VIDYA VIKAS ART'S, COMMERCE & SCIENCE COLLEGE, SAMUDRAPUR

Programme Specific outcomes and Course Outcomes

DEPARTMENT OF BOTANY
PROGRAMME: B. SC.

Statements of programme Specific Outcomes (PSOs)

By the end of this course, the students will be able to:

1. Know the characteristics, systematics, morphology, structure and life cycle pattern of Viruses, Mycoplasma, Bacteria, Cyanobacteria, Algae, Fungi, Lichens, Bryophytes and Pteridophytes.
2. Understand the diversity, systematics and biology of seed plants.
3. Understand the nature and basic concepts of cell biology, genetics, anatomy, morphology, Biochemistry, Physiology, Taxonomy and ecology.
4. Analyze the interrelationships among prokaryotic and eukaryotic organisms
5. Study of organization and function of the gene, genome, cell, tissue, organ and organ-system including development, reproduction, ecological and physiological adaptations and behavior of different forms of life.
6. Understand the basic concepts of lower group plants and morphology of higher groups.
7. Understand the importance of plants, their diversity and its conservation.
8. Achieve pure and applied botanical knowledge.
9. Perform procedures as per laboratory standards in the areas of Biochemistry, Physiology, Biotechnology, Taxonomy, Economic Botany and Ecology
10. Demonstrate hands on skill in the experimental techniques and methods of analysis in various field of Botany.
11. Understand the application of genetic engineering for the improvements of plants.
12. Generate test hypotheses, observations, data, analyze and interpret results, derive conclusions, and evaluate their significance within a broad scientific context.
13. Promotes stewardship responsibility, entrepreneurship skill, research and career opportunities

Statements of course outcomes (Cos)

B.Sc. Course: SEM-I (Paper –I)

Course Outcomes: By the end of this course, the students will be able to:

1. Understand the basic concept of bacteria, virus and mycoplasma.
2. To Know the General characteristics, systematics, morphology, Ultramicroscopic cell structure and life cycle pattern of Viruses, Mycoplasma, Bacteria, Cyanobacteria and Algae.
2. Student will understand types of bacteria, viruses and mycoplasma.
3 Student will able to describe Classification and general characteristic of Algae.
4 Analyze economic importance of bacteria, virus and algae.
5. Student will describe life-cycle of micro organism and Algae.
6. Student will able to differentiated between bacteria, Viruses and Algae.
7. Student will understand the different types of biofertilizers and their production.

B.Sc. Course: SEM-I (Paper –II)

Course Outcomes: By the end of this course, the students will be able to:

1. Compare lower group of plants with higher.

2. Students understand Fungi, Plant diseases, Lichens and Bryophytes.
3. Student identifies and understand the different types of Mushrooms.
4. Understand the different techniques of mushroom cultivations.
5. Identify the different plant diseases.
6.Understand the Economic importance fungi, lichens and bryophytes.
7.Discuss the classification of fungi (Alexopoulos, 1996) and Bryophytes (Proskauer, 1957).

B.Sc.Course:SEM-I Lab

Course Outcomes: By the end of this course, the students will be able to:
1.Student will understand working and precaution while handling microscope.
2.Understand the basic technique in lab e.g. Slide preparation and Section cutting.
3. Identify bacterial, cynobacterial, algal, fungal, lichens and Bryophytic plant.
4. Comparative study of lower groups and lower higher groups.
5. Understand and identify the algal, bryophyte, fungal, plant pathology and lichens under natural habitat.
6. Understand the methods of preparation of spawn and mushroom beds.

B.Sc.Course: SEM-II (Paper-I)

Course Outcomes: By the end of this course, the students will be able to:
1.Explain the classification pteridophyta and gymnosperm.
2 Describe the economic importance of pteridophyta and gymnosperm.
3.Discuss the alternation of generation pteridophyta and gymnosperm.
4.Critize the concept of heterospory and seed habit.
5 .Discuss morphology and anatomy of cycadeoidea.

B.sc. course: SEM II (Paper –II)

Course outcomes: By the end of this course, the students will be able to:

1.Understand the paleobotany and geological time scale.

2.Identify the different type of fossils.

3.Explain the morphology and modification of plants.

4.Compare the types inflorescence and fruits.

5. Describe the parts of flower.

6. Student will understand the process of fossilization.

7.Student will understand fossil types in the field.

8.Student will describe vegetative and floral parts in scientific language.

9.Students will identify types of root, stem, leaves and flowers.

B. Sc.Course: SEM-II Lab

Course Outcomes: By the end of this course, the students will be able to:

1.Describe the various parts of flower.

2.Identify the anatomy of plants material by making temporary mount.

3.Identify the different types of fossils.

4.Identify various Plant specimen.

5.Understand and Identify the morphological characters of plants in natural environment.

6.Students will understand the structure of *Enigmocarpon* fruit.

2.Students will identify types of roots, stem, leaves, inflorescence, flower and fruits in the field visit.

B. Sc. Course: SEM-III (Paper-I)

Course Outcomes: By the end of this course, the students will be able to:

1.Describe general taxonomic rule of plant classification.

