Re-Accredited 'B++' 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
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સંદર્ભ: (૧) યુનિવર્સિટી પરિપત્ર ક્રમાંકઃએસ./સાયન્સ/પરિપત્ર/૧૬૨૨૧/૨૦૨૩ તા.૩૦–૦૬–૨૦૨૩
(૨) યુનિવર્સિટી પરિપત્ર ક્રમાંકઃ એસ./સાયન્સ/પરિપત્ર/૨૧૫૫૧/૨૦૨૩તા.૧૮–૦૮–૨૦૨૩

–: **પરિપત્ર** :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કૉલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, NEP-2020 અંતર્ગત શૈક્ષણિક વર્ષ ૨૦૨૩–૨૪ થી અમલમાં આવેલ F.Y.B.Sc. Bio-Science(Microbiology)Sem.-1&2 Major અને Minor નો સુધારેલ અભ્યાસક્રમ બાયોસાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૪/૦૫/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંકઃ૦૨ 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 ક્રમાંકઃ૧૦૪ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત ઈ.ચા.માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે.જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૧૧૮૯૭/૨૦૨૪
તા.૦૫–૦૬–૨૦૨૪

કુલસચિવ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જાણ કરી અમલ કરવા સારૂ.
૨) અધ્યક્ષશ્રી, વિજ્ઞાન વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી,પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

B. Sc. Bioscience (Microbiology) Syllabus

NEP 2020

(Effective from June, 2023)

(Revised – 2024)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

NEP 2020, CBCS Semester system

B. Sc. Bioscience (Microbiology)

(Major)

F. Y. B. Sc. Semester I & II (New)

(Effective from June 2023)

(Revised – 2024)

Paper No., Paper title, Teaching & Evaluation Scheme

Semester I

Paper No.	Paper Title	Course Credit	Hrs/ week	External marks	Internal marks	Total marks	Duration of Exam
BM-MJ- 101	Introduction to Microbiology	3	3	35	35	70	1.5 Hrs
BM-MJ- 102	Basic Microbial Techniques	3	3	35	35	70	1.5 Hrs
BMP-MJ-101	Introduction to Microbiology Practical	1	2	15	15	30	2 Hrs
BMP-MJ-102	Basic Microbial Techniques Practical	1	2	15	15	30	2 Hrs

B. Sc. Bioscience (Microbiology)

(Major)

F. Y. B. Sc. Semester I & II (New)

(Effective from June 2023)

(Revised – 2024)

Semester II

Paper No.	Paper Title	Course Credit	Hrs/ week	External marks	Internal marks	Total marks	Duration of Exam
BM-MJ- 201	Microbial Diversity	3	3	35	35	70	1.5 Hrs
BM-MJ- 202	Microbial Biochemistry Techniques	3	3	35	35	70	1.5 Hrs
BMP-MJ-201	Microbial Diversity Practical	1	2	15	15	30	2 Hrs
BMP-MJ-202	Microbial Biochemistry Practical	1	2	15	15	30	2 Hrs

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
B. Sc. Bioscience (Microbiology)
NEP 2020, CBCS Semester system

B. Sc. Bioscience (Microbiology)

It is a three-year Bachelor's degree &four-year Honours course as per NEP 2020 which can be pursued after passing 12th Science. The subject includes the study of microbes and the science of micro-organisms -Microbiology. It mainly focuses on the understanding of the diversity of micro-organisms and the wide application of these life forms in various fields & nature. The course includes the study of major aspects of microbiology & allied discipline for the better understanding and use of microscopic forms of life.

Program Outcome:

PO1 Students shall learn basic fundamental aspects of microbiology such as microbial diversity, microbial taxonomy, microbial physiology, microbial genetics, microbial biochemistry, and microbial ecology.

PO2 Students shall acquire the knowledge regarding applied field of microbiology like medical microbiology, food and dairy microbiology, environmental microbiology, industrial microbiology, biotechnology.

