



Re-Accredited 'B++' 2.86 CGPA by NAAC

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વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી

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-: પરિપત્ર :-

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, B.Sc.BioScience (Microbiology) વિષયના અભ્યાસક્રમના PO, PSO, CO અને Subject Mapping બાયોસાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૫/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક:૫(બ) અન્વયે મંજૂર કરી વિજ્ઞાન વિદ્યાશાખાને કરેલ ભલામણ વિજ્ઞાન વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૦૧/૦૩/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક:૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણ: ઉપર મુજબ)

ક્રમાંક:એસ./પરિપત્ર/૧૧૯૦૦/૨૦૨૪

તા.૦૫-૦૬-૨૦૨૪


કુલસચિવશ્રી

પ્રતિ,

૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.

..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારું.

૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા,

૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ.ગુ.યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારું.

Department of Biology

Goals

A major educational goal for the undergraduate degree programs:

- To build and strengthen in the basic fundamental of the theoretical aspect and experimental skills in Bioscience

Program Outcomes (PO)

After completing B. Sc. (Bioscience) Program, the student will be able to:

- Apply the acquired basic concepts and principles of,
 1. Introduction to microbiology, genetics, microbial diversity & eucaryotic cell structure & function.
 2. Fundamentals of biochemistry, molecular biology, biophysics, biostatistics, physiology, immunology and microbiology.
 3. Histophysiology, endocrinology, metabolic processes, clinical biochemistry, hematology, biotechnology.
 4. Nutritional aspects, blood banking, medical microbiology, immunology, Parasitology, clinical microbiology and applied microbiology.
 5. Demonstrate one's laboratory skills, enabling them to take measurements in the clinical laboratory and analyze the measurements to draw conclusions, report the results of a complex extended experiment.

Course Outcomes

F. Y. B. Sc.

Course: **Introduction to microbiology** (BS 101)

After successfully completing this course, the student will be able to learn about,

- Understand history, scope & relevance of microbiology, biogenesis and abiogenesis, contribution of scientist in the field of microbiology.
- Know about the microscope – resolution power, NA & working principle, component of microscope, types of microscope and microscopy. Electron microscope
- Study dye, stain and staining techniques, Introduction to microbial control; antiseptics, sterilization, preservation, disinfection, sanitization, sterilization by heat, filtration & radiation. Control of microbes by chemicals.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Basic Genetics (BS 102)**

After successfully completing this course, the student will be able to learn about,

- Know the Mendelian genetics, Mendel's experiments, Mendel's law. Incomplete dominance & epistasis, multiple allele & Blood group inheritance. Gene concept, Morgan classical concept, modern concept of gene, Gene-enzyme relationship, Fine structure of gene.
- Understand sex-linked inheritance, X & Y linked inheritance, Intermediate inheritance & sickle cell anemia, Sex determination in drosophila & human.
- Study human karyotype, Banding technique, Chromosomal abnormality: Structural & Numerical.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Bioscience Practical (BS 100P)**

After successfully completing this course, the student will be able to:

- Demonstrate an understanding of laboratory procedures using scientific methods demonstrate an ability to collect data through observation;
- Acquire technical skills in using laboratory equipment, tools and materials, staining, microscopy.
- Demonstrate various microorganisms, Monochrome staining, viability staining, study barr body, human karyotype & chromosomal abnormalities.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Microbial Diversity** (BS 201)

After successfully completing this course, the student will be able to learn about,

- Understand the basics of microbial taxonomy, current position & 3 domains of life, Criteria for microbial taxonomy. Morphology & types of bacteria, Cyanobacteria & archeobacteria. Introduction to viruses.
- Know the general characteristics & classification of protozoan and algae. Study and importance of some protozoa and algae
- Study of some fungi. General characteristics and Outline classification of fungi. Life cycle & reproduction of Mucor, Yeast & Mushroom. Importance of fungi.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Eucaryotic cell structure & function** (BS 202)

After successfully completing this course, the student will be able to learn about,

- Understand the cell, cell theory, types, prokaryotic and eukaryotic cell, cell structure & eukaryotic cell organization.
- Study various cell organelles mitochondria, golgi body, lysosome, ER, chloroplast, cell membrane, ribosome, nucleus, centriole, cilia & flagella.
- Know about chromosome - morphology, types, structure, special chromosome and cell cycle – mitotic cell division, meiosis and apoptosis.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Bioscience Practical** (BS 200P)

After successfully completing this course, the student will be able to:

- Demonstrate an understanding of laboratory procedures using scientific methods demonstrate microscopic form of life
- Acquire technical skills in using laboratory equipment, tools and materials, staining, microscopic observation of cyanobacteria, algae, protozoa, fungi.