2.Acquire the basic knowledge of taxonomy.

3.Made aware with local flora.

4.Discuss the principal of botanical nomenclature.

5.Criticize the classification of angiosperms.

6.Justify the merits and demerits of systems of classification.

7.Understand the fossil angiosperm *sahanianthus*

B. Sc. Course: SEM-III (Paper-2)

Course Outcomes: By the end of this course,the students will be able to:

1.Describe the structure of plant cell and its organelles.

2.Analyze the morphology of chromosome organization.

3.Explain the plant cell-division and its significance.

4.Evaluate the biostatic formulas.

5.Understand the method of plants breeding.

6. structure of typical plant cell and plant membrane.

7. Objectives and application of plant breeding statistical methods used in biology.

B. Sc. Course: SEM-III lab

Course Outcomes: By the end of this course,the students will be able to:

1.Preparation of herbarium.

2.Analyze the floral formula of monocot and dicot families.

3.Perform the procedure of cytological techniques.

4. Analyze the biostatics data.

5. Understand and identify the plants under natural environment.

6.Enriched with fundamental aspects of botany.

B. Sc. Course: SEM-IV (paper-I)

Course Outcomes: By the end of this course, the students will be able to:

1. Classify the meristimatic and permanent tissue based on origin and position.

2. Compare the different theories of tissue.

3. Understand primary, secondary and anomalous, anatomical structure of plant parts.

4. Understand the various types of pollination mechanism.

5. Explain the types of ovules.

6. Students will understand double staining technique.

B. Sc. Course: SEM-IV (paper-II)

Course Outcomes: By the end of this course, the students will be able to:

1. Describe the laws of mendelism.

2. Summarize the theories of linkage.

3. Design and construct the variation in chromosome structure and number.

4. Discuss the types of mutations and its application in crop –improvement.

5. Understand the concept of gene.

B. Sc. Course: SEM-IV Lab

Course Outcomes: By the end of this course, the students will be able to:

1. Perform double-stained permanent slide mounting.

2. Calculate the percent germination of pollen-grains.

3. Solve the Mendel's law of inheritance through color beads.
4. Solve interaction of gens from the given data.

B. Sc. Course: SEM-V (Paper-I)

Course Outcomes: By the end of this course,the students will be able to:1.Classify and describe about bimolecular.
2. Describe about the basic of enzymes.
3. Understand plant water relation.Write about mineral nutrients.
4.Summerize the cycle of respiration and photosynthesis.

B. Sc. Course: SEM-V (Paper-II)

Course Outcomes: By the end of this course, the students will be able to:
1.Define and explain about ecology branches and its significance.
2. Summarize the environmental factors.
3. Understand and explain the nitrogen cycle.
4. Compare the various Phytogeographic regions of India.
5. Describe the types of ecosystem.
6. Student will explain the effect of climatic factors on vegetation.
7. Students will understand food chain, food web and ecological pyramids.

B.Sc. Course: SEM-V Lab

Course Outcomes: By the end of this course, the students will be able to:
1. Perform major and minor physiology experiment.
2. Perform micro-chemical and bio-chemical test.
3. Understand ecological adaptations of plants.
4. Compare different types of soil.
5. Students able to measure the water holding capacity and moisture content.

B. Sc. Course: SEM-VI (Paper-I)

Course Outcomes: By the end of this course, the students will be able to:
1.Describe the plant growth and its growth regulators.
2. Describe the seed –dormancy.
3. Describe the plant-defense and role of secondary metabolites.
4.Discuss plant tissue culture technique and its application.
5.Discuss the advantages and disadvantages of genetic-engineering.

B. Sc. Course: SEM-VI (Paper-II)

Course Outcomes: By the end of this course, the students will be able to:
1.Compare the various ecological successions.
2. Explain different types of environmental pollution and its management.
3. Understand about the renewable and non-renewable natural sources.

4. Analyze the principal, types and application of instruments.
5. Explain morphology utilization and chemical-constituents of different plants.

B. Sc. Course: SEM-VI lab

Course Outcomes: By the end of this course, the students will be able to:

1. Perform principles and working of instruments.
2. Study and identity the types and Characteristic of soil.
3. Study the physical and chemical properties of water.
4. Study the plants of ethnobotanical importance.
5. Understand and identify ethno-botanical plants under natural habitat.

DEPARTMENT OF BOTANY

PROGRAMME: M. Sc.

Statements of Programme Specific Outcomes (PSOs)

By the end of this course, the students will be able to:

1. Learn about practical technique in lab for detail study of plant cell structure, reproduction, anatomy, breeding procedures for hybridization
2. To utilize the knowledge of mycology and plant pathology to satisfy the need of farmers
3. Procure the knowledge of importance of plant to human being and all organisms.
4. Prepare the students for many competitive exams like MPSC, UPSC, CSIR-NET, SET, GATE, etc.
5. Enable the students to be resourceful in identifying the plants.

