

DEPARTMENT OF BOTANY & BIOTECHNOLOGY

COURSE OUTCOME(CO)

Semester: I

Foundation Course Course Code: BB 1121

Credits: 3 Course

Title : Methodology and Perspective of Biotechnology

CO1 Modern scientific methods and to familiarize Biotechnology and its various areas.

CO2 The students will be able to understand how science works.

CO3 Students will learn how to apply statistics and IT in Biological science

CO4 They will receive a general awareness about Biotechnology and its application in various fields.

CO5 Overview of Information of Technology and its importance in Biotechnology

CO6 Data handling in science and Biostatistics

CO7 Application of Biotechnology

Core Course Course Code: BB 1141

Credits: 2

Course Title: Angiosperm Anatomy and Reproductive Botany

CO1 Basic concepts of plant anatomy

CO2 About flowering plants and anatomy of flowering plants

CO3 About the environmental adaptations of plants

CO4 The relationship of anatomy and physiology with the environmental adaptations

CO5 Reproduction of flowering plants

CO6 Plant development and its adaptations with respect to the environment

Core Course Vocational Course Code: BB 1171

Credits: 4

Course Title : Microbiology

CO1 Basic concepts of Microbiology

CO2 Give a thorough and basic understanding in various aspects of classical Microbiology

CO3 Application of Microbiology in Biotechnology

CO4 Various branches of Microbiology – Medical, Food and Industrial Microbiology

CO5 Metabolism and Genetics of Microbes – bacteria and Virus.

CO6 Students are expected to master the major theoretical and practical expertise from this course

Semester: II

Foundation Course Credits: 2

Course Code: BB 1221

Course Title : Biophysics & Instrumentation

CO1 aim is to introduce the physical aspects and bioenergetics of the living system

CO2 familiarize the principle and working of various instruments used in Biotechnology experiments

CO3 The students will be able to understand the fundamentals of Biophysics

CO4 General instrumental techniques used in Biotechnology

CO5 First and Second Laws of thermo dynamics and its importance in biological system.

CO6 Various analytical techniques – separation and identification techniques

Course Code: BB 1241

Credits: 4

Course Title: Environmental Studies

CO1 Students should acquire a basic understanding about the structure and function of the environment

CO2 Students learn about Environment and its interaction with the living systems

CO3 It will impart knowledge about the geographical distribution of plants

CO4 Student will learn about the impact of human intervention in the environment

CO5 Students will understand about the delicate balance of various factors in the environment.

CO6 It gives an idea about the various types of biodiversity and the influence of environmental pollution on the biodiversity

Core Course Practical Botany I

Credits: 2

Course Code: BB 1242

Course Title: Practical Botany

CO1 Experiments to prepare reagents and fixatives for anatomy

CO2 Experiments to see non living inclusions, various living and non living tissues

CO3 Experiments to visualize anatomy of various plant parts and Secondary structure of root and stems

CO4 Experiments to see secretory tissues & Demonstration of the Preparation of permanent slides

CO5 Experiments of reproductive biology and palynology CO6 Examining the morphological and anatomical adaptation of environmentally adapted plants

Core Course Vocational

Credits: 3

Course Code: BB 1271

Course Title: Microbial Metabolism, Genetics and Diseases

CO Statement

CO1 Student will learn microbial metabolism and microbial biochemistry

CO2 They will acquire a detailed information about microbial genetics and genomics

CO3 They will learn various types of microbial pathogens in human and domestic animals

CO 4 Importance of microbial metabolism, microbial genetics, and microbial diseases in Biotechnology

CO5 They should learn microbial and related biotechnology techniques during this course CO6 Students will understand the microbial metabolism in industrial biotechnology

Credits: 2

Course Code: BB 1272

Course Title: Biotechniques I (Practical of BB1171 & BB1271)

CO Statement

CO1 Student learn Laboratory safety , GLP, Various Instruments , LAF , filtration Unit etc.