PO3 Students shall acquire the awareness regarding the important role of microorganisms in human health and diseases, environment.

PO4 Students shall learn the knowledge regarding microbial technology and its applications in the production of important microbial products.

PO5 Program shall generate skilled manpower ready to use by various industrial sectors.

Program Specific Outcome:

PSO1 Students will develop the skill to observe, isolate, identify and cultivate the microbes.

PSO2 Students will acquire the GLP in microbiology laboratory.

PSO3 Students will develop practical skills of various instruments and techniques used in diverse field of microbiology as well as biological science.

PSO4 Students will develop communication skills, effective presentation skills and interpretation skills.

PSO5 Students will be graduates in Bioscience (microbiology) who shall understand the societal problems and play a vital role by providing microbial solutions.

PSO6 Students will be able to build their careers in public health, dairy and food, environmental organizations, pharmaceuticals and fermentation industries, even in research laboratory & academic field.

F. Y. B. Sc. Semester - I
Bioscience (Microbiology)
BM-MJ-101: INTRODUCTION TO MICROBIOLOGY

Course Description:

Course Code	BM-MJ- 101
Course Title	Introduction to Microbiology
Course Type	Core (Major)
Course Credit	03

Course Overview:

This course introduces about the world of microbes, the science of microbes, its scope & relevance, the history of microbes and its development in microbiology.

Course Objectives:

- To introduce microbes & microbiology.
- To describe the current position and importance of microorganisms in the living world
- To introduce various microbes and their distribution in nature.
- To learn various microbial discoveries and contributions of scientists.
- To study various developments in the field of microbiology.

Course Content:

Unit: I Introduction to Microbial World. **[15 Hrs]**

- Introduction to science of microbes - Microbiology.
- Position of Microbes in the living world. Binomial system, three kingdoms, introduction to prokaryotes, four kingdoms. Whittaker's five kingdoms & Carl Woese's classification.
- Taxonomic status of viruses
- A major group of microorganisms
  Prokaryotes microbes – Eubacteria & Archeobacteria.
  Eukaryotes microbes – Protista (Photosynthetic, Nonphotosynthetic & slime molds), Fungi (Yeast & Mold)
  Acellular – Viruses.
- Distribution of microorganisms in nature.

Unit: II History & Scope of Microbiology. **[15 Hrs]**

- Scope & relevance of Microbiology.
- Microbiology as a science – Basic & Applied area of microbiology
- Discovery of microbial world & Microorganism. Contribution of Leeuwenhoek-Microscope.
- Spontaneous generation and Biogenesis.
- Golden age of microbiology. Louis Pasteur& Robert Koch
  Fermentation & Germ theory of disease, Pure culture technique & Koch postulate.
  Lister & antisepsis. Contribution of Edward Jenner & Pasteur in Immunology.

Unit: III Development in Microbiology. **[15 Hrs]**

- Birth of Modern Chemotherapy – Ehrlich
  Antibiotics - Fleming & Waksman
- Development in field of Medical Microbiology
  Discovery of phagocytosis, immunity, bacterial toxin & antitoxin
- Development in field of Agriculture Microbiology
  Soil microbiology – Contribution of Winogradsky, Beijerinck, Plant pathology.
- History & Discovery of virus
- Microbial Genetics & Molecular Biology.
  One gene one enzyme – Beadle & Tatum, DNA as hereditary material – Griffith, Avery et al.

Course Outcomes:

CO1 After successfully completing this course, the student will be able to understand the basics of microbes and microbiology.
CO2 They will know various micro-organisms, their distribution, scope & relevance of microbiology.
CO3 They will understand history and contribution of scientist in the field of microbiology.
CO4 They will also learn about the development in various fields of microbiology.