Statements of Course Outcomes (COs)

M. Sc. I Course: SEM-I Core 1((1T1)

By the end of this course, the students will be able to:

1. Understand the structure, function of virtues and bacteria
2. Describe the life cycle, structure and functions of algae
3. Students will classify and describe the life, cycle, structure and function of fungi around them.
4. Comparative study of different fungi with special reference to diseases in crop plant and symptoms of fungal diseases.
5. Identify algae and fungi in their natural habitat on the basis of characters
6. Develop the cultures of algae and fungi.

M. Sc. I Course: SEM-I paper II (1T2)

By the end of this course, the students will be able to:

1. Understand the structure and life cycle of different bryophytes
2. Identify the members of Hepatocopsida and Bryopsida
3. Study of evolutionary trends of Sphenopsida and filicopsida
4. Study of distribution and classification of rhyniopsida, psilopsida and Lycopsida
5. Identify bryophyte and pteridophyte material for specimens

M. Sc. I Course: SEM-I paper III (1T3)

By the end of this course, the students will be able to:

1. Study the different types of fossils of extinct plants/ flora
2. Study the origin of gymnosperm by living fossil genera.
3. Study the evolutionary affinity between cordiattes, caytonicles and pentoxylales.
4. Study of living gymnosperm and fossil forms.
5. Identify fossil and living form of gymanosperm.

M. Sc. I Course: SEM-I paper IV (1T4)

By the end of this course, the students will be able to:

Study Mendelian law including incomplete dominance, penetrance ,expressivity in Drosophila.

2. Explain the study of chromatin organization, karyotype analysis.
3. Discuss the breeding behavior of duplicator, deficiency, inversion and translocator.
4. Detail study of spontaneous and indeed mutation of chromosomes on the basis of karyotype.
5. Gain knowledge about actual mutations happens in plants.

M. Sc. I Course: SEM-I Practical-I (1P1)

By the end of this course, the students will be able to:

1. Identify cyanobacteria and algae.
2. Prepare and identify the fungal culture.
3. Identify bryophytes and plant disease.
4. Identify fungi and bryophytes.
5. Prepare slides of Bryophytes, Pteridophytes and Gymnosperms.

M. Sc. I Course: SEM-I Practical-II (1P2)

By the end of this course, the students will be able to:

1. Identify pteridophyte and gymnosperm material
2. Study the anatomical preparation of pteridophyte and gymnosperm.
3. Describe the fossil specimens
4. Perform the experiments on cytology and genetics
5. Prepare the botanical excursion report.

M. Sc. I Course: SEM-II paper I (2T1)

By the end of this course, the students will be able to:

1. Students will understand how the process of photosynthesis feed all organism and balancing Co_2 and O_2 ratio.
2. Explain the mechanism of growth hormones, auxin, gibberellins.
3. Classify enzymes and regulation of their activity
4. Compare the structure and function of carbohydrate lipid and protein metabolism

M. Sc. I Course: SEM-II paper II (2T2)

By the end of this course, the students will be able to:

1. Understand photo morphogenesis and seedling development
2. Evaluate the root developments, flower development in plants
3. Study the reproduction in plants with the help of male female gametophyte
4. Study of microsporogenesis and megasporogenesis.
5. Understand pollen-pistil interacting and seed development.

M. Sc. I Course: SEM-II paper III (2T3)

By the end of this course, the students will be able to:

1. Describe cell wall, plasma membrane and plasmodesmata.
2. Understand cell organelles Golgi complex, lysosomes, peroxysomes etc
3. Study the nucleus-ultra structure and function.
4. Study the stress biology, biotic and abiotic stress.

Correlate the theoretical description of cell components with microscopic ultrastructures.

M. Sc. I Course: SEM-II paper IV (2T4)

By the end of this course, the students will be able to:

1. Study of floral symmetry of dicot and monocot flowers.
2. Discuss about the principles of taxonomy and major system of plant classification.
3. Understand anatomy, embryology, palynology and photochemistry.
4. Discuss the principles of biosystematics numerical taxonomy.
5. Collect the ethno botanical museum specimens.

M. Sc. I Course: SEM-II Practical- I (2P1)

By the end of this course, the students will be able to:

1. Perform the experiments on photosynthesis, respiration and growth of plants.
2. Identify amount of metabolic-protein, amino acids, fat, carbohydrate, present in plants.
3. Classify different kind of cytohistological zonation of shoot and root meristem.
4. Understand the process of micro and megasporogenesis.
5. Understand physiological effects of temperature, humidity, CO_2 level on plants.

M. Sc. I Course: SEM-II Practical-II (2P2)

By the end of this course, the students will be able to:

1. Study the salivary gland chromosome of chiranomas larva.
2. Isolate DNA and prepare cot curve.
3. Study the different families of dicot.
4. Prepare cardiogram of different species of Ficus.
5. Collect the different types of inflorescence and fruits.
6. Collect the museum specimens of morphology of plants.