CO2 Learning the importance of Cleaning and Sterilization of glassware

CO3 Learning of the Media preparation for microbial cultures, agar slant , agar plate etc

CO4 Isolation bacterial cultures and purification

CO5 Learning to isolate bacteria and fungus from air and water

CO6 Students learn techniques like streak plating method- T streaking, Quadrant, Zig Zag; pour plate

Core Course Credits: 3

Course Code: BB 1341

Course Title: Phycology, Mycology, Lichenology & Plant Pathology

CO Statement

CO1 Students are given a basic idea about lower forms plants

CO2 They will learn about plants like algae, fungi, and Lichen

CO3 They also learn the diseases caused by these organisms in plants

CO4 This will give an account on the life cycle, habitat, anatomy and classification

CO5 Students will study the influence of these organisms in the life cycle of other plants

CO6 The economic importance of these plants and its biotechnological application

Core Course Credits: 3

Course Code: BB 1342 Contact hours: 72

Course Title: Horticulture, Mushroom Cultivation & Marketing

CO Statements

CO1 This course will give an idea about the application of plant science in business generations and self-employment

CO2 Students will learn about various aspects of Horticulture and its application in business developments

CO3 Learn about Mushroom , various types of edible mushrooms and its cultivation

CO4 Various types of Horticultural crops and flowering plants.

CO5 Various Methods of propagation of Horticultural plants

CO6 Learn to develop Gardens and landscaping and its marketing

Core Course Vocational

Credits 4

Course Code : BB 1371

Course Title : Protista and Animal Diversity

CO Statements

CO1 This course is designed in such a way to get a basic insight into the diversity of animals

CO2 Students will learn its morphological and physiological adaptations suited to their ecosystems.

CO3 Students learn the systematic classification of the living world.

CO4 They will learn animal Kingdoms and its related classifications

CO5 Students will get a basic knowledge about the various taxonomic positions of animal Kingdoms

CO6 They will learn about the various phyla with examples.

Core Course Vocational

Credits 3

Course Code : BB 1372

Title : Animal Physiology and anatomy

CO Statements

CO1 This course is will give very fundamental and essential information about the anatomy

CO2 Students will learn functioning of the various types of cell, tissues and organs in selected model organisms.

CO3 Students get a basic idea nutrition, feeding mechanisms and digestion .

CO4 Will learn about the respiratory system and circulatory systems in animals with examples.

CO5 Students will get a basic knowledge on reproductive systems, excretory systems in selected animals

CO6 They will learn about the endocrine systems and functioning of nervous systems in selected animals and also in Human

Core Course Vocational

Credits 3

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Core Course Credits 2

Course Code: BB 1442

Course Title: Cell Biology, Plant Breeding and Evolutionary Biology

CO Statements

CO1 This course will provide a basic understanding in cell biology

CO2 This also will provide a basic understanding in cell biology, plant breeding and evolution

CO3 Students learn the basic structure of plant cells, and the various organelles and its functions

CO4 It gives an idea about the organization of chromosomes , various types of chromosomes in plant cells

CO5 Learn about the structure of Chromosome and mutations, variations in chromosome number

CO6 It gives basic concepts of Plant breeding and evolution.

Core Course Credits 2

Course Code: BB 1443

Practical hrs of BB1341, BB1342, BB1441 & BB1442

Course Title : Practical Botany II (Practical of BB1341, BB1342, BB1441 & BB1442)

CO Statement

CO1 Experiments to study algae with live sample organisms or preserved one on phycology

CO2 Samples of Fungi available locally to study morphology, reproduction

CO3 Identification of the plant Diseases with respect to causal organism and symptoms

CO4 Experiments for Horticulture, Mushroom Cultivation & Marketing

CO5 Experiments for Bryology, Pteridology, Gymnosperms & Paleobotany

CO6 Practical experiments for the topics Cell Biology, Plant Breeding and Evolutionary Biology

Core Course Vocational Credits 3

Course Code: BB 1471

Course Title : Molecular Biology

. CO Statement

CO1 Students learn the basis of Molecular biology as their basis of Modern biology and Biotechnology

CO2 Gives an important foundation for life at Molecular level

CO3 The exposure to Molecular biology forms the basics for further studies in Genetic engineering and Immunology

CO4 Making of transgenic organisms depends on Molecular biology

CO5 Learn Genes , Genome and understanding the structure and function of DNA

CO6 Learning the important components of Gene expression

Core Course Vocational Credits 2

Course Code BB 1472

Course Title Immunology

CO Statement

CO1 Students get a basic training on Immune system, immunology and immunotechniques essential for biotechnology

CO2 Gives an important foundation for immunology at Molecular level

CO3 The exposure to Immunology and related techniques makes the student more interested in the subject for further studies in Biotechnology

CO4 Students learn about the mechanism of the generation immunity against diseases.