- Demonstrate various cell component, nucleus, chloroplast, mitotic cell division Chromosome, types and giant chromosomes.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

S. Y. B. Sc.

Course: **Microbial Chemistry** (BS 301)

After successfully completing this course, the student will be able to:

- Basic knowledge of biological macromolecules. Classification, structure & biological importance of carbohydrates, amino acids, protein, fatty acids, lipid.
- Detail information regarding biocatalyst, Nomenclature, classification of enzymes. Mechanism of action & biological role
- Types of mixture; solution, colloids & suspension.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Microbial Genetics** (BS 302)

After successfully completing this course, the student will be able to:

- Basic knowledge of NA. Structure & component of nucleic acid. DNA structure, RNA structure & types. Central dogma of the life, flow of genetic information,
- DNA replication, Gene expression – Transcription, Genetic code. Gene mutation & DNA repair mechanism.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Instrumentation & Biostatistics** (BS 303)

After successfully completing this course, the student will be able to:

- Basic knowledge of electromagnetic radiation, types of EM radiation. Radioactivity & Radioisotopes, their uses. Radiation hazards.
- Introduction, principle, operational technique of pH meter, colorimeter, Basics of spectrophotometer & electrophoresis. Chromatographic technique, types. Detail about paper chromatography, TLC.
- Introduction to biostatistics, data, table & frequency, sampling, statistical averages. Graphical representation of data, normal curve, test of significance.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Bioscience Practical** (BS 300P)

After successfully completing this course, the student will be able to:

- Qualitative determination of monosaccharide, disaccharides, polysaccharides, protein.
- Preparation of normal, molal, molar, % & buffer solutions.
- Measurement of pH of samples, take the OD of sample, prepare a standard graph of protein & sugar.
- Paper chromatography of amino acids, sugar.
- Separation of chlorophyll by ascending chromatography.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					
CO4					
CO5					

Course: **Microbial Cytology & Physiology** (BS 401)

After successfully completing this course, the student will be able to:

- Bacterial & archaeal cell wall and membrane. Structure & functions of various cell components. Uptake of nutrient & membrane transport. Nutritional requirement & types.
- Culture media: Ingredients, types and application of media. Isolation techniques, Anaerobic cultivation, Preservation & maintenance of culture.
- Microbial growth, Mathematics of growth, Generation time and growth rate. Measurement of growth, Growth curve.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Introductory Medical Microbiology** (BS 402)

After successfully completing this course, the student will be able to:

- Basic knowledge of immune system, cell, tissue & organs of immune system, immune response, immunity; natural & acquired.
- Host defense system – internal & external. Detail aspect of antigen, types. Immunoglobulins – structure and types.
- Normal flora, Pathogen & their entry. Infection, its types, virulence & virulence factor, pathological condition. Types of diseases.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Human Physiology** (BS 403)

After successfully completing this course, the student will be able to:

- Basic knowledge regarding tissues, Types of tissue, detail about various tissues. Detail about the blood, its component and its functional aspect.
- Blood coagulation, mechanism, pathway, Blood pressure & its measurement.
- Temperature regulation, heat regulation mechanism.
- Osmoregulation and body fluids.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Bioscience Practical (BS 400P)**

After successfully completing this course, the student will be able to:

- Determination of blood groups, Blood cell count: RBC, WBC & Differential counts DC.
- Estimation of hemoglobin, Measurement of blood pressure, Determination of clotting time.
- Various types of bacterial staining: Gram's staining, Acid -fast staining, Spirochete staining, Capsule and Cell wall staining, Volutin and Endospore staining.
- Preparation culture media, biochemical media, study of biochemical properties of some bacteria.
- Study of bacterial growth curve, effect of heat, chemical agents on bacterial growth.
- Pure culture study of *Escherichia coli*, *Klebseilla mobillis* (*E. aerogenes*), *Proteus vulgaris*, *Serratia marcescens*, *B. megaterium*, *B. subtilis*, *B. cereus*, *Staph. aureus* & *S. epidermidis*.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					
CO4					
CO5					
CO6					

T. Y. B. Sc.

Course: **Microbial Taxonomy & Virology (BS 501)**

After successfully completing this course, the student will be able to learn about,

- Basic knowledge of Microbial Taxonomy, microbial phylogeny, higher level of classification.
- Bergey's Manual of Systematic Bacteriology & major physiological groups of Archea

- Viral classification, viral cultivation, viral replication, basics of Virioids, Prions, Oncoviruses & emerging viruses.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Microbial Genetics** (BS 502)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge of Gene expression in prokaryotes and eukaryotes, Regulation of gene expression, Gene transfer & recombination:
- Recombinant DNA technology, Basic fundamental process & application.
- Advanced techniques like PCR, Blot tech, DNA finger printing etc.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Microbial Metabolism** (BS 503)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge of microbial metabolism, fermentation, EMP, TCA, ETC, Protein lipid catabolism, Nitrification.
- Principle and precursor metabolites of Anabolism, Reductive TCA cycle, Glyoxylate cycle & Peptidoglycan synthesis.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Medical Physiology** (BS 504)

