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: યુનિવર્સિટી કાર્યાલયના તા.૩૦–૦૬–૨૦૨૩, ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૧૬૨૨૧/૨૦૨૩

–: પરિપત્ર :–

વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૩–૨૪ થી અમલમાં આવનાર શિક્ષણ વિભાગના રાજયની તમામ ઉચ્ચ શૈક્ષણિક સંસ્થાઓ માટે રાષ્ટ્રીય શિક્ષણ નીતિ ૨૦૨૦ અંતર્ગત કોમન કરીકયુલમ એન્ડ ક્રેડિટ ફ્રેમવર્ક હેઠળ ક્રેડિટ માળખું અમલીકરણ માટે નિયત કરવા બાબત અંગેના તા.૧૧/૦૭/૨૦૨૩, ઠરાવ ક્રમાંકઃ KCG/admin/2023-24/0607/kh.1 અનુસાર તથા વિજ્ઞાન વિદ્યાશાખાનાં સ્ટ્રકચર મુજબ શૈક્ષણિક વર્ષ ૨૦૨૩–૨૪ થી અમલમાં આવનાર B.Sc. Bioscience (Microbiology) Sem-1 & 2 નો Major, Minor, નો અભ્યાસક્રમ બાયોસાયન્સ વિષયની અભ્યાસ સમિતિ વતી અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ અને વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૧૭/૦૮/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ૧૦ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

એકેડેમિક કાઉન્સિલની તા.૧૭/૦૮/૨૦૨૩ની સભાનાં ઠરાવ ક્રમાંકઃ૧૦

:: **આથી ઠરાવવામાં આવે છે કે,** શૈક્ષણિક વર્ષ ૨૦૨૩–૨૪ થી અમલમાં આવનાર B.Sc. Bioscience (Microbiology) Sem-1 & 2 નો Major, Minor, નો અભ્યાસક્રમ બાયોસાયન્સ વિષયની અભ્યાસ સમિતિ વતી અભ્યાસ સમિતિનાં ચેરમેનશ્રીએ અને વિજ્ઞાન વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિજ્ઞાન વિદ્યાશાખા વતી વિજ્ઞાન વિદ્યાશાખાનાં અધ્યક્ષશ્રીએ મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણનો સ્વીકાર કરી મંજૂર કરવામાં આવે છે.

(બિડાણઃ ઉપર મુજબ)

ક્રમાંક : એસ./સાયન્સ/પરિપત્ર/૨૧૫૫૧/૨૦૨૩
તા.૧૮–૦૮–૨૦૨૩

કુલસચિવ ધ્વજ

પ્રતિ,
૧) વિજ્ઞાન વિદ્યાશાખા હેઠળની સંલગ્ન તમામ કોલેજોનાં આચાર્યશ્રીઓ.
..... આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને 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 2023

(Effective from June, 2023)

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

B. Sc. Bioscience (Microbiology)

It is a three years Bachelor 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 science of micro-organism -Microbiology. It mainly focuses the understanding of the diversity of micro-organisms and the wide application of these life forms in various field & the nature. The course includes the study of major aspects of microbiology & allied discipline for the better understanding and use of microscopic form of life.

Program Outcome:

- Students shall learn basic fundamental aspects of microbiology such as microbial diversity, microbial taxonomy, microbial physiology, microbial genetics, microbial biochemistry, and microbial ecology.
- Students shall acquire the knowledge regarding applied field of microbiology like medical microbiology, food and dairy microbiology, environmental microbiology, industrial microbiology, biotechnology.
- Students shall acquire the awareness regarding the important role of microorganisms in human health and diseases, environment.
- Students shall learn the knowledge regarding microbial technology and its applications in the production of important microbial products.
- To generate skilled manpower ready to use by various industrial sectors.

Program Specific Outcome:

- Students will develop the skill to observe, isolate, identify and cultivate the microbes.
- Students will acquire the GLP in microbiology laboratory.
- Students will develop practical skills of various instruments and techniques used in diverse field of microbiology as well as biological science.
- Students will develop communication skills, effective presentation skills and interpretation skills.
- Students will be graduates in Bioscience (microbiology) who shall understand the societal problems and play a vital role by providing microbial solutions.
- 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.