CO5 Learns about immunization and the molecular mechanism

CO6 Understands auto immune disorder and related immune errors and related diseases.

Core Course Vocational

Credits 2

Course Code BB 1473

Course Title Biotechniques II (Practical of BB1371, BB1372, BB1471& BB1472)

CO Statement

CO1 Students get a basic training on the practicals of the subject Protista and Animal Diversity

CO2 Identification and assigning the systematic position of selected specimens

CO3 Students learn physiology and anatomy of specific specimens available as major and minor experiments

CO4 Students are trained to carry specific experiments in Molecular Biology with the needed instruments and equipments

CO5 Students are trained to do specific experiments in Immunotechniques

CO6 Students familiarize the use of instruments and equipments of Molecular biology and immunotechniques.

Semester V

Core Course Credits 4

Course Code BB 1541

Course Title Plant Physiology

CO Statement

CO1 Students get a basic information on Plant Physiology

CO2 Students learn biochemistry and Biophysics related to the plant physiology.

CO3 This course will equip the students to understand the functions of the plant system on biophysical and biochemical approach

CO4 Students learn about water relations in the physiology and biophysics with respect plant biology

CO5 Students get basic knowledge on Photosynthesis and related topics

CO6 Students familiarize with the Mineral nutrition, Nitrogen metabolism, and translocation of solutes in plant system.

Core Course Credits 4

Course Code BB 1542

Course Title Angiosperm Morphology and Systematic Botany

CO Statement

CO1 The course is designed to give a basic awareness in systematic botany

CO2 The course makes the student to learn morphology of higher plants

CO3 The course should generate interest on students to pursue continuous studies in systematic botany.

CO4 Discuss various classification in Plant taxonomy and nomenclature

CO5 Discusses the floral morphology with respect to the identification of taxonomic position of plants

CO6 Students are exposed to the detailed study of specific families and its taxonomic relations.

Core Course Vocational

Credits 4

Course Code: BB 1571

Course Title : Recombinant DNA Technology

CO Statement

CO1 To give a basic training to the students of Biotechnology on recombinant DNA and related techniques.

CO2 Training in this course should create an interest in genetic engineering for further studies among students

CO3 Students understands molecular cloning and gene cloning

CO4 Understands the concept of gene and its relation with characters

CO5 Enzymes of genetic engineering

CO6 Training in this course will create an interest in genetic engineering and is essential for further studies in Biotechnology and further development of transgenic organisms

Core Course Vocational

Credits 3 Course Code : BB 1572

Course Title : Plant Biotechnology

CO Statement

CO1 This course is designed to impart basic knowledge in the applied aspects of plant biotechnology

CO2 Students should be made to understand that plant biotechnology is needed for the improvement of agriculture and plant based industries

CO3 Students will get an outline of plant tissue culture cell culture and plant genetic transformation methods

CO4 Understands the methods of genetic engineering in plants for making G M Plants

CO5 Students understand the methods of tissue culture CO6 Students understand about the Methods of Genetic transformation in plants

Core Course Vocational

Credits 3

Course Code : BB 1573

Course Title : Animal Biotechnology

CO Statement

CO1 This course is designed to impart basic knowledge in the applied aspects of Animal biotechnology

CO2 Students should be made to understand that animal biotechnology is needed for the improvement of health science and animal cell culture based industries

CO3 Students will get an outline of animal tissue and cell culture and its application

CO4 Understands the methods of genetic engineering in animal for making Transgenic Animals and cells and methods of genetic transformation

CO5 Students understand the methods of Animal cell & tissue culture and making of Animal cell culture laboratory

CO6 Students understand about the application of animal cell culture in clinical and health care sectors.

Core Course Credits

Course Code BB 1641

Course Title Genetics

CO Statement

CO1 This course is supposed to supplement the basic knowledge in genetics

CO2 It gives the students a basic concept of Mendelian Genetics

CO3 Basic knowledge in Genetics and its molecular aspects makes the students to acquire knowledge in Molecular biology and gene Technology

CO4 It makes the students understand Linkage of genes and its crossing over

CO5 Students also learn Sex determination by chromosomes

CO6 They also learn about Molecular genetics and Population Genetics

Credits 2

Course Code : BB 1642

Course Title : Economic Botany, Ethnobotany & Medicinal Botany

CO Statement

CO1 This gives awareness to the students about the importance of Medicinal plants and its useful parts

CO2 It make the students to understand the economic importance of medicinal plants and the products from the medicinal plants.