M. Sc. II Course: SEM-III paper I (3T1)

By the end of this course, the students will be able to:

1. Understand the concept of community and vegetable development and succession.
2. Organize the ecosystem and mechanism of biogeochemical cycle.
3. Students will differentiate hydrophytes, mesophytes, and xerophytes and discussing the concept of ecosystem stability.
4. Know about IUCN, red data book, sanctuaries and national park.
5. Study of topography of an area and sampling of plant community by quadrate method.
6. Study of composition of wetlands and mangroves.

M. Sc. II Course: SEM-III paper II (3T2)

By the end of this course, the students will be able to:

1. Study of taxonomic classification- croquets (1968).
2. Study of systematic position of Alismatidae, commeliadae, Asteraceae and

Lemnaceae.

3. Explain the fossil angiosperm and global Biodiversity.
4. Study of socio-economic importance of diversity of plants.
5. Collect the herbarium specimens.
6. Collect the morphological specimens- cones, flowers, fruits and seeds etc.

M. Sc. II Course: SEM-III paper III (3T3)

3T3 -Core Elective I : (Plant Physiology –I)

At the end of this course, the students will be able to:

1. Understand the aspects of plant growth and development.
2. Understand the aspects of plant Regulators (Plant Hormones).
3. Understand the aspects of seed physiology and stress physiology.
4. Understand the concepts of Biotic and Abiotic Stress.

M. Sc. II Course: SEM III paper IV (3T4)

By the end of this course, the students will be able to:

1. Introduce to Aesthetic botany in syllabus to study phytogeography and forest types in India
2. Understand the technique of grafting, budding, industrial gardening, terrace gardening etc.
3. Develop nurseries and other management for cultivation of flowers
4. Design landscape in commercial, residential bungalows
5. Develop the technique to set up playhouses and ornamental succulents.

M. Sc. II Course: SEM-III Practical-I (3P1)

By the end of this course, the students will be able to:

1. Study of frequency, abundance and density by quadrate method
2. Study of statistical problems based o biometry
3. Identify morphological and floral characters of different plants
4. Use of generic key and species key for plant
5. Collect the herbarium specimens for herbarium record in the department for UG and PG students.

M. Sc. II Course: SEM-III Practical-II (3P2)

By the end of this course, the students will be able to:

1. Estimation of Phenols, Proline, Alkaloids.
2. Estimation of 'Vitamins C'.
3. Demonstration of effects of Auxin, Cytokinin, Abscission acid, Gibberellic acid.
4. Study the effects of $ZnSO_4$ on Paddy.
5. Study the Physical and Chemical methods for breaking seed dormancy.
6. Preparation of Cytoplasmic and Chloroplastic LPC.

M. Sc. II Course: SEM-IV paper I (4T1)

Course Outcomes: By the end of this course, the students will be able to:

1. Students will understand and compare the process of protein synthesis in prokaryotes and eukaryotes.
2. Students will perceive structure and functions of sub cellular components.
3. Understand the mechanism of gene mapping and genetic recombination.
4. Students will draw cell cycle-mitosis and meiosis.
5. Understand signal transduction, sensor, regulator system in bacteria and plants.

M. Sc. II Course: SEM-IV paper II (4T2)

Course Outcomes: By the end of this course, the students will be able to:

1. Understand the application of DNA recombination technology in genetic engineering
2. Discuss about polymerase chain reaction and DNA fingerprinting
3. Describe detail of tissue culture technique and its application
4. Study bioinformatics, data base sequences DNA nomenclature and taxonomy database
5. Study methods of plant breeding technique
6. Study the technique of hybridization.

M. Sc. Sem-IV Plant Physiology-II Paper- III (4T3)

At the end of this course, the students will be able to:

1. Understand the importance of secondary metabolites and their medicinal importance.
2. Understand the different Leaf Proteins.
3. Understand the applicability of learnt concepts at industrial level.
4. Understand the pathways and proteins involved for different signaling response at cellular level.
5. Understand the Vitamins and their different types.
6. Understand the concept of the antioxidants and nanobiotechnology.

M. Sc. Sem-IV Applied Botany Paper- IV Foundation Course (4T4)

At the end of this course, the students will be able to:

1. Learn the production of plant bio-products.
2. Applying knowledge with reference to green herbal techniques.
3. Applying knowledge with reference to culture technique.
4. Applying knowledge with reference to cultivation of garden, silviculture, post-harvesting techniques etc.

1.

M. Sc. I Course: SEM-IV Practical-I (4P1)

Course Outcomes: By the end of this course, the students will be able to:

2. Students will understand the technique of SDS-PAGE and ELISA.
3. Perform the experiment on restriction digestion of DNA
4. Study of media for plants tissue culture
5. Study of oil, rubber, medicinal plants, dyes etc.
6. Identify medicinal and economical plants.
7. Students will understand the concept of conjugation in bacteria.
8. Students will prepare gene maps on the basis of cross over data.

M. Sc. I Course: SEM-IV Practical-II Project (4 PROJ 1)

Course Outcomes: By the end of this course, the students will be able to:

1. Learn different techniques of research used in analysis.
2. Prepare power point presentation.
3. Improve presentation skill and teaching communication skill.

DEPARTMENT OF CHEMISTRY
PROGRAMME: B.SC.