References:

- **Microbiology – An Introduction** 11th ed. by Tortora (Pearson India)
- **Elementary Microbiology Vol. I** by H. A. Modi (Ekta Prakasan)
- **Microbiology** 5th ed. by Pelzar, Chan &Kreig (Tata McGraw-Hill)
- **Fundamental Principles of Bacteriology** 7th ed. by A. J. Salle (Tata McGraw- Hill)

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F. Y. B. Sc. Semester - I
Bioscience (Microbiology)
BM-MJ-102: BASIC MICROBIAL TECHNIQUES

Course Description:

Course Code	BM-MJ- 102
Course Title	Basic Microbial Techniques
Course Type	Core (Major)
Course Credit	03

Course overview:

This course introduces the basic principles of microscopy, different types of microscope, and microscopy. Also provide knowledge regarding dyes, stains, and staining of bacteria. It also covers the basic sterilization method, culture media, and isolation technique.

Course Objectives:

- To introduce the basic principle of microscopy.
- To describe components of microscope & types of microscopy – Light & Electron.
- To introduce dyes, stains, staining solutions, and staining techniques.
- To study various sterilization methods.

Course Content:

Unit: I Microscope and Microscopy. [15 Hrs]

- Structure & properties of light. Working principle of microscope Objectives, Resolution, NA, Immersion objectives, Condenser, Ocular
- The Light Microscope, Optical & mechanical components of microscope.
- Types of Light Microscopy. Bright-field & Dark-field microscopy. Phase-contrast & Fluorescence microscopy
- Limits of resolution & basic component and principle of electron microscope
- Transmission and Scanning electron microscope. Scanning probe microscopy

Unit: II Dyes, Stains, and Staining. [15 Hrs]

- Basic concept of dyes and stains. Types of stain. (Classification of stain)
- Application of dyes in microbiology: Indicator & Inhibitor dyes.
- Fixatives, mordent, decolorizer & intensifier. Staining solution
- Mechanism of staining& staining of bacteria. Simple (Direct & Indirect)
- Introduction to differential staining & special staining.

Unit: III Microbial Control. **[15 Hrs]**

- Overview of microbial control methods.
- Pattern of microbial death.
- Sterilization by Physical agents: Heat (Dry & Moist heat), Low temperature. Filtration and Radiation.
- Sterilization by Chemical agents: Aldehyde, Alcohol, Halogens Heavy metals, Phenolic, Quaternary Ammonium compound, and Sterilizing Gases.
- Evaluation of antimicrobial agent effectiveness.

Course Outcomes:

CO1 After completing this course, the student will be able to understand the basic principles of microscope and types of microscopy.
CO2 They will know about electron microscopes & types of electron microscopes.
CO3 They will understand the basic concept of dyes, stains, staining solutions, and staining of bacteria.
CO4 They will also learn about microbial control and common sterilization methods.

References:

- **Microbiology** 5th ed. by Pelzar, Chan &Kreig (Tata McGraw-Hill)
- **Fundamental Principles of Bacteriology** 7th ed. by A. J. Salle (Tata McGraw- Hill)
- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2020), 11ed., McGraw-Hill.
- **Elementary Microbiology Vol. I** by H. A. Modi (Ekta Prakasan)

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F. Y. B. Sc. Semester - I
BIOSCIENCE (Microbiology)
BMP-MJ-101: Introduction to Microbiology Practical

(Time duration: 2 hours/week)

Course Content:

1. Introduction to Basic Microbiology Laboratory Rules.
2. Introduction to common instruments in microbiology laboratory: Autoclave, Incubator, Hot air oven, laminar air flow, Centrifuge.
3. Introduction to common equipment in microbiology laboratory: Colony counter, Bacteriological Filter, Anaerobic jar, Micropipette.
4. Introduction to microscope – Component, use & care.
5. Microscopic examinations of Natural infusion.
6. Microscopic examinations of Pond water
7. Study of Contribution of Scientist.
8. Study of permanent slide/specimens

Course Outcomes:

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

CO1 Acquire technical skills in using laboratory instruments and equipment.
CO2 Demonstrate an understanding of laboratory procedures using scientific methods.
CO3 Perform and demonstrate the microscopic form of life - cyanobacteria, algae, fungi, protozoa.