CO3 It familiarise the students about the traditional medicines , herbs and its importance in the modern world.

CO4 Students should get a detailed account of the traditional economically important plants and its useful parts with its morphological details.

CO5 Students will learn about some of the selected horticultural plants and its useful parts with economic importance

CO6 Students also will learn about the ancient herbal medicines and plants through Ethnobotany

Core Course Credits 2

Course Code : BB 1643

Course Title : Practical Botany III (Practical of BB1541, BB1542, BB1641, BB1642)

CO Statement

CO1 Students trained on practicals of the Plant physiology (BB1541) on selected experiments

CO2 Students learn and understand the procedures and protocol of the experiments.

CO3 Students will be made aware of the Angiosperm Morphology and Systematic Botany with selected types available locally

CO4 They will be trained to draw the floral diagram and floral and other identification parts of the plants.

CO5 Students will be practiced to work out genetic problems independently

CO6 Students will be able to identify economically important plants and its parts and morphology of the useful parts, including medicinal plants

Core Course Vocational Credits 3

Course Code : BB 1671

Course Title : Industrial Biotechnology

CO Statement

CO1 The students will be introduced to the industrial application of Biotechnology and Bioprocess technology

CO2 Students get familiarized to the commercial importance of Biotechnology through this course.

CO3 Students should understand industrially important Microbes that are used in Bioprocess.

CO4 Students should learn about the Biotechnology industries in India and also abroad.

CO5 Students should learn Bioprocess Technology and the importance of Fermenter and Bioreactors in Biotechnology

CO6 Students are familiarized about the methods by which agricultural waste and other materials are used in Biotechnology for the production of valuable compounds.

Core Course Vocational

Credits 2

Course Code : BB 1672

Course Title : Environmental Biotechnology

CO Statement

CO1 This course is aimed to bring an enthusiasm among the students on environmental protection and to learn the techniques of biotechnology to keep the environment clean and healthy

CO2 Students will learn about the various sources pollution and its impact in the Environment.

CO3 They are informed about the ways of water pollution due to organic load

CO4 They should be made to understand about BOD and COD with respect to water pollution

CO5 They will learn about making Biomass and its use for Bioenergy as non conventional energy sources.

CO6 They will be made aware of cleaning the environment through Biotechnology disposing the solid waste effectively

Elective course for Biotechnology students

Credits 2

Course Code : BB 1681.1

Title : Bioinformatics and Nanobiotechnology

CO Statement

CO1 This course is for students to learn about the methods and application of Bioinformatics in Biotechnology

CO2 This course also make the students to learn Nanobiotechnology by understanding the role of nanoparticle in Biology

CO3 They will learn the beginning and development of Bioinformatics and its limitations and advantages

CO4 They learn about the sequence annotating and alignment

CO5 They also learn about protein sequencing and its management through Bioinformatics

CO6 They will learn computational Biology, Proteomics and Genomics and its importance in health care and Pharmaceutical industry

Elective course for Biotechnology students

Credits 2

Course Code : BB 1681.2

Course Title : Genetic Engineering

CO Statement

CO1 This course is for students to learn about the methods and application of Genetic Engineering in Biotechnology

CO2 This course is intended to know about the methods and application of genetic engineering and its contribution in the various fields of Biotechnology.

CO3 They will learn the basics of molecular biology and its importance in Genetic engineering

CO4 They learn about the various types of vectors used in Genetic Engineering

CO5 They also learn about protein and enzymes involved and required for making a recombinant DNA

CO6 They will learn the methods of bacterial transformation and transfection in animal cells and plant cells for various applications in Industry.

Elective course for Biotechnology students

Credits 2

Course Code : BB 1681.3

Course Title : Food & Dairy Biotechnology

CO Statement

CO1 This course is intended to get a basic knowledge in the application of Biotechnology in food processing, food spoilage, food preservation and dairy industry.

CO2 This course is intended to know about the methods and application of food processing technology and its association with Biotechnology.

CO3 They will learn the basic reasons of food spoilage and methods to prevent it without losing the nutritional qualities

CO4 They learn about the various types of processed food products and its making

CO5 They also learn about protein and enzymes involved in the processing of foods.

CO6 They will learn the methods of milk processing and the dairy products and various enzymes and its applications in Industry.