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)

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	50	20	70	2 Hrs
BM-MJ- 102	Basic Microbial Techniques	3	3	50	20	70	2 Hrs
BMP-MJ-1	Practical	2	4	40	20	60	4 Hrs

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	50	20	70	2 Hrs
BM-MJ- 202	Microbial Biochemistry	3	3	50	20	70	2 Hrs
BMP-MJ-2	Practical	2	4	40	20	60	4 Hrs

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

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, science of microbes, scope & relevance, history of microbes and development in microbiology.

Course Objectives:

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

Course Content:

Unit: I Introduction to Microbial World. **[10 Hrs]**

- Introduction to science of microbes - Microbiology.
- Position of Microbes in living world.
  Binomial system, three kingdoms, introduction to prokaryotes, four kingdoms.
- Whittaker's five kingdoms & Carl Woese's classification.
- Taxonomic status of viruses

Unit: II Microbes & Scope of Microbiology. **[10 Hrs]**

- Major group of microorganism
  Prokaryotes microbes – Eubacteria & Archeobacteria.
  Eukaryotes microbes – Protista (Photosynthetic, Nonphotosynthetic & slime molds), Fungi (Yeast & Mold)
  Acellular – Viruses.
- Distribution of microorganism in the nature.
- Scope & relevance of Microbiology.
- Microbiology as a science – Basic & Applied area of microbiology

Unit: III History of Microbiology. **[15 Hrs]**

- Discovery of microbial world & Microorganism.
  Contribution of A. V. 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.
- Birth of Modern Chemotherapy – Ehrlich
  Antibiotics - Fleming & Waksman

Unit: IV Development in Microbiology. **[10 Hrs]**

- 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 the development in various field of microbiology.

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
Bioscience (Microbiology)
BM - 102: BASIC MICROBIAL TECHNIQUES
BM-MJ- 102 (Major)

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 type 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 basic principle of microscopy.
- To describe component of microscope & types of microscopy – Light & Electron.
- To introduce dyes, stains, staining solution and staining technique.
- To study various sterilization method, culture media& isolation technique.

Course Content:

Unit: I Principles of Microscopy. [15 Hrs]

- Structure & properties of light. Working principle of microscope
- Objectives, Resolution, NA, Immersion objectives, Condenser, Ocular
- The Light Microscope, Optical & mechanical component of microscope.
- Types of Light Microscopy.
  Bright-field & Dark-field microscopy.
  Phase-contrast & Fluorescence microscopy

Unit: II Electron Microscopy [10 Hrs]

- Limits of resolution & basic component and principle of electron microscope
- Transmission electron microscope.
- Scanning electron microscope.
- Scanning probe microscopy

Unit: III Dyes, Stains and Staining. **[10 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) & Differential staining.

Unit: IV Sterilization & Isolation Techniques. **[10 Hrs]**

- Basic concept of sterilization.
- Sterilization by Physical agents: Heat (Dry & Moist heat), Low temperature.
- Sterilization by Chemical agents: Aldehyde, Alcohol, Halogens Heavy metals, Phenolic, Quaternary Ammonium compound, and Sterilizing Gases.
- Culture media and isolation techniques.

Course Outcomes:

CO1 After successfully 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 microscope &types of electron microscope.
CO3 They will understand basic concept of dyes, stains, staining solution and staining of bacteria.
CO4 They will also learn about common sterilization method, culture media and techniques for isolation of bacteria.

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 (Ektaprakasan)

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F. Y. B. Sc. Semester - I

BMP - 1: BIOSCIENCE PRACTICAL

Practical based on paper BM-101 & BM-102

(Time duration: 4 hours/week)

1. Introduction to Lab apparatus.
2. Introduction to microscope.
3. Microscopic examinations - Wet-mount preparation
4. Bacterial motility by Hanging drop preparation.
5. Measurement of microorganism. (Micrometry)
6. Observation & morphological characters of yeast, fungi & protozoa by phase contrast & dark field microscopy
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. Demonstration of Spirochete
12. Gram staining

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)
- **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 - 201: MICROBIAL DIVERSITY
BM-MJ- 201 (Major)

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

Course Content:

Unit: I Introduction to Prokaryotes. [10 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 Photosynthetic Protists. [10 Hrs]

- Occurrence & General characteristics of Algae.
- Outline classification of Algae.
- Study of some algae. (Habitat, morphology, structure, life cycle & reproduction of Chlorella & Chlamydomonas)
- Importance of Algae.