Reference books:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel & Kiran Patel (Aditya Publication)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)

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F. Y. B. Sc. Semester - I
BIOSCIENCE (Microbiology)
BMP-MJ-102: Basic Microbial Techniques Practical

(Time duration: 2 hours/week)

Course Content:

1. Microscopic examinations: Wet-mount preparation
2. Study of Bacterial motility by Hanging drop preparation.
3. Measurement of microorganisms
4. Observation & morphological characters of yeast, fungi & protozoa by phase contrast & dark field microscopy
5. Preparation of staining solutions.
6. Monochrome staining by basic & acidic dye. (Positive & Negative staining)
7. Cleaning, preparation & sterilization of glassware.
8. Study of disinfectants & Antiseptics.

Course Outcomes:

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

CO1 Acquire technical skills to study the morphology & structure of yeast, fungi, and protozoa.
CO2 Prepare the staining reagent & perform the bacterial staining.
CO3 Demonstrate their skill in sterilization of glassware & know antiseptics/disinfectants.

Reference books:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel & Kiran Patel (Aditya Publication)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **Experiments in Microbiology, Plant Pathology, and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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F. Y. B. Sc. Semester - II
Bioscience (Microbiology)
BM-MJ-201: MICROBIAL DIVERSITY

Course Description:

Course Code	BM-MJ- 201
Course Title	Microbial Diversity
Course Type	Core (Major/Minor)
Course Credit	03

Course Overview:

This course introduces the diverse groups of micro-organisms, their morphology, habitat, classification, reproduction, and importance. Microorganisms can be explained simply and in-depth.

Course Objectives:

- To introduce prokaryotes and their diversity to students.
- To study the structure & morphology of diverse groups of organisms.
- To study the habitat, classification, and reproduction of different groups of organisms.
- To learn the economic importance of prokaryotes, protozoa, algae, and fungi.

Course Content:

Unit: I Introduction to Prokaryotes. [15 Hrs]

- General structure of prokaryotes & function
- Morphology & types of bacteria. Reproduction of bacteria.
- Cyanobacteria. Habitat, morphology, classification, importance
- Archeobacteria – Bacteria of extreme environment

Unit: II Introduction to Protozoa. [15 Hrs]

- Occurrence & General characteristics of protozoa.
- Outline classification of protozoa
- Study of some protozoa (Habitat, morphology, structure, life cycle & reproduction of Amoeba & Paramecium)
- Study of habitat, morphology, structure, life cycle Plasmodium.
- Importance of Protozoa

Unit: III Introduction to Algae & Fungi. [15 Hrs]

- The general structure, characteristics, outline classification, and Importance of Algae.
- Introduction to Slime molds, Water molds & their significance.
- The general structure, characteristics, and Outline classification of Fungi.
- Study of habitat, morphology, structure, life cycle & reproduction of Yeast & Mucor
- Cultivation, economic importance of fungi. Pathogenic & harmful fungi.

Course Outcomes:

CO1 After completing this course, the student will be able to understand the morphology & types of bacteria, habitat, and structure of Cyanobacteria, and archeobacteria.

CO2 They will understand the basic concept of general structure, characteristics, and outline classification, and importance of protozoa.

CO3 They will also learn about general structure, characteristics, outline classification, cultivation & economic importance of algae & fungi.

References:

- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2020), 11ed., McGraw-Hill.
- **Elementary Microbiology Vol. II** by H. A. Modi (Ekta Prakasan)
- **Microbiology** 5th ed. by Pelzar, Chan &Kreig (Tata McGraw-Hill)
- **Microbiology-A systems Approach by** M. K. Cowan and K. P. Talaro (McGraw-Hill)

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F. Y. B. Sc. Semester - II
Bioscience (Microbiology)
BM-MJ-202: MICROBIAL BIOCHEMISTRY

Course Description:

Course Code	BM-MJ- 202
Course Title	Microbial Biochemistry
Course Type	Core (Major)
Course Credit	03

Course Overview:

This course offers knowledge regarding to various biomolecules to understand their structure, classification, and importance in micro-organisms & other living organisms. It also emphasizes on the structure, composition, and importance of nucleic acid – DNA & RNA.

