

GDC Memorial College, Bahal (Bhiwani)

**Department of Botany**

2017-18(Odd)

**Learning Objective & Outcomes**

**B.Sc.(Botany) 1<sup>st</sup> Semester**

**Subject: DIVERSITY OF MICROBES**

**Subject Code: BOT. 1.1**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Origin, evolution, and genetic diversity of microbial life
2. Physiological diversity of metabolic and bioenergetics pathways
3. Microbial species and speciation;
4. Phylogenetic and functional analysis of (meta) genomic data
5. Characterization of uncultivated microbial lineages; and
6. Linkage between microbial diversity, function, and ecology

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Describe cellular, biochemical, and physiological aspects of microorganisms and recognize the similarities and differences between microbial groups (bacteria, algae, fungi, protozoa, viruses, viroids, and prions).
2. Explain cellular and biochemical processes involved in pathogenesis (human-pathogen interactions).
3. Identify microorganisms and their role in various environments.
4. Describe the cultural use of microorganisms in food production, medicine, fuel production, and waste treatment.
5. Apply microbiology techniques (cell culture, chemical and molecular based methods) to solve scientific problems.

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**Learning Objective & Outcomes**  
**B.Sc.(Botany) 1<sup>st</sup> Semester**

**Subject: CELL BIOLOGY**

**Subject Code: BOT. 1.2**

### **Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. To understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
2. Students will understand how these cellular components are used to generate and utilize energy in cells
3. Students will understand the cellular components underlying mitotic cell division.
4. Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

### **Learning outcomes**

Students who successfully complete this course will be able to:

1. Outline the structure of the biomolecules found in all living organisms.
2. Describe the function and structure of cells including the metabolic reactions that occur in cells.
3. Explain the process of inheritance.
4. Describe how RNA, DNA and proteins are synthesized.
5. Explain the process of cell division in both somatic and germ cells.
6. Describe cytological, biochemical, physiological and genetic aspects of the cell, including cellular processes common to all cells, to all eukaryotic cells as well as processes in certain specialized cells.
7. Relate normal cellular structures to their functions.
8. Explain cellular processes and mechanisms that lead to physiological functions as well as examples of pathological state.
9. Apply modern cellular techniques to solve aspects of scientific problems.
10. Describe the intricate relationship between various cellular structures and their corresponding functions.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 2<sup>nd</sup> Semester**

**Subject: DIVERSITY OF ARCHEGONIATES**

**Subject Code: BOT. 2.1**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. To study general characteristics of bryophytes.
2. To classify and evaluate sporophytes and economic importance of bryophytes.
3. To study alternation of generations in bryophytes.
4. To study heterospory, apospory, apogamy and economic importance of pteridophytes.
5. To give General account of stellar evolution.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Describe general account of bryophytes
2. Identify given specimen.
3. Evaluate importance of archegoniatates.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 2<sup>nd</sup> Semester**

**Subject: GENETICS**

**Subject Code: BOT. 2.2**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. The basic principles of inheritance at the molecular, cellular and organism levels.
2. Causal relationships between molecule/cell level phenomena and organism-level patterns of heredity.
3. To test and deepen their mastery of genetics by applying this knowledge in a variety of problem-solving situations.
4. Describe the mechanisms governing Mendelian inheritance, gene interactions, and gene expression.
5. Describe mechanisms that generate variation in traits.
6. Apply principles of genetics to real-world problems in biology.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Apply quantitative problem-solving skills to genetics problems and issues.
2. Demonstrate their ability to reason both inductively and deductively with experimental information and data.
3. Describe the chromosome theory, molecular genetics and quantitative and evolutionary genetics.
4. Select and apply experimental procedures to solve genetic problems.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 3<sup>rd</sup> Semester**

**Subject: BIOLOGY AND DIVERSITY OF SEED PLANTS –I  
3.1**

**Subject Code: BOT.**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. General characters, origin and evolution of Gymnosperms
2. Geological Time Table; Evolution of Seed Habit.
3. Fossils and Fossilization
4. Economic importance of Gymnosperms
5. General characters, origin and evolution of Angiosperms

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Draw life-cycle and economic importance of : Cycas and Pinus
2. Describe Process involved in fossilization, types of fossils and importance of fossils
3. Evaluate Economic importance of Gymnosperms
4. Give general characters, origin and evolution of Angiosperms

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 3<sup>rd</sup> Semester**

**Subject: PLANT ANATOMY**

**Subject Code: BOT. 3.2**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Summarize the role of each cell structure in plant development
2. Evaluate the importance of various plant tissues in plant development
3. Summarize the contribution of each organ within the plant body
4. Evaluate the stages of plant growth and development
5. Structural and functional organization
6. To understand the conduction path of water and mineral nutrients
7. Translocation of assimilates into different plant parts
8. Plant metabolic activity
9. Plant development and storage of food

**Learning outcomes**

Students who successfully complete this course will be able to draw Diagram and explain the major structures within the root, shoot, leaves, Flowers, seeds, and seedlings of representative monocot and dicot angiosperm plants.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 4<sup>th</sup> Semester**