Unit: III Introduction to Non-photosynthetic Protists. [10 Hrs]

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

Unit: IV Introduction to Fungi. [15 Hrs]

- General characteristics of fungi.
- Outline classification of fungi.
- Study of some fungi. (Habitat, morphology, structure, life cycle & reproduction of Yeast &Mucor)
- Cultivation, economic importance of fungi. Harmful fungi.

Course Outcomes:

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

CO2 They will understand basic concept about general structure, characteristics, and outline classification, importance of photosynthetic protists.

CO3 They will learn about general structure, characteristics, outline classification, importance of non-photosynthetic protists.

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

References:

- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2020), 11ed., McGraw-Hill .
- **Elementary Microbiology Vol. II** by H. A. Modi (Ektaprakasan)
- **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 - 202: MICROBIAL BIOCHEMISTRY
BM-MJ- 202 (Major)

Course Description:

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

Course Overview:

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

Course Objectives:

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

Course Content:

Unit: I Carbohydrates. **[10 Hrs]**

- Introduction, natural occurrence & physiological importance.
- Classification: aldose & ketoses. Monosaccharide, Disaccharides & polysaccharides. Their structure.
- Physical properties of carbohydrates, asymmetrical carbon atom, stereoisomerism & optical isomerism.
- Configuration in Sugar: Linear & Ring structure.

Unit: II Amino acids & Proteins. **[10 Hrs]**

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

Unit: III Fatty acids & lipids. **[10 Hrs]**

- Introduction & classification of lipids.
- Fatty acids - saturated & unsaturated.
- Triglycerides, Phospholipids, glycolipids, lipoprotein, steroids.
- Physiological importance.

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

- Introduction, Components and organization of nucleic acids
- Nucleoside, nucleotide, polynucleotide.
- DNA structure & importance.
- RNA structure & types.

Course Outcomes:

CO1 After successfully 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 basic concept of fatty acids, lipids and fats.
CO4 They will also learn about nucleoside, nucleotide and 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

BMP - 2: BIOSCIENCE PRACTICAL

Practical based on paper BM-201 & BM-202

(Time duration: 4 hours/week)

1. Qualitative determination of monosaccharide.
2. Qualitative determination of disaccharides.
3. Qualitative determination of polysaccharides.
4. Qualitative determination of protein.
5. Qualitative determination of unknown solution.
6. Preparation of standard solutions (Normal, molar, molal, Part, Percentage, PPM and PPB solutions)
7. Study of Nostoc & Oscillatoria. (Habitat, morphology, structure & reproduction)
8. Study of bacteria & blue green algae by slide/images.
9. Microscopic study of algae, fungi & protozoa by slide/images.
10. Study of Mucor. (Habitat, morphology, structure & reproduction)
11. Study of Saccharomyces –Yeast. (Habitat, morphology, structure & reproduction)
12. Study of Paramecium. (Habitat, morphology, structure & reproduction)

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)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **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)

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

B. Sc. Bioscience (Microbiology)

It is a three years Bachelor 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 science of micro-organism -Microbiology. It mainly focuses the understanding of the diversity of micro-organisms and the wide application of these life forms in various field & the nature. The course includes the study of major aspects of microbiology & allied discipline for the better understanding and use of microscopic form of life.

Program Outcome:

- Students shall learn basic fundamental aspects of microbiology such as microbial diversity, microbial taxonomy, microbial physiology, microbial genetics, microbial biochemistry, and microbial ecology.
- Students shall acquire the knowledge regarding applied field of microbiology like medical microbiology, food and dairy microbiology, environmental microbiology, industrial microbiology, biotechnology.
- Students shall acquire the awareness regarding the important role of microorganisms in human health and diseases, environment.
- Students shall learn the knowledge regarding microbial technology and its applications in the production of important microbial products.
- To generate skilled manpower ready to use by various industrial sectors.

Program Specific Outcome:

- Students will develop the skill to observe, isolate, identify and cultivate the microbes.
- Students will acquire the GLP in microbiology laboratory.
- Students will develop practical skills of various instruments and techniques used in diverse field of microbiology as well as biological science.
- Students will develop communication skills, effective presentation skills and interpretation skills.
- Students will be graduates in Bioscience (microbiology) who shall understand the societal problems and play a vital role by providing microbial solutions.
- 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.