Course Objectives:

- To provide basic concepts of structure, classification, and characteristics of carbohydrates.
- To learn about various amino acids. Structure & classification of protein
- To understand the physicochemical properties and characteristics of fats and lipids
- To understand the basic biology of nucleic acid.

Course Content:

Unit: I Carbohydrates. **[15 Hrs]**

- Introduction, natural occurrence & physiological importance.
- Classification: aldose & ketoses. Monosaccharide, Disaccharides – Reducing & Non reducing.
- Polysaccharides – Mucopolysaccharides, their structure & importance.
- Physical properties of carbohydrates, asymmetrical carbon atoms, stereoisomerism & optical isomerism.
- Configuration in Sugar: Linear & Ring structure.

Unit: II Proteins & Lipids. **[15 Hrs]**

- Introduction to amino acids. Essential amino acids, structure & importance.
- Peptide linkage, polypeptide – primary, secondary tertiary structure of protein.

- Properties, classification & importance of proteins.
- Introduction & classification of lipids. Fatty acids - saturated & unsaturated.
- Steroids. Physiological importance of lipids.

Unit: IV Biology of Nucleic acids. **[10 Hrs]**

- Introduction, Components and organization of nucleic acids
- Nucleoside, nucleotide, polynucleotide.
- DNA structure, properties & types of DNA.
- RNA structure & Types of RNA
- Physiological importance of Nucleic acid.

Course Outcomes:

CO1 After completing this course, the student will be able to understand structure, types, and importance of carbohydrates.
CO2 They will know about various amino acids & their role. They also acquired the basics of protein structure & classification
CO3 They will understand the basic concept of fatty acids, lipids, and fats.
CO4 They will also learn about nucleosides, nucleotides, and the structure of DNA & RNA.

References:

- **Biochemistry** by Satyanarayana, 3rd ed. Books & Allied Pvt. Ltd.
- **Harper's Review of Physiological Chemistry.** 6th ed. Lange med publication.
- **Fundamentals of Biochemistry** 6th ed. by Jain, J. L., & Jain, N. (2006)., S. Chand Publications.
- **Biochemistry** by Moore, Wiley Publishing, Inc.

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F. Y. B. Sc. Semester - II
BIOSCIENCE (Microbiology)
BMP-MJ-201: Microbial Diversity Practical

(Time duration: 2 hours/week)

Course Content:

1. Study of Nostoc. (Habitat, morphology, structure & reproduction)
2. Study of Oscillatoria. (Habitat, morphology, structure & reproduction)
3. Study of bacteria & blue-green algae by slide/images.
4. Microscopic study of algae, fungi & protozoa by slide/images.
5. Study of Mucor. (Habitat, morphology, structure & reproduction)
6. Study of Saccharomyces –Yeast. (Habitat, morphology, structure & reproduction)
7. Study of Paramecium. (Habitat, morphology, structure & reproduction)
8. Study of Plasmodium. (Life cycle) by slide/chart.

Course Outcomes:

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

CO1 Acquire technical skills to study morphology, structure & reproduction of some cyanobacteria and protozoa.
CO2 Study the morphology, structure & reproduction of some protozoa.
CO3 Demonstrate, mount & identify the algae and fungi.

References:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** 9th ed. by Rakesh Patel&Kiran Patel (Aditya Publication)
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F. Y. B. Sc. Semester - II
BIOSCIENCE (Microbiology)
BMP-MJ-202: Microbial Biochemistry Practical

(Time duration: 2 hours/week)

Course Content:

1. Qualitative determination of monosaccharide.
2. Qualitative determination of disaccharides- Reducing Sugar
3. Qualitative determination of disaccharides- Non-reducing Sugar
4. Qualitative determination of polysaccharides.
5. Qualitative determination of protein.
6. Qualitative determination of unknown solution.
7. Detection of Pentose & Deoxyribose Sugar.
8. Preparation of standard solutions (Normal, molar, molal, Part, Percentage, PPM and PPB solutions)

Course Outcomes:

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

CO1 Acquire technical skills to detect the sugar, starch & protein.
CO2 Study the biochemical properties of sugar, protein & nucleotides. Demonstrate & identify the compound from the unknown mixture.
CO3 Prepare various types of solutions.

References:

- **Practical Biochemistry** by Plummer Tata McGraw-Hill.
- **Experimental physiology & Biochemistry** by Chand, Jaypee publication.
- **Experiments in Microbiology, Plant Pathology and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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Veer Narmad South Gujarat University, Surat

B. Sc. Bioscience (Microbiology) Syllabus

NEP 2023

(Effective from June, 2023)

(Revised – 2024)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT
B. Sc. Bioscience (Microbiology)
NEP 2020, CBCS Semester system

B. Sc. Bioscience (Microbiology)

It is a three-year Bachelor's degree &four-year Honours course as per NEP 2020 which can be pursued after passing 12th Science. The subject includes the study of microbes and the science of micro-organisms -Microbiology. It mainly focuses on the understanding of the diversity of micro-organisms and the wide application of these life forms in various fields & nature. The course includes the study of major aspects of microbiology & allied discipline for the better understanding and use of microscopic forms of life.

Program Outcome:

PO1 Students shall learn basic fundamental aspects of microbiology such as microbial diversity, microbial taxonomy, microbial physiology, microbial genetics, microbial biochemistry, and microbial ecology.

PO2 Students shall acquire the knowledge regarding applied field of microbiology like medical microbiology, food and dairy microbiology, environmental microbiology, industrial microbiology, biotechnology.

PO3 Students shall acquire the awareness regarding the important role of microorganisms in human health and diseases, environment.

PO4 Students shall learn the knowledge regarding microbial technology and its applications in the production of important microbial products.

PO5 Program shall generate skilled manpower ready to use by various industrial sectors.

Program Specific Outcome:

PSO1 Students will develop the skill to observe, isolate, identify, and cultivate the microbes.

PSO2 Students will acquire the GLP in the microbiology laboratory.

PSO3 Students will develop practical skills of various instruments and techniques used in diverse fields of microbiology as well as biological science.

PSO4 Students will develop communication skills, effective presentation skills, and interpretation skills.

PSO5 Students will be graduates in Bioscience (microbiology) who shall understand the societal problems and play a vital role by providing microbial solutions.

PSO6 Students will be able to build their careers in public health, dairy & food, research & academic fields, environmental organizations, pharmaceuticals & fermentation industries.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

NEP 2020, CBCS Semester system

B. Sc. Bioscience (Microbiology)

[Minor]

F. Y. B. Sc. Semester I & II (New)

(Effective from June 2023)

(Revised – 2024)

Paper No., Paper title, Teaching & Evaluation Scheme

Semester I

Paper No.	Paper Title	Course Credit	Hrs/ week	External marks	Internal marks	Total marks	Duration of Exam
BM-MN- 1	Fundamental Microbiology	2	2	25	25	50	1 Hrs
BMP-MN-1	Fundamental Microbiology Practical	2	4	25	25	50	4 Hrs

Semester II

Paper No.	Paper Title	Course Credit	Hrs/ week	External marks	Internal marks	Total marks	Duration of Exam
BM-MN- 2	Biology of Microbes	2	2	25	25	50	1Hrs
BMP-MN-2	Biology of Microbes Practical	2	4	25	25	50	4 Hrs

F. Y. B. Sc. Semester - I
Bioscience (Microbiology)
BM-MN-1: FUNDAMENTAL MICROBIOLOGY

Course Description:

Course Code	BM-MN- 1
Course Title	Fundamental Microbiology
Course Type	Core (Minor)
Course Credit	02

Course Overview:

This course introduces about the world of microbes, the scope & history of microbes, and their development in microbiology. It also introduces the basic principles of microscopy, different types of microscope, and microscopy. Also provide knowledge regarding the staining of bacteria, basic sterilization methods, and isolation techniques.