Statements of Programme Specific Outcomes (PSOs)

By the end of the course, the students will be able to:

- Join school as Chemistry teacher.
- Prepare for competitive exams like MPSC,UPSC, GATE,CAT.
- Analyze and grasp abstract ideas to apply them to important practical problems.
- Develop strong analytical skills and a broad-based background in the Chemical Sciences to join Indian industry.

Statement of Course Outcomes (COs)

B. Sc. Sem-I Paper-CH 101: (Inorganic Chemistry)

By the end of this course, Students will be able to:

- Understand the basic structure of atom.
- Understand the concept nature of chemical bond.
- Overview of periodic table and S,P block elements.

B. Sc. Sem-I Paper-CH 102: Physical Chemistry

By the end of this course, Students will be able to:

- Understand the various states of matter.
- Overview of solid, liquid and gaseous state of matter.
- Understand the concept of different types of surface phenomenon and catalytic property.

B. Sc. I Sem-I Paper- CH-103: Laboratory Course

By the end of this course, Students will be able to:

- Students will be able to investigate different metal salts by using inorganic qualitative analysis.
- Students are able to understand various properties of liquids i.e. surface tension, refractive index, viscosity

B.Sc. Sem-II CH – 201: Paper- I (Organic Chemistry)

By the end of this course, Students will be able to:

- Understand the concept structure and bonding in organic compounds.
- Understand the concept of stereochemistry.
- Understand different types of reaction mechanism.
- Understand alkanes, alkenes.
- Understand the aromaticity of organic compounds.

B. Sc. Sem-II CH – 202: Paper- II (Physical Chemistry)

By the end of this course, Students will be able to:

- Understand the thermodynamics of chemical reactions.
- Understand the concept of chemical kinetics.

- Understand the concept of phase equilibria.

B. Sc. Sem-II CH-203: Laboratory Course

By the end of this course, Students will be able to:

- Students will able to analyse organic compounds by organic qualitative analysis method.
- Students will able to synthesize simple molecule like benzamide and benzaldehyde.
- Students will able to use various techniques useful for analysis such as calorimetry,conductometry.

B. Sc. Sem-III CH – 301:Paper- I (Inorganic Chemistry)

By the end of this course, Students will be able to:

- Understand the concepts of molecular orbital theory.
- Understand the properties of d and f block elements.
- Understand the role of non aqueous solvents.
- Understand concepts of errors and evaluation in chemical analysis.

B. Sc. Sem-III CH-302 : Paper- II (Organic Chemistry)

By the end of this course, Students will be able to:

- Understand the structure and chemical bonding in aryl ,alkyl halides,aldehydes.
- Understand the structure and chemical bonding in alcohols and phenols..
- Understand chemical reactions of acids, alcohols, phenols etc.

B. Sc. Sem-III CH- 303: Laboratory Course

By the end of this course, Students will be able to:

- Perform volumetric analysis for the estimation of Zn,Fe and alkali content in given sample.
- identify given organic compound by organic qualitative analysis.

B. Sc. Sem-IV CH – 401:Paper- I (Inorganic Chemistry)

By the end of this course, Students will be able to:

- Understand the properties of coordination compounds.
- Overview of organometallic chemistry.
- Understand the importance of essential elements in living organism.
- To understand the Concept of hard and soft acid base theory.

B. Sc. Sem-IV CH – 402:Paper- II (Physical Chemistry)

By the end of this course, Students will be able to:

- Understand second law of thermodynamics.
- Use spectroscopy for chemical analysis.
- Understand electrochemistry of reversible and irreversible cells.
- Understand the nuclear properties of atom.

B. Sc. Sem-IV CH-403: Laboratory Course

By the end of this course, Students will be able to:

- Perform gravimetric analysis of Ni, Ba.
- To estimate amount of constituents present in given solution by conductometer, potentiometer.

B. Sc. Sem-V CH- 501:Paper- I (Organic Chemistry)

By the end of this course, Students will be able to:

- Understand heterocyclic chemistry.
- Understand the theory behind the organic qualitative analysis.
- Understand the chemistry of organomagnesium and organozinc compound.

B. Sc. Sem-V CH- 502:Paper- II (Physical Chemistry)

By the end of this course, Students will be able to:

- Understand quantum chemistry and its application.
- Understand molecular orbital theory.
- Understand photochemistry and Raman spectroscopy

B. Sc. Sem-V CH- 503: Laboratory Course

By the end of this course, Students will be able to:

- Perform estimation of different functional groups present in organic compound.
- Perform analysis based on viscosity,colorimetry,refractometry.

B. Sc. Sem-VI CH – 601: Paper- I (Inorganic Chemistry)

By the end of this course, Students will be able to:

- Understand metal-ligand bonding in co-ordination compounds.
- Understand electronic spectra of transition metal complexes.
- Understand separation techniques used in analysis and purification.
- Understand the importance of inorganic polymers.

B. Sc. Sem-VI CH- 602: Paper- II (Organic Chemistry)

By the end of this course, Students will be able to:

- Understand the theory behind Nuclear magnetic resonance spectroscopy..
- Understand structure and properties of biomolecules.
- understand the importance of synthetic dyes, synthetic drugs and synthetic polymers .