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)

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	3	3	50	20	70	2 Hrs
BMP-MN-1	Practical	1	2	20	10	30	3 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	3	3	50	20	70	2 Hrs
BMP-MN-2	Practical	1	2	20	10	30	3 Hrs

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

Course Description:

Course Code	BM-MN- 1
Course Title	Fundamental Microbiology
Course Type	Core (Minor)
Course Credit	03

Course Overview:

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

Course Objectives:

- To introduce microbes & microbiology.
- To introduce various microbes and their distribution in nature.
- To learn various microbial discovery and contribution of scientists.
- To introduce basic principle of microscopy, microscope & types of microscopy.
- To introduce staining technique, various sterilization method & isolation technique.

Course Content:

Unit: I Microbial World: Scope & History. **[10 Hrs]**

- Introduction to science of microbes - Microbiology.
- Scope & History of Microbiology.
- Contribution of scientist in various field of microbiology: Antony Van Leeuwenhoek, Louis Pasteur, Robert Koch,, Joseph Lister, Edward Jenner, Alexander Fleming.
- Major group of microorganism
  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 Microscopy & Staining. [10 Hrs]

- Working principle of microscope, Resolution, NA.
  Optical & mechanical component of microscope.
- Types of Light 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, Gram staining.

Unit: III Sterilization & Isolation Techniques. [10 Hrs]

- Basic concept of sterilization, Disinfection, Antisepsis.
- Sterilization by Physical agents: Heat (Dry & Moist heat)
  Low temperature, Filtration.
- Sterilization by Chemical agents: Aldehyde, Alcohol, Halogens Heavy metals,
  Phenolic, Quaternary Ammonium compound and
  Sterilizing Gases.
- Culture media and isolation techniques.

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 microscope, types of microscopy, stains & staining of bacteria.

CO3 They will also learn about common sterilization method and techniques for isolation of bacteria.

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 - 1: BIOSCIENCE (Micro) PRACTICAL

Practical based on paper BM-1

(Time duration: 2 hours/week)

Course Description:

Course Code	BM-MN- 1
Course Title	Fundamental Microbiology - Practical
Course Type	Core (Minor)
Course Credit	01

Course Content:

1. Introduction to Lab apparatus.
2. Introduction to microscope.
3. Microscopic examinations - Wet-mount preparation
4. Cleaning, Preparation & Sterilization of glassware.
5. Preparation of staining solutions.
6. Monochrome staining by basic dye. (Positive staining)
7. Monochrome staining by acidic dye. (Negative staining)
8. Isolation method for bacteria - Demonstration

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)
- **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 - 2: BIOLOGY OF MICROBES
BM-MN- 2 (Minor)

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

Course Content:

Unit: I Introduction to Prokaryotes. [10 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 Protists. [10 Hrs]

- General structure, characteristics and Outline classification of Algae.
- Importance of Algae.
- General structure, characteristics and Outline classification of Protozoa.
- Study of habitat, morphology, structure, life cycle & reproduction of Amoeba & Plasmodium.
- Introduction to Slime molds, Water molds & their significance.

Unit: III Introduction to Fungi. **[10 Hrs]**

- General structure, characteristics and Outline classification of Algae.
- Study of habitat, morphology, structure, life cycle & reproduction of Yeast & Mucor
- Cultivation, economic importance of fungi.
- Pathogenic & harmful fungi.

Course Outcomes:

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

CO2 They will understand basic concept about general structure, characteristics, outline classification, importance of algae & protozoa.

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

References:

- **Prescott, Harley, and Klein's Microbiology** Wiley, J., & Sherwood, L. (2020), 11ed., McGraw-Hill .
- **Elementary Microbiology Vol. II** by H. A. Modi (Ektaprakasan)
- **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 - 2: BIOSCIENCE (Micro) PRACTICAL

Practical based on paper BM-2

(Time duration: 2 hours/week)

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 & protozoa by slide/images.
5. Microscopic study of fungi by slide/images.
6. Study of Mucor. (Habitat, morphology, structure & reproduction)
7. Study of Saccharomyces –Yeast. (Habitat, morphology, structure & reproduction)
8. Study of Paramecium. (Habitat, morphology, structure & reproduction)

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)
- **Microbiology: A Laboratory Manual** 11th ed. by J. G. Cappuccino (Pearson Education Pvt. Ltd, Singapore)
- **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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