Course Objectives:

- To introduce microbes & microbiology.
- To introduce various microbes and their distribution in nature.
- To learn various microbial discoveries and contributions of scientists.
- To introduce basic principles of microscopy, microscope & types of microscopy.
- To introduce staining techniques, various sterilization methods & isolation techniques.

Course Content:

Unit: I Microbial World: Scope & History. **[15 Hrs]**

- Introduction to science of microbes - Microbiology.
- Position of Microorganisms
- Scope & History of Microbiology.
- Contribution of scientists in various fields of microbiology: Antony Van Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Edward Jenner, Alexander Fleming.
- A major group of microorganisms
  Prokaryotes microbes – Eubacteria (Bacteria & Cyanobacteria) and Archeobacteria.
  Eukaryotes microbes – Protista (Photosynthetic – Algae)
  (Nonphotosynthetic – Protozoa) & slime molds.
  Fungi (Yeast & Mold)
  Acellular – Viruses.

Unit: II Introduction to Microbial Techniques. [15 Hrs]

- Introduction to Microscope, principle, components & types of Microscopy. (Bright-field, Dark-field, Phase-contrast, Fluorescence)
- Basic concept of dyes and stains. Application of dyes in microbiology, Mechanism of staining of bacteria, Fixatives, mordent, decolorizer & intensifier.
- Monochrome staining – Direct staining & indirect staining.
- Basic concept of sterilization, Disinfection, and Antisepsis.
- Sterilization by Physical agents & Chemical agents

Course Outcomes:

CO1 After successfully completing this course, the student will be able to understand the microbes, scope & history and contribution of scientist in the field of microbiology.

CO2 After successfully completing this course, the student will be able to understand the basic principles of the microscope, types of microscopy, stains & staining of bacteria.

CO3 They will also learn about the Sterilization concept and common sterilization method.

References:

- **Microbiology – An Introduction** 11th ed. by Tortora (Pearson India)
- **Elementary Microbiology Vol. I** by H. A. Modi (Ektaprakasan)
- **Microbiology** 5th ed. by Pelzar, Chan &Kreig (Tata McGraw-Hill)
- **Fundamental Principles of Bacteriology** 7th ed. by A. J. Salle (Tata McGraw- Hill)

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F. Y. B. Sc. Semester - I

BMP-MN-1: FUNDAMENTAL MICROBIOLOGY PRACTICAL

(Time duration: 2 hours/week)

Course Content:

1. Introduction to Basic Microbiology Laboratory Rules.
2. Introduction to common instruments in microbiology laboratory: Autoclave, Incubator, Hot air oven, laminar air flow, Centrifuge.
3. Introduction to common equipment in microbiology laboratory: Colony counter, Bacteriological Filter, Anaerobic jar, Micropipette.
4. Introduction to microscope – Component, use & care.
5. Microscopic examinations of Natural infusion.
6. Study of Contribution of Scientist.
7. Cleaning, Preparation & Sterilization of glassware.
8. Preparation of staining solutions.
9. Monochrome staining by basic dye. (Positive staining)
10. Monochrome staining by acidic dye. (Negative staining)
11. Study of antiseptics & disinfectants
12. Study of permanent slide/specimens

Course Outcomes:

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

CO1 Acquire technical skills in using laboratory instruments and equipment.
CO2 Demonstrate an understanding of laboratory procedures using scientific methods to demonstrate microscopic forms of life - cyanobacteria, algae, fungi, and protozoa.
CO3 Perform the bacterial staining and observe the bacterial morphology.

References:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** by Rakesh Patel & Kiran Patel
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **Experiments in Microbiology, Plant Pathology, and Biotechnology** 4th ed. by K. R. Aneja (New Age International Publishers)

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F. Y. B. Sc. Semester - II
Bioscience (Microbiology)
BM-MN-2: BIOLOGY OF MICROBES

Course Description:

Course Code	BM-MN- 201
Course Title	Biology of Microbes
Course Type	Core (Minor)
Course Credit	03

Course Overview:

This course introduces the diverse groups of micro-organisms, their morphology, habitat, classification, reproduction, and importance. Microorganisms can be explained simply and in-depth.

Course Objectives:

- To introduce prokaryotes and their diversity to students.
- To study the structure & morphology of diverse groups of organisms.
- To study the habitat, classification, and reproduction of different groups of organisms.
- To learn the economic importance of prokaryotes, protozoa, algae, and fungi.

Course Content:

Unit: I Introduction to Prokaryotes & Protozoa. [15 Hrs]

- The general structure of prokaryotes & function. Morphology & types of bacteria.
- Cyanobacteria - Habitat, morphology, classification, importance.
- Introduction to Archeobacteria – Bacteria of extreme environment
- The general structure, characteristics, and Outline classification of Protozoa.
- Study of habitat, morphology, structure, life cycle & reproduction of Amoeba & Plasmodium.

Unit: II Introduction to Algae & Fungi. [15 Hrs]

- The general structure, characteristics, outline classification, and Importance of Algae.
- Introduction to Slime molds, Water molds & their significance.
- The general structure, characteristics and Outline classification of Fungi.

- Study of habitat, morphology, structure, life cycle & reproduction of Yeast & Mucor
- Cultivation, economic importance of fungi. Pathogenic & harmful fungi.

Course Outcomes:

CO1 After completing this course, the student will be able to understand the morphology & types of bacteria, habitat, and structure of Cyanobacteria, and archeobacteria.

CO2 They will understand the basic concept of general structure, characteristics, outline classification, and importance of protozoa.

CO3 They will also learn about the general structure, characteristics, outline classification, cultivation & economic importance of algae & fungi.

References:

- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2020), 11ed., McGraw-Hill.
- **Elementary Microbiology Vol. II** by H. A. Modi (Ekta Prakasan)
- **Microbiology** 5th ed. by Pelzar, Chan &Kreig (Tata McGraw-Hill)
- **Microbiology-A systems Approach by** M. K. Cowan and K. P. Talaro (McGraw-Hill)

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F. Y. B. Sc. Semester - II

BMP-MN-2: BIOLOGY OF MICROBES PRACTICAL

(Time duration: 2 hours/week)

Course Content:

1. Study of Nostoc. (Habitat, morphology, structure & reproduction)
2. Study of Oscillatoria. (Habitat, morphology, structure & reproduction)
3. Study of morphology of bacteria.
4. Study of cyanobacteria by slide/images.
5. Microscopic study of protozoa by slide/images.
6. Microscopic study of algae by slide/images.
7. Microscopic study of diatoms.
8. Microscopic study of fungi by slide/images.
9. Study of Mucor. (Habitat, morphology, structure & reproduction)
10. Study of Saccharomyces –Yeast. (Habitat, morphology, structure & reproduction)
11. Study of Paramecium. (Habitat, morphology, structure & reproduction)
12. Study of Plasmodium. (Life cycle) by slide/chart.

Course Outcomes:

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

CO1 Acquire technical skills to study morphology, structure & reproduction of some cyanobacteria and protozoa.
CO2 Study the morphology, structure & reproduction of some protozoa.
CO3 Demonstrate, mount & identify the algae and fungi.

References:

- **Manual of Microbiology** 2nd ed. by Kanika Sharma, (Ane Books Pvt. Ltd)
- **Experimental Microbiology Vol. 1** by Rakesh Patel & Kiran Patel
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
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