**Subject: BIOLOGY AND DIVERSITY OF SEED PLANTS-II      Subject Code: BOT. 4.1**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. To classify the plant Kingdom
2. To diverse taxonomic resources for plant identification, including electronic and print media, reference materials, and herbarium collections
3. To identify and name a plant and fix its rank in a recognized system of classification.
4. Describe the biological basis of plant classification.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Recognize ecologically and economically important plant species by sight.
2. Identify unknown plant species using dichotomous keys.
3. Employ diverse taxonomic resources for plant identification, including electronic and print media, reference materials, and herbarium collections.
4. Discuss current questions in plant evolution and classification.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 4<sup>th</sup> Semester**

**Subject: PLANT EMBRYOLOGY**

**Subject Code: BOT. 4.2**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Students should understand complete details about the structures, development of embryo at different stages including gametogenesis, fertilization, and implantation.
2. Ability to correlate between the embryological structure and its significance.
3. Demonstrate activities on the gametogenesis, fertilization.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. complete details about the structures, development of embryo at different stages including gametogenesis, fertilization, and implantation.
2. correlate between the embryological structure and its significance.
3. Demonstrate activities on the gametogenesis, fertilization.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 5<sup>th</sup> Semester**

**Subject: PLANT PHYSIOLOGY**

**Subject Code: BOT. 5.1**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Identify location and function of apical meristems, and describe their general structure
2. Identify the essential elements, rank their relative abundance in plant tissues, and describe their general roles in plant function.
3. Identify the ionic forms in which essential macro-elements are typically available in the soil.
4. Explain the mechanisms by which inorganic ions are absorbed by the root and transported throughout the plant.
5. Describe the two major symbioses occurring between plant roots and other organisms, and the benefit of each for plant nutrition.
6. Define hormone and explain its general role as a signal transducer. • List the well-documented roles of each of the major hormone groups in plant development and responses to environment.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Demonstrate an understanding of how water moves in plants at both molecular and organismal levels.
2. Demonstrate an understanding of the biochemical processes of photosynthesis, glycolysis, citric acid cycle, and electron transport.
3. Use simple laboratory skills in scientific measurements.
4. Write a scientific research paper.

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**Learning Objective & Outcomes**  
**B.Sc.(Botany) 5<sup>th</sup> Semester**

**Subject: ECOLOGY**

**Subject Code: BOT. 5.2**

### **Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Describe the structure and function of ecological systems and explain how ecological systems work at different spatial and temporal scales
2. List abiotic and biotic factors that affect, the distribution, dispersal, and behavior of organisms
3. Identify factors that affect biological diversity and the functioning of ecological systems
4. Use an ecological vocabulary in arguments and explanations of ecological phenomena
5. Apply concepts and theories from biology to ecological examples
6. Analyze and interpret ecological information, research and data

### **Learning outcomes**

Students who successfully complete this course will be able to:

1. Identify and describe the structural features of plants.
2. Discuss the basic processes of plant metabolism, transport, nutrition, growth, and reproduction.
3. Describe major evolutionary lineages of plants and their defining characteristics.
4. Identify plant species important in local ecosystems.
5. Describe the cultural uses of plants for food, fiber, medicine, biotechnology, etc.
6. Discuss plants in the context of broader environmental concerns, such as climate change, habitat destruction, pollution, invasive species, and agriculture.
7. Describe plant and animal distribution patterns in relation to abiotic and biotic factors.
8. Define the essential characteristics underlying natural ecosystems.
9. Explain model population and community-level dynamics.
10. Interpret and present ecological results.
11. Identify global environmental problems.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 6<sup>th</sup> Semester**

**Subject: BIOCHEMISTRY AND PLANT BIOTECHNOLOGY    Subject Code: BOT. 6.1**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. To study basics of enzymology
2. Discovery, nomenclature and characteristics of enzymes.
3. To study concept of holoenzyme, apoenzyme, coenzyme and co-factors.
4. Regulation of enzyme activity and mechanism of action.
5. To study tools and techniques of recombinant DNA technology.
6. Evaluate biology of nitrogen fixation.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Describe biocatalysis, pathway engineering, bioprocess control and downstream processing.
2. Demonstrate their ability to reason both inductively and deductively with experimental information and data.
3. Explain the theory and practice of recombinant DNA technology.
4. Select and apply experimental procedures to the spectrum of fields making use of biotechnology.
5. Grow, maintain, and propagate specific plant and animal cell types in a sterile environment.
6. Handle, store and identify cells in culture.
7. Count, identify and assess viability of cells by microscopic examination.
8. Identify the problems associated with growing, storing and identifying a wide range of different cell types.
9. Describe how cell culture can be used for in vitro studies and commercial applications.
10. Analyze data using appropriate techniques.

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**Learning Objective & Outcomes**

**B.Sc.(Botany) 6<sup>th</sup> Semester**

**Subject: ECONOMIC BOTANY**

**Subject Code: BOT. 6.2**

**Learning objectives**

The specific objectives of this course are to expose students to the following topics:

1. Investigate utilization and domestification of crop plant throughout history.
2. Investigate many uses of plants by other culture
3. Study origin, distribution, botanical description, brief idea of cultivation and economic uses of pulses
4. Analyze morphological description, brief idea of cultivation and economic uses of medicinal plants
5. Study botanical description, processing and uses beverages, sugar, tea and coffee.

**Learning outcomes**

Students who successfully complete this course will be able to:

1. Learn the importance of plant identification.
2. Learn the importance of plant identification.
3. Participate in plant identification using observation skills.