DEPARTMENT OF ZOOLOGY
PROGRAMME: B. SC.

Statement of Course Outcomes (COs)

B.SC. SEMESTER I

Paper – I

Life and Diversity of Animals - Nonchordates (Protozoa to Annelida)

By the end of this program, the students will acquire knowledge and they will understand the:

- General characters and classification of Protozoa, Porifera, Helminthes, Annelida.
- Structure and reproduction of Paramoecium, Plasmodium, Sycon, Obelia, Ascaris, Leech
- life cycle of Plasmodium, Obelia, Ascaris, Taenia solium.
- Parasitic Protozoans of Man- Mode of infection and its control, parasitic adaptations in helminthes.
- Trochophore larva- significance
- Canal system in sponges, corals and coral reef formation, Vermiculture and its importance.

Paper – II

Environmental Biology

By the end of this program, the students will understand the:

- Atmosphere (Hydrosphere, Lithosphere): Major zones and its importance, energy sources, Energy flow in an ecosystem.
- Ecosystem - Definition and types - pond ecosystem, Food chain, food
- web and ecological pyramids.
- Biodiversity and its conservation , causes of reduction , Hot spots in India, Wildlife conservation acts (1972 and 1984), national parks and sanctuaries .
- Sources, effect and control measures - air pollution, water pollution, noise pollution.
- Toxic effects of heavy metals- Bioaccumulation and biomagnifications

PRACTICAL – I

By the end of this programme, the students will be able to

- Study and Classify Life and Diversity of Animals – Nonchordates with the help of museum specimens, permanent slides, diagrams.
- Prepare temporary and permanent slides.
- Estimate DO, free CO2, pH, total hardness of water sample.
- Study of pond ecosystem – analyze plankton quantitatively.
- Observe animals in natural habitat of National park and Sanctuary.

B.Sc. Semester – II

Paper – III

Life and Diversity of Animals – Nonchordates (Arthropoda to Hemichordata)

By the end of this programme, the students will be able to understand

- General characters and classification up to classes: Arthropoda , Mollusca, Echinodermata, Hemichordata

- study the Morphology and anatomy of Cockroach , Pila, Asterias, Balanoglossus.
- Insects as Vectors , Social behavior in honey bees & Pearl formation in Mollusca
- Study the larval forms -crustacea, Mollusca, Echinoderms.
- Affinities of Balanoglossus.

Paper – IV

Cell Biology

By the end of this programme, the students will get knowledge and they will understand the:

- Ultra structure of prokaryotic and eukaryotic cell ,
- structure and function of Cell organelles.
- Oxidative phosphorylation, Glycolysis and Kreb's cycle & Electron Transport Chain and
- terminal oxidation.
- Giant chromosomes: Lamp-brush and polytene chromosome
- Cell cycle and Mitosis ,Meiosis (different phases and significance),
- 6)Cellular ageing and cell death, Elementary idea of cancer and its causative agents.

PRACTICAL – II

By the end of this programme, the students will be able to :

Section A

- Study and classify Life and Diversity of Nonchordates .
- Prepare temporary and permanent slides.

Section B: Cell Biology

- Study the ultra structure of prokaryotic cell & eukaryotic cell .
- observe osmosis in human RBCs , Barr body in blood smear.
- prepare and observe the mitotic cell division in onion root tips , meiosis in Tradescantia bud/ Grasshopper testis by squash method .
- study the salivary gland chromosome in Chironomous larva.
- prepare and observe the mitochondria in buccal epithelium/ lip mucosa .
- Use ocular micrometer to measure micro objects.

B.Sc. Semester – III

Paper – V

Life and Diversity of Animals - Chordates (Protochordata to Amphibia)

By the end of this programme, the students will be able to understand

- General characters and classification up to classes: Protochordata, Pisces, Amphibia, & Agnatha
- The Morphology and anatomy of Herdmania, Amphioxus.
- *R*etrogressive metamorphosis of ascidian tadpole of Herdmania.
- Scales of fishes ,origin of paired fins ,migration and accessory respiratory organs and Embryology.
- Parental care and Neotony in Amphibia .
- Frog Embryology & Development of respiratory organs & Aortic arches in frog .

Paper – VI

Genetics

By the end of this programme, the students will be able to understand

- Mendelian Principles& laws.

- Interaction of genes, quantitative genetics & extra nuclear genome .
- Cytoplasmic inheritance, Linkage and crossing over.
- Concepts of genes & Genetic disorders in human.
- Sex determination.
- Gene mutations & Lethal genes.
- Population genetics, Genetic counseling & Applied genetics

PRACTICAL – II

Section A :Life and Diversity of Animals – Chordates (Protochordata to Amphibia)

By the end of this programme, the students will be able to

- Identify, classify and distinguish the characters and adaptive features of animals from Urochordata , Cephalochordata ,Cyclostomata , Pisces & Amphibia .
- Describe Digestive system ,Reproductive system &Brain of locally available culturable Fish.
- Explain the histology of Amphioxus and embryology of Frog from the permanent slides .
- Prepare the permanent stained slide .

