

Paper: UGZOOMIT101

Title: Diversity of Animals and Cytogenetics

Course objective: It is required to generalize about certain things and to dismiss others because the field of non-chordate and chordate biology is so extensive and runs across so many disciplinary lines that it is necessary to generalize about some topics. Classification, Structure and function were chosen as the primary focuses for the curriculum that we devised for studying diversity of animals so that we could establish common threads of interest.

Genetics is one of the fastest-moving fields of science, with new discoveries being made every month. The study of genetics is timely, important, and fascinating because of the many new discoveries and applications of genetics that have substantial economic and ethical implications. Unknown to them, human beings had been applying the principles of genetics by engaging in selective breeding of domesticated animals for many centuries.

Course outcomes:

1. Understand basics of classification of non-chordates and chordates.
2. Learn the diversity of habit and habitat of these species.
3. Study the functional biology of animals through their body organization and its function.
4. Develop the skills to identify different classes and species of animals and their evolutionary relationships.
5. Enhance the basic laboratory skill like keen observation and drawing.
6. Understand the structure and function of the cell organelles
7. Understand the principles of inheritance, Mendel 's laws and the deviations
8. Comprehend the facts of sex determination in *Drosophila* sp.
9. Detect chromosomal aberrations in humans and study of pedigree analysis.

Title: Ecology and Evolution

Course objective: Basic concept of how animals interact with their surroundings and what are the factors that regulates the extremely complex multi species dynamics in which each species and individual plays a specific role is absolute necessity to understand impact of human activities, fragility of a system and its outcome, possible ways of restoration and management. Ecological awareness and knowledge how complex interconnected biotic and abiotic components of nature ultimately regulates global outcomes is thus a necessary part of any biological course.

Elementary and fundamental idea regarding how forces of nature and ecological, biological interactions continuously push individual, species and groups to change characteristics to prevent extinction and evolve in to organisms that are different from ancestor is necessary to understand any biological process and even systems that has the capacity to evolve like

Artificial intelligence. Last but not the least it provides us with a glimpse of our past selves and our probable future selves.

Course Outcome:

- Become familiar with the variety of ways that organisms interact with both the physical and the biological environment.
- Develop an understanding of the differences in the structure and function of different types of ecosystems.
- Develop an appreciation of the natural world through direct experience with local ecosystems.
- Learn techniques for gathering data in the field.
- Develop an understanding on Life's beginnings with natural selection which is one of several processes that can bring about evolution.
- Demonstrate knowledge of the concept of speciation, Adaptation,
- A better understanding of how evolutionary science generates knowledge by providing information regarding how systems and function change over time

Title: Molecular Biology and Developmental Biology

Course objective: The course aims to provide students with an introduction of the underlying molecular mechanisms of various biological processes in cells and organisms. The study primarily involves learning about structure and synthesis of deoxyribo- and ribo-nucleic acids, formation of proteins, and regulation of gene expression. The course aims to develop basic understanding of structure-function relationships of nucleic acids and proteins.

The main aim of the paper on Developmental Biology is to provide the undergraduate students an in-depth knowledge on the embryonic and post embryonic developmental processes. An important aspect of developmental biology is its implication in medicine which is also dealt with in this course. The approach of this paper is to make the students realize the most fascinating aspect of developmental biology that a single fertilized egg can give rise to a fully developed complex organism. The course explains the basic principles and concepts underlying the developmental processes at the cellular and molecular level. To understand morphogenesis, the students are introduced to model organisms like Sea urchin, Drosophila, Frog and Chick to study different types of eggs, cleavage patterns and various morphogenetic movements during gastrulation leading to formation of germ layers and their fate. By understanding the developmental processes, the students can relate to errors occurring during development leading to congenital disorders and human diseases. The paper also addresses the problems of infertility in humans. The students are familiarized with the technique of IVF and pre-diagnostic methods to identify any abnormality arising during development. The students are made aware of the areas of great interest including stem cell therapy, tissue engineering and regenerative medicine.

Course outcomes:

- Describe the core principles of molecular biology.
- Describe the genetic structure and types of chromatin.
- Elucidate the types, damage and repair of DNA, types of RNAs, genetic code, Understand the concept of mutations.
- Describe the morphological processes that transform a fertilised egg into a multicellular organism.
- Explain the molecular, biochemical and cellular events that regulate the development of specialised cells, tissues and organs during embryonic development.
- Identify model organisms used to investigate developmental biology and compare the developmental programmes of different organisms.
- Describe genetic, molecular and cellular techniques, including genome editing, used to investigate developmental and molecular biology processes in various organisms.
- Gain higher level thinking skills that is necessary for research.
- 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.