After successfully completing this course, the student will be able to learn about,

- Microscopic organization of organs of alimentary tract, other organs & their physiological functions, details of digestive juices.
- Introduction to endocrine glands, hormone, neurohormone, Microscopic organization of endocrine gland, their physiological functions & abnormalities.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Clinical Biochemistry** (BS 505)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & details of organ function tests; LFT, KFT, PFT, CPT, thyroid function test.
- Physiology, collection of body fluids. Physical, chemical & microscopic examination of Urine, CSF, semen. Routine examination of Sputum and of Stool.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Hematology & Blood Banking** (BS 506)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & detail of hematopoietic system of the body, Blood collection and Clinical hematology, Blood disorder, coagulation disorder. Automation in hematology
- Blood transfusion practice, Documentation & QC in blood banking, transfusion practice, testing of blood, Transfusion complications – types, investigation, prevention.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Bioscience Practical** (BS 500P)

After successfully completing this course, the student will be able to:

- Study of various system of Rat, microscopic structure of organs, gonads, endocrine gland
- Physical, chemical & microscopic examination of urine, CSF, Semen
- Quantitative estimation of various blood constituents and enzymes.
- Skill to collect the blood & hematological analysis of various parameters.
- Blood banking, grouping techniques & Cross-matching.
- Basic operational skill regarding Electrophoresis, technique for serum protein & Hb electrophoresis.
- Isolation of mutants.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					
CO4					
CO5					
CO6					

Course: **Medical Microbiology & Immunology** (BS 601)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & detail of various bacterial, some viral & fungal diseases, some parasitic & worm infection.
- In immunology they learn about Cytokines, various antigen antibody reactions, Allergic reaction & some autoimmune diseases.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Clinical Microbiology** (BS 602)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & detail of various aspects of epidemiology, about epidemics: prevention & control,
- Collection & aseptic handling of clinical specimen, microbiological examination of clinical sample.

- Chemotherapeutic agents, Antimicrobial sensitivity testing in detail, MIC, MBC. They also learn some advanced technique like ELISA, RIA, Hybridoma, Immunoblot, Immunofluorescence, Immunochromatographic technique

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Food & Dairy Microbiology (BS 603)**

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & detail of food microbes, food preservation technique, food spoilage, food borne diseases, detection of food pathogen, food intoxication.
- Microbiology of fermented food, production of alcoholic beverages, breads. Microbiology of milk, pasteurization, curdling, spoilage of milk. Microbiological analysis of milk, Milk products cheese, probiotics

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Environmental Microbiology (BS 604)**

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & detail about microbiology of water, water quality, microbiological analysis of water. Sewage, water quality, municipal sewage treatment.
- Agriculture microbiology, soil fertility, nitrogen fixation, PGPR. Biofertilizer, Biopesticide, Bioenergy.
- General aspects of bioremediation, bioremediation of hydrocarbon, xenobiotics, industrial waste. Biodegradation process & types, Phytoremediation.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Fermentation Technology** (BS 605)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge of fermentation process, screening technique & detail of fermentation media, Media sterilization & types
- Essential features of bioreactor. Complete detail regarding bioreactor & types. Downstream processes, Cell harvesting, product recovery, some important industrial products.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					

Course: **Fundamentals of Bioinformatics** (BS 606)

After successfully completing this course, the student will be able to learn about,

- Basic knowledge & detail about genomics and genome sequencing. Introduction to proteomics, amino acid sequencing, structural & functional proteomics.
- Introduction to bioinformatics, present scenario, application Bioinformatics database, types of data, structural database.
- Bioalgorithm tools, sequence alignment. Phylogenetic, molecular evolution and Phylogenetic tree.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					

Course: **Bioscience Practical** (BS 600P)

After successfully completing this course, the student will be able to:

- Various immunological test like Widal, RPR, RA test
- Demonstration of Gel precipitate, ELISA, immunodot, Immunochromatographic test.
- Microbiological analysis of milk, water and sewage sample.
- Diagnostic medical problem: Collection of clinical sample - Blood / Urine / Stool & Wound/Abscess/ Purulent exudates. Routine examination of stool & sputum.
- Pure culture study of Salmonella group, UTI pathogen & Staphylococci.

- Antibiotic sensitivity testing & Determination of MIC.
- Primary screening of amylase, organic acid, antibiotic producers, Production of amylase and its activity check
- Demonstration of recovery of crude protein / amylase from fermentation broth, Bioassay of penicillin.
- Separation of nucleic acid by agarose gel electrophoresis.

Mapping between CO with PO:

	PO1	PO2	PO3	PO4	PO5
CO1					
CO2					
CO3					
CO4					
CO5					
CO6					
CO7					
CO8					
CO9					

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