Section B : Genetics

- Uunderstand monohybrid and dihybrid ratio
- Study of normal human karyotype (Normal male and female)
- Study characters and karyotypes of Syndromes.
- Study the genetic traits .

B.Sc. Semester IV

Paper - VII

Life and Diversity of Animals – Chordates (Reptilia, Aves and Mammals)

By the end of this programme, the students will be able to

- Identify, classify and distinguish the characters and adaptive features of animals from
- Reptilia, Aves & Mammals.
- understand Poison apparatus, biting mechanism, snake venom and its importance.
- understand Comparison of Ratitae and Caranitae, Flight adaptations and migration .
- understand theories of evolution & genetic basis of evolution.
- understand Adaptations in animals.
- understand Races in Man
- understand Comparative account of aortic arches and heart in Reptiles, Birds and Mammals
- understand embyology of Mammals & chick
- understand Stem cells .
- understand Biological clock : Diurnal and rhythmic behavior in birds and mammals
- understand the Role of pheromones in reproductive behavior

Paper VIII

Molecular Biology and Immunology

By the end of this programme, the students will be able to understand

- Structure & properties of DNA, RNA as genetic material ; DNA replication.
- Recombination in Bacteria.
- Genetic code & Protein synthesis.
- Gene regulation .
- Concepts of immunity, Structure, types and functions of Antigen & Antibody.

- Antigen-antibody interaction .Types of immune response.
- Complement system, Cytokines.
- Autoimmunity and immunodeficiency.

PRACTICAL – IV

Section A : Life and Diversity of Animals – Chordates

(Reptilia, Aves and Mammals)

By the end of this programme, the students will be able to understand

- Identify, classify and distinguish the characters and adaptive features of animals from
- Chordates (Reptilia, Aves and Mammals)
- skeleton of Rabbit and Fowl .
- chick embryology from W.M.

Filoplume & skin of Bird, Skin of Mammal.

Section B: Molecular Biology and Immunology

Molecular Biology

By the end of this programme, the students will be able to

- perform staining of DNA and RNA from blood smear of various animals.
- understand basic laboratory instruments and equipments.
- 3) perform calculations of Molarity and normality of solutions .
- Isolate Genomic DNA from any available source.

Immunology

- Determine blood groups in humans.
- Perform Antigen – Antibody interaction by double diffusion method (Ouchterlony).
- Study of histological slides of organs of immune system.

B.Sc. Semester V

Paper IX

General Mammalian Physiology

By the end of this program, the students will understand the:

- Importance of vitamins & Enzymes-biocatalyst,
- Glands and hormones associated with digestion.
- and explain the physiology of digestion , respiration, circulation
- Blood pressure, E.C.G. & working of Heart.
- Composition of blood, respiratory pigments in mammals.

Paper X

Applied Zoology

Students will get knowledge and will be able to:

- Establish their own aquaculture unit, aquarium .
- Culture prawn and oyster (for pearl).
- Identify insects pest (agriculture and veterinary).apply ways to control them
- Understand the types of Silkworm, their Life cycle and economic importance.
- Establish their own sericulture , apiculture, lac culture units.

PRACTICAL V

Section A: General Mammalian Physiology - I

Section A: General Mammalian Physiology – I

By the end of this programme, the students will be able to:

- Detect the action of salivary amylase on starch.
- Detect the presence of carbohydrates, proteins, Lipids, Vitamin A and Vitamin C in given sample.
- Measure lung capacity .
- Prepare slide of Haemin crystal.
- Total WBC and RBC count from blood.
- Understand histology of digestive and lungs.

Section B : Applied Zoology –I (Aquaculture and Economic Entomology)

Aquaculture:

By the end of this programme, the students will be able to:

- 1. Collect and identify Freshwater edible fishes & Aquarium fishes .
- 2. explain the digestive, reproductive systems and brain with pituitary of culturable fishes & the Gonosomatic index
- 3. Fabricate and set up own aquarium
- 4. Mount the Scales of fishes, zooplankton .

B.Sc. Semester VI

Paper -XI

General Mammalian Physiology

By the end of this program, the students will receive knowledge and they will be able to understand the:

- E.M. structure ,types of Neurons & conduction of nerve impulse .
- Ultrastructure & properties of striated muscle .
- Muscle contraction- sliding filament theory.
- Structure & function of uriniferous tubule.
- Normal and abnormal constituents of urine, dialysis.
- Structure and functions of endocrine glands.
- Oestrous and menstrual cycle ,male and female sex hormones , Contraceptives .
- Causes of infertility ,In-vitro fertilization.

Paper - XII

Applied Zoology II

(Biotechniques, Microtechnique, Biotechnology, Bioinformatics and Biostatistics)

By the end of this programme students will able to understand :

- Sterilization methods, Separation of biomolecules; Chromatography (Elementary idea) ,Electrophoresis.
- Pprinciples of colorimeter and spectrophotometers.
- The microtechnique procedure.
- Histochemical staining techniques for carbohydrates, proteins and lipids .
- Recombinant DNA technology, application of biotechnology: Insulin and vaccine

production.

