomic positions of Protochordates and Agnatha to Mammalia.
- It will help the students to identify the body plan types of complex chordates and their systematic organization based on evolutionary relationships, structural and functional affinities.
- The course will help the students to understand the characteristic morphological, adaptive and anatomical features of diverse animals.
- The course will help students to understand the economic and ecological significance of various animals in human life.
- The course will create interest among them to explore and appreciate the animal diversity in nature.

Learning Outcomes

By studying this course, students will be able to

- Correlate the importance of systematics, taxonomy, and structural organization of chordates. Recognize the diversity of chordates living in varied ecological habitats.

- Critically analyse the organization, complexity and characteristic features of chordates. comprehend the economic importance of chordates, their interaction with the environment and their role in the ecosystem.
- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

DSE-8: BIOCHEMISTRY: METABOLIC PROCESSES

Learning Objectives

The learning objectives of this course are as follows:

- To provide fundamental and precise knowledge of the metabolic processes that play a crucial role in all processes of life and the development of diseases.
- To apprise the students of the various functions of the molecules like providing structural integrity to the tissue-engineered constructs.
- Through this course, the students would be able to understand myriads of health, potential treatments of diseases and solve several industrial problems
- The enzymatic study would enable them to understand the various metabolic pathways and physiological reactions.

Learning Outcomes

By studying this course, students will be able to

- Interpret the structure-functional relationships of carbohydrates, proteins, lipids and nucleic acids.
- Understand the clinical knowledge and importance of antioxidants.
- Understand the process of biological oxidation crucial to generation of energy for a living cell.
- Appreciate the action of various types of enzymes under variety of conditions.

DSE-9: Human Physiology-Life Sustaining Systems

Learning Objectives

The learning objectives of this course are as follows:

- The course will provide a thorough understanding of the normal body function and helps to determine the cause of disease.
- It will enable the development of new and more effective treatments and guidelines for maintaining good health.
- It will equip the students with an ability to pursue career in medical and healthcare sector, pharmaceuticals and other related areas.
- It will help in understanding how these systems interact among themselves to maintain stability or homeostasis.

Learning Outcomes

By studying this course, students will be able to:

- Appreciate human physiology and have its enhanced knowledge.
- Recognize and identify principal and physiology of digestion.
- Understand the functions of important physiological systems including the digestive, circulatory, renal and respiratory system.
- Learn an integrative approach to understand how these separate systems interact to yield integrated physiological responses to maintain homeostasis in the body along with feedback mechanisms.
- Amalgamate ideas to make the connection between knowledge of physiology and real-world situations, including healthy lifestyle decisions and problems faced due to homeostatic imbalances.
- Perform, analyze and report on experiments and observations in physiology.

- Know the fundamentals and understand advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue an advanced degree.

GE: FOOD, NUTRITION & HEALTH

Learning Objectives

The learning objectives of this course are as follows:

- This course offers an overview of the concepts of normal food and nutrition required by the human body to maintain good health.
- To understand physiology, biochemistry, pathology, immunology, medicine, food science, and other fields with context to nutrition.
  Learn the concept of malnutrition, lifestyle-related disorders, addiction-related social health problems and eating disorders will be introduced.
- Appreciate knowledge that can be applied in everyday life.
- Learn the role of macronutrients and micronutrients, their nutritional requirements for different age groups during various health conditions.
- The students will be encouraged to pursue further studies in nutrition and health.

Learning Outcomes

By studying this course, students will be able to

- Have an in-depth understanding of the dietary sources and role of nutrients in forming a balanced diet.
- Appreciate the concept of nutritional requirements for different age groups and in pregnancy and lactation.
- Know about the various food allergens and the body's hypersensitivity towards it.
- Understand the concept of health and role of various nutrients in mitigating several deficiency disorders.

- Identify and analyse the causes of malnutrition, lifestyle-related disorders, addiction-related social health problems and eating disorders.

SEMESTER -IV

DSE-10: ANATOMY OF VERTEBRATES

Learning Objectives

The learning objectives of this course are as follows:

- To impart in-depth knowledge about the structural patterns and a comparative account of the different organ systems of vertebrates.
- To understand the account of the functional and comparative morphology provides a deep understanding of animal diversity and the adaptive changes the vertebrates have gone through during evolution from common ancestors
- To help students identify the body plan types of complex chordates and their systematic organization based on evolutionary relationships, structural and functional affinities.
- To apprise the students about the correlation of comparative development to evolutionary biology and phylogeny, and how it helps in classifying animals.
- To enable students to establish the evolutionary links based on fossil records.

Learning Outcomes

By studying this course, students will be able to

- Have a better understanding of the evolutionary significance of comparative anatomy.
- Understand the importance of morphology and anatomy of organisms in relation to evolution.
- Appreciate the comparative anatomy among vertebrates that provides evolutionary evidences.

- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

DSE-11: DEVELOPMENTAL BIOLOGY

Learning Objectives

The learning objectives of this course are as follows:

- To provide an in-depth knowledge on the embryonic and post embryonic developmental processes.
- To apprise the students of the fascinating aspect of the development of a single fertilized egg to mature into a fully developed complex organism.
- To explain the basic principles and concepts the developmental processes from a single cell system to a multi-cellular system.
- To understand morphogenesis in Sea urchin, Drosophila, Frog and Chick.
- To provide the undergraduate students an in-depth knowledge on the embryonic and post embryonic developmental processes.
- To by understanding the developmental processes, the students can relate to errors occurring during development leading to congenital disorders and human diseases.
- To familiarize the students with the technique of IVF and pre-diagnostic methods to identify any abnormality arising during development.
- To make the students aware of the areas of great interest including stem cell therapy, tissue engineering and regenerative medicine.

Learning Outcomes

By studying this course, students will be able to

- Appreciate the events that lead to the formation of a multicellular organism from a single fertilized egg.

- Better understand the general patterns and sequential developmental stages during embryogenesis.
- Gain knowledge of the general mechanisms involved in morphogenesis.
- Comprehend the processes of ageing to improve the overall health and quality of life in aged people.
- Acquire basic knowledge and importance of latest techniques like stem cell therapy, *in vitro* fertilization and amniocentesis etc.
- Develop the skill to raise and maintain culture of model system- *Drosophila* in the laboratory.

DSE-12: ANIMAL BEHAVIOUR

Learning Objectives

The learning objectives of this course are as follows:

- To provide an overview of animal behaviour in a scientific study of the wild and the wonderful ways in which animals interact with each other, with other living beings, and with the environment.
- To understand and appreciate different types of animal behaviour, their adaptive and evolutionary significance.
- To equip the students with an ability to pursue career in behavioural ecology other related areas.
- To apprise the students of the versatility of Animal behaviour and its crosstalk among conservation biology, molecular biology, behavioural ecology and integrated pest management.

Learning Outcomes

By studying this course, students will be able to:

- Comprehend various types of animal behaviour and their importance.
- Observe, analyse, interpret and document the different types of behaviour.
- Enhance their skills by taking short projects pertaining to Animal behaviour.
- Appreciate and develop passion to biodiversity; and respect the nature and environment.
- Better understand and relate the fundamentals and advanced concepts so as to develop a strong foundation that will enable them to acquire skills and knowledge.

GE: MICROBIOTA: IMPORTANCE IN HEALTH AND DISEASE

Learning Objectives

The learning objectives of this course are as follows:

- To acquaint students with the basic concepts of microbiota that coexist with the human being both in health and in different pathologies.
- To enable students to understand how microbiota undergoes changes as a consequence of the influence of multiple factors, diet, lifestyle, pharmacological treatments generating alterations in this bacterial ecosystem.
- To compare the role of our microbiota in behavior, mood, and development.
- To make the students aware of the microbial communities that reside within or upon us, and how they impact our health.
- To acquire knowledge about the interactions between the different types of microbiota and their host in different pathophysiological situations.

Learning Outcomes

By studying this course, students will be able to

- Identify the components of the human microbiota and their major characteristics.
- Learn the key approaches and techniques used to identify and quantify the bacterial, fungal, archaeal, protozoan, and viral components of the microbiota. Identify the common members of the microbiota and their influence on various body systems including the skin, upper and lower respiratory system, oral and the lower digestive system, urinary and reproductive systems, the immune system, and the nervous system in healthy and diseased states.
- Compare the role of our microbiota in behavior, mood, and development.
- Appreciate the emerging treatment approaches for microbiota-associated illnesses.

SEMESTER -V

ZH Core VIII: Comparative anatomy of Vertebrates

Learning Outcomes

Upon completion of the course, students should be able to:

- Explain comparative account of the different vertebrate systems.
- Understand the pattern of vertebrate evolution, organisation, and functions of various systems. Learn the comparative account of integument, skeletal components, their functions, and modifications in different vertebrates.
- Understand the evolution of heart, modification in aortic arches, structure of respiratory organs used in aquatic, terrestrial and aerial vertebrates; and digestive system and its anatomical specializations with respect to different diets and feeding habits.
- Learn the evolution of brain, sense organs and excretory organs to a complex, highly evolved form in mammals.

- Learn to analyse and critically evaluate the structure and functions of vertebrate systems, which helps them to discern the developmental, functional, and evolutionary history of vertebrate species.
- Understand the importance of comparative vertebrate anatomy to discriminate human biology.