Paper:UGZOOMIT301

Title: Biochemistry and Physiology

Course objective: Biochemistry is the wing of biology that deals with the basic bio-molecules and their structure and function. Here an emphasis has been made so that the students can obtain a basic understanding of chemical solutions, metabolic processes of bio-

molecules, enzymes and Bioenergetics. Furthermore, this paper deals with Physiology which is the study of the structural and functional plans found in animals. Understanding how animals' function on all levels as a whole integrated organism, from cells to tissues to organs, can be aided by knowledge gained through the study of animal physiology. Clarifying the functions of all cells in all organs and all animals in relation to the neurological, respiratory, circulatory, muscular systems etc. falls under the purview of the scientific discipline known as physiology.

The other half of this paper deals with Biodiversity and Conservation. Due to significant loss of biodiversity and deterioration of natural ecosystems, there is little room for argument that all life on Earth is currently in jeopardy. As a result, this course is available to all graduate students, regardless of their academic expertise, in order to make them aware of and sensitize them to this survival dilemma.

Course Outcomes:

- Students who complete this course will have gained a solid foundation in the basic Biochemistry and physiological processes and are also expected to be having profound knowledge on the importance of biodiversity and ecosystem services in supporting life on Earth.
- Understanding of the dangers posed by the careless behavior of man and possible conservation strategies.

Title: Biodiversity & Conservation

Course objective: As populations grow and human activities threaten the natural world, ecology and conservation biology has never been more important. With this degree, you will discover how we sustain biodiversity and the fundamental importance of the ecological processes involved.

On this course, students will gain cutting-edge knowledge and develop your skills and experience in ecology and conservation, from your doorstep to the globe. With exciting field courses in wonderful landscapes, to observations of animals behaving in the lab, they will learn how to measure the distribution and abundance of different species, how organisms interact with each other and their environment, and they will be challenged to think creatively about the application of ecology to conservation problems.

Course Outcome: Biodiversity and wildlife: Student will be learning the various issues related to biodiversity loss and conservation as well as status, conditions and conservation of forests and wildlife. They will also be able to use various tools used in field biology.

Paper :UGZOOMIT401

Title:Parasitology and Immunology

Course Objectives:

This course is aimed to provide students with knowledge regarding parasitological terms, types of parasites and host parasite relationship. To provide students with knowledge concerning biological and epidemiological aspects of parasites causing diseases to humans. To enable students to understand the pathogenesis, clinical presentations and complications of parasitic diseases. To enable students to learn diagnosis and know the general outline of treatment, prevention and control of parasitic infections. To provide students with knowledge regarding basic idea of zoonosis and zoonotic diseases. To provide an adequate knowledge about the basic concepts of health and diseases. To provide students with knowledge regarding cells and organs of the immune system. To enable students to understand the innate and adaptive immunity. To provide students with knowledge about antigens and immunoglobulins. To enable students to understand the antigen-antibody interactions and monoclonal antibody production. To provide an adequate knowledge regarding vaccines and autoimmune diseases.

Advances in biotechnology now can track many inherited disorders. People may now live in considerably higher population densities due to biotechnology's ability to produce more food per acre. As a result of advance biotechnology, we now know more about genomes of a wide range of creatures. It is the most promising field that generates pharmaceuticals, vaccines, and treatments . This course is designed to flash the spotlight of Biotechnology on student to make them equipped with the modern science

Statistics is fundamental to experimental science, to prove or disprove or to establish meaningful interpretation of data. This course is designed to clear the basic fundamental idea regarding traditional and molecular taxonomy. In the portion of Biostatistics, the students will have an exposure on the basic statistical tools that are an essential part of modern biological research.

Course Outcomes:

- Identify the different types of parasites.
- Classify parasites causing diseases to humans.
- Assess the reasons of infections with parasites.
- Define the principles of management for some common parasitic diseases.
- Outline the methods of parasitic disease treatment, prevention and control.
- Functioning in multi-disciplinary teams to advise the general public on scientific basis to prevent infections with parasite.

- Discuss the function of cells and organs involved in immunity.
- Explain features and mechanisms of innate and adaptive immunity.
- Explain about autoimmune diseases.
- antigen-antibody interactions and antibody production.
- Apply the acquired knowledge to explain defence mechanisms against infectious agents.
- Advise the general public, why vaccination is necessary.

Title: Biotechnology and Biostatistics

Course Objectives:

Biotechnology is the advanced branch of biological sciences which mostly deals with technological application on biological systems. The present paper on biotechnology attempts to give a wholesome idea of biotechnology at a basic level. It provides a tool kit in the form of a number of various techniques and processes developed over time to solve problems involving primarily human welfare with focus on health and medicine. It will equip the students with basic tools of biotechnology which are a must for everyone interested in pursuing a career in biotechnology. It makes one aware of the scope of this field which encompasses almost every field of science like engineering, research, commercialization and academics.

Outcome of the study

- 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.
- Students will also learn about various data analysing tools and techniques such as, t-test, chi-square, , correlations and regression etc.
- They are expected to gather knowledge on implementation of various tools in biomedical research works.
- Fundamental knowledge about the structural and functional features of biological macromolecules such as DNA, RNA, and proteins.
- After completion of this course the students will be able to use this knowledge in their scientific discipline and in future higher studies.