- Bioinformatics: Definition, Basic concepts ,importance and its role in life sciences & Bioinformatics databases.
- Biostatistics.

PRACTICAL VI

By the end of this programme, the students will be able

- To detect of urea, albumin, sugar and creatinin from urine .
- To count the sperms from given semen sample .
- To describe the endocrine glands of culturable fishes
- To identify and explain the histology of kidney, endocrine glands, uterus, placenta, nerve fibre, muscles of mammals.
- To separate amino acids by paper chromatography
- To separate proteins by electrophoresis technique
- To develop skill in microtechnique.
- To demonstrate the carbohydrates, proteins and lipids by histochemical methods
- To determine mean, mode, median from a given biostatistical data
- To represent statistical data graphically using computers.

Physiology helps to understand the mechanism or working of body, its systems , its tissues, the cells and the biomolecules .

It helps to understand how homeostasis is maintained in body, in response to changes in environmental factors.

It helps to understand processes of life in healthy and diseased states.

- Bioinformatics is the currently popular term for **the application of computational and analytical methods to biological problems.**
- To study the origin of diseases at molecular level the study of molecular data (i.e DNA, RNA & Proteins), its analysis and interpretation is done with the help of computational biology or bioinformatics .
- The information of gene structure, gene sequence and expression, protein structure and function can then be applied to gene-based drug discovery and development, development of anti microbial agents and vaccines.
- application of bioinformatics programs is very ***useful, easier, and shorter process*** and at much ***lower cost.***

DEPARTMENT OF MATHEMATICS

PROGRAMME: B. Sc.

B. SC. SEM I

1) Students can able to evaluate the limits analytically and use in Industrial field.
2) Students will be able to interpret slope as rate of change.

B. SC. SEM II

1) Students will be able to observe he data and draw appropriate statistical conclusions.
2) Students can demonstrate the ability to apply analytical and theoretical skills to model and solve mathematical problems.
3) Students will be able to understand the knowledge of curve tracing use in Engineering.

B. SC. SEM III

1) Students can able to find derivatives of a function using rules of derivatives
2) Students will be able to solve Higher order differential equations
3) Students will be able to recognize, apply and interpret multiple representations of integration and its applications.

B. SC. SEM IV

1) Students will be able to solve partial differential equation.
2) Students will be able to solve equations involving trigonometric functions
3) Students will be able to to analyze and solve a precalculus level problems.

B. SC. SEM V

1) Students can apply graph theory to study technically.
2) Students will be able to observe he data and draw appropriate statistical conclusions.
3) Students can demonstrate to write a linear model of a real world situation

B. SC. SEM VI

1) Students will be easily apply the mathematical principles and techniques to solve the problems in areas such metric spaces, set theory and Discrete Mathematics..
2) Students can apply graph theory to study technically.
3) Students will be able to get knowledge of affective domain and study skills.
4) Students can demonstrate the ability to apply theoretical skills to model and solve mathematical problems.

DEPARTMENT OF PHYSICS

PROGRAMME: B. SC.

Program Specific Outcome (PSO)

1. Develop scientific attitude and temperament and give emphasis on the development of experimental skills, data analysis, calculation, measurements and also on the limitations and precautions aboutthe experimental method data and results obtained.
2. To apply graduate-level knowledge and solve problems in the areas of electrodynamics, quantum mechanics, classical mechanics, statistical mechanics, mathematical physics and Nanoscience and nanotechnology, Electricity and magnetism ,Atomic physics, Nuclear– Physics.
3. Understand theories of physics and its relevance in present day Technology.
4. Study the strength of equation, format graphs, and mathematical tools to solve the problems.
5. Make models and circuits through the study of digital electronics.

Course Outcomes (CO)

On the completion of the course the students are able to:

1. Explain the concept of Gravitation, Astrophysics, and planetary motion, rotational motion of rigid body and moment of inertia and concept of linear, angular momentum and Newton's law of motion.
2. Understand the concept of properties of matter viz. Elasticity, viscosity, surface tension, thermodynamics and Kinetic theory.
3. Interpret and illustrate concepts of sound waves, acoustics and ultrasonic and oscillations (Free, damped and forced oscillation).
4. Honed the skilled to understand Electrostatic properties, Magnetostatics, magnetism, Electromagnetic nature.
5. Develop the understanding of the optical phenomenon such as interference, diffraction, polarization, reflection, refraction, transmission etc.
6. Acclimatize with the concept of solid state Physics, relativity, Nuclear Physics, Bio-Physics,X-ray, Laser, Raman spectroscopy, Electron spin resonance, Nuclear magnetic Resonance, Atomic and molecular physics.
7. Learn the basics of solid state electronics eg. BJT, FET, JFET, MOSFET, also communication and digital electronics, fiber optical communication.
8. Gain the knowledge of quantum mechanical concepts applicable in understanding behavior of Nanomaterials and applications in nanotechnology.