ZH Core IX: Physiology: Life Sustaining Systems

Learning Outcomes

Upon completion of the course, students should be able to:

- Have an explicit knowledge of fundamentals and understanding of advanced concepts to develop a strong foundation that will help them to acquire skills and knowledge to pursue advanced degree courses.
- Comprehend and analyse problem-based questions on physiological aspects.
- Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body; and use feedback loops to control the same.
- Learn an integrative approach to understanding the interactions of various organ systems resulting in the complex overall functioning of the body.

ZH Core X: Biochemistry of Metabolic Processes

Learning Outcomes

Upon completion of the course, students should be able to: Gain knowledge and skill in the fundamentals of biochemical sciences, interactions, and interdependence of physiological and biochemical processes.

- Get exposed to various processes used in industries and gain skills in techniques of chromatography and spectroscopy.

- Demonstrate foundation knowledge in biochemistry; synthesis of proteins, lipids, nucleic acids, and carbohydrates; and their role in metabolic pathways along with their regulation. Know about classical laboratory techniques, use modern instrumentation, design, and conduct scientific experiments, and analyse the resulting data.
- Be knowledgeable in proper procedures and regulations in handling and disposal of chemicals

- Understand the methods of citation and referencing styles, check plagiarism and get insight of intellectual property right.

SEMESTER-V

ZH Core XI: Molecular Biology

Learning Outcomes

Upon completion of the course, students will be able to:

- Describe the basic structure and chemistry of nucleic acids, DNA and RNA.
- Compare and contrast DNA replication machinery and mechanisms in prokaryotes and eukaryotes.
- Elucidate the molecular machinery and mechanism of information transfer processes– transcription and translation-in prokaryotes and eukaryotes;
- Explain post-transcriptional modification mechanisms for the processing of eukaryotic RNAs;
- Discuss general principles of transcription regulation in prokaryotes by exploring the structure and function of lactose and tryptophan metabolism operons;
- Give an overview of gene expression regulation in eukaryotes;
- Explain the significance of DNA repair mechanisms in controlling DNA damage;

- Recognise role of RNAs (riboswitches, siRNA and miRNA) in gene expression regulation.
- Demonstrate practical knowledge of raising, handling, maintenance, and special features such as antibiotic resistance of a simple prokaryotic model organism, Escherichia coli. • Quantitatively estimate concentration of DNA and RNA by colorimetric methods.

ZH Core XII: Principles of Genetics

Learning Outcomes

Upon completion of the course, students will be able to:

- Have a deeper understanding of the varied branches of the biological sciences like microbiology, evolutionary biology, genomics and metagenomics.
- Gain knowledge of the basic principles of inheritance.
- Analyse pedigree leading to development of analytical skills and critical thinking enabling the students to present the conclusion of their findings in a scientific manner.
- Know the mechanisms of mutations, the causative agents and the harmful impact of various chemicals and drugs being used in day to-day life.
- Find out the effects of indiscriminate use of various chemicals, drugs, or insecticides in nature by studying their effect on various bacterial species in soil and water samples from different industrial or polluted areas.

ZH DSE Course-I: Animal Behaviour and Chronobiology

Learning Outcomes

- Understand types of animal behaviour and their importance to the organisms.

- Enhance their observation, analysis, interpretation and documentation skills by taking short projects pertaining to Animal behaviour and chronobiology.
- Relate animal behaviour with other subjects such as Animal biodiversity,
- Evolutionary biology, Ecology, Conservation biology and Genetic basis of the behaviour.
- Understand various process of chronobiology in their daily life such as jet lag.
- Learn about the biological rhythm and their application in pharmacology and modern medicine.
- Realize, appreciate and develop passion to biodiversity; andy will respect the nature and environment.

ZH DSE Course-II: Immunology

Learning Outcomes

- Describe the basic mechanisms, distinctions and functional interplay of innate and adaptive immunity.
- Define the cellular/molecular pathways of humoral/cell-mediated adaptive responses including the role of Major Histocompatibility Complex.
- Explain the cellular and molecular aspects of lymphocyte activation, homeostasis, differentiation, and memory.
- Understand the molecular basis of complex, humoral (Cytokines and Complement)and cellular processes involved in inflammation and immunity, in states of health and disease.
- Describe basic and state-of-the art experimental methods and technologies.
- Integrate knowledge of each subsystem to see their contribution to the functioning of higher-level systems in health and disease including basis of vaccination, autoimmunity, immunodeficiency, hypersensitivity and tolerance

Life Sciences

LS DSE paper 3 - ANIMAL BIOTECHNOLOGY

Learning Outcomes

Upon completion of the course, students will be able to:

- Use or demonstrate the basic techniques of biotechnology; like DNA isolation, PCR, transformation, restriction, digestion etc.
- Devise a strategy to manipulate genetic structure of an organism for the improvement in any trait or its well-being based on the techniques.
- Understand the ethical and social issues raised regarding GMOs.
- Apply the knowledge for designing a proposal for research project.
- Develop entrepreneurial skills necessary for self-employment in mulberry and seed production and be apprised about practicing sericulture as a profit-making enterprise.
- Enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

SEMESTER-VI

Core paper: ZH Course XIII: DEVELOPMENTAL BIOLOGY

Learning Outcomes

Upon completion of the course, students should be able to:

- Understand the events that lead to formation of a multicellular organism from a single fertilized egg, the zygote.
- Acquire basic knowledge of the cellular processes of development and the molecular mechanisms underlying these.

- Describe the general patterns and sequential developmental stages during embryogenesis; and understand how the developmental processes lead to establishment of body plan of multicellular organisms.
- Discuss the general mechanisms involved in morphogenesis and to explain how different cells and tissues interact in a coordinated way to form various tissues and organs.
- Understand about the evolutionary development of various animals.
- Know the process of ageing leading to interventions that can improve the overall health and quality of life in aged people.
- Learn the importance of latest techniques like stem cell therapy, in vitro fertilization and amniocentesis etc. to be applied for human welfare.
- Develop the skill to raise and maintain culture of model system; Drosophila in the laboratory. Develop the skill to raise and maintain a culture of the model system; *Drosophila* in the laboratory.

Core paper: ZH Course XIV: Evolutionary Biology

Learning Outcomes

Upon completion of the course, students should be able to:

- Acquire problem solving and high order analytical skills by attempting numerical problems as well as performing simulation studies of various evolutionary forces in action.
- Apply knowledge gained, on populations in real time, while studying speciation, behaviour and susceptibility to diseases.
- Gain knowledge about the relationship of the evolution of various species and the environment they live in.

- Get motivated to work towards mitigating climate change so that well adapted species do not face extinction as a result of sudden drastic changes in environment.
- Use knowledge gained from study of variations, genetic drift to ensure that conservation efforts for small threatened populations are focused in right direction.
- Predict the practical implication of various evolutionary forces acting on the human population in the field of human health, agriculture and wildlife conservation.
- Use various software to generate interest towards the field of bioinformatics and coding used in programming language

ZH DSE COURSE-III: ANIMAL BIOTECHNOLOGY

Learning Outcomes

Upon completion of the course, students should be able to:

- Use or demonstrate the basic techniques of biotechnology like DNA isolation, PCR, transformation, restriction digestion etc.
- Make a strategy to manipulate genetic structure of an organism for the improvement in any trait or its well-being based on the techniques learned during this course. • Understand better the ethical and social issues regarding GMOs.
- Use the knowledge for designing a project for research and execute it.

ZH DSE COURSE-IV: WILDLIFE CONSERVATION AND MANAGEMENT

Learning Outcomes

- Upon completion of the course, students will be able to: Become aware about the importance of wildlife in general, and its conservation and management in particular.
- Comprehend the application of the principles of ecology and animal behaviour to formulate strategies for the management of wildlife populations and their habitats.

- Understand the management practices required to achieve a healthy ecosystem for wildlife population along with emphasis on conservation and restoration.
- Know the key factors for loss of wildlife and important strategies for their in situ and ex situ conservation.
- Recognize the techniques for estimation, remote sensing and Global Position Tracking for wildlife.
- Gain knowledge about the wildlife diseases and the quarantine policies.
- Know about the Protected Area Networks in India, Ecotourism, Ecology of perturbation and Climax persistence.
- Perform critical thinking, literature review; scientific writing as well as presentations; and participation in citizen science initiatives with reference to wildlife

Life Sciences

LS DSE 4: IMMUNOLOGY

Learning Outcomes Upon completion of the course, students will be able to:

- Study hematopoies is to know the
- concepts of stem cells and their differentiation into progenitor stem cells and adult lineages. •
- Learn the concepts of innate and acquired immunity.
- Understand adaptive immune responses
- and sequential phases-antigen recognition by lymphocytes, their proliferation, differentiation into effector and memory cells and elimination of pathogens.
- Learn about major histocompatibility complex and their role in transplantation immunity and autoimmunity
- Gain knowledge about the Complement system and how they interact and activate a catalytic cascade to remove immunogens.

- Study the role of various cytokines involved in cell to cell
- communication in the removal of pathogens.
- Understand the advent of hypersensitivities due to inappropriate innate and adaptive immune responses.
- Know the basic immunological aspects to comprehend the newer strategies in vaccine design, and efforts to treat autoimmunity, hypersensitivity and immunodeficiency.