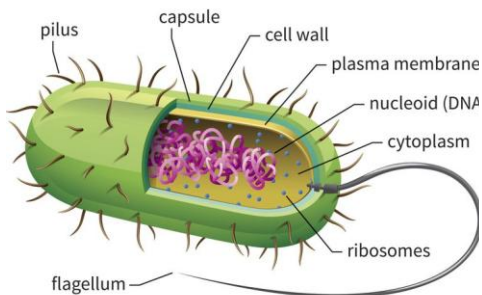


# BHAKTA KAVI NARSINH MEHTA UNIVERSITY JUNAGADH



## COURSE STRUCTURE & SYLLABUS FOR UNDERGRADUATE PROGRAMME IN MICROBIOLOGY



**(CORE COURSE FOR SEMESTER-II)**

**(As per Choice Based Credit System as recommended by UGC)**

**Effective from November - 2018**

# Preamble

Updating and revision of the Curriculum at regular interval of time is a prime criterion of IQAC – NAAC and prime need for the college educational systems affiliated to Universities. University Grants Commission has advocated the implementation of Choice Based Credit System in undergraduate and post graduate levels for better teaching learning process and evaluation of the candidate.

Microbiology is a foundation subject for Biotechnology, Genetic engineering, Molecular biology, Biochemistry, Bioinformatics and Medical Microbiology and hence holds the central position in the curriculum of these subjects. Looking to the rapid inventions and technological developments in the field of Microbiology as well as keeping in view the recommendations of UGC and Bhakta Kavi Narsinh Mehta University, this syllabus has been formulated by the combined and coordinated efforts of all the faculty members of all the Microbiology Departments of Colleges affiliated to BKNMU.

Composition of Curriculum for a particular subject requires following criteria to be considered:

1. Guidelines and Model curriculum given by the UGC and the University
2. Regional needs and Present National and International trends in the subject
3. Geographical parameters of the University and its demographic property
4. Relationship with other related subjects
5. Financial and statutory provisions of the State government
6. Resources of Educational needs.

The content of a syllabus should be such that it maintains continuity with the course content of higher secondary class and post graduate course. The present curriculum is made keeping this in mind and is an effort to impart fundamental knowledge of the subject needed at this level. The curriculum is designed as per the guidelines for Choice Based Credit System and reflects the total credit, teaching hours and question paper style of the paper. The units of the syllabus are well defined and the scope of each is given in detail. A list of reference books is provided at the end of each course. Microbiology being an experimental science, sufficient emphasis is given in the syllabus for training in laboratory skills and instrumentation. Following objectives have been considered while formulation of the curriculum:

1. To provide an updated, feasible and modern syllabus to the students and thereby to buildup their valuable college educational and job-oriented carrier.
2. To frame syllabus in accordance with the semester system and CBCS system.
3. Establishment of 10 Paper statuses up to Graduate level in the Bhakta Kavi Narsinh Mehta University

The authorities of Bhakta Kavi Narsinh Mehta University have provided valuable guidelines and facilities for the same for which, the Board expresses its heartfelt gratitude. The Board wishes all the students pursuing Microbiology a very bright future.

**BHAKTA KAVI NARSINH MEHTA UNIVERSITY**  
**FACULTY OF SCIENCE**  
**CONCEPTUAL FRAMEWORK**  
**CBCS SYLLABUS FOR SEMESTER 1 TO 6 EFFECTIVE FROM JUNE 2018**

No	Diploma/ Graduate/ Post Graduate	Semester	Name Of Paper	Paper No.	Credits	Internal Marks	External Marks	Practical & Viva Marks	Total Marks
1	Graduate	01	Microbiology : Basics and Scopes	MB 101	07	30	70	50	150
2	Graduate	02	Microbial Physiology	MB 201	07	30	70	50	150

**COURSE STRUCTURE FOR UG PROGRAM AND CREDIT SYSTEM**  
**SKELETON OF COMPLETE COURSE CONTENT OF**  
**UNDER GRADUATE MICROBIOLOGY (SEMESTER I & II)**

SEMESTER	PAPER NO. & CODE	TITLE OF THE PAPER	CREDIT
<b>I</b>	MB-101 (Theory)	<b>Microbiology : Basics and Scopes</b>	04
	MB-101 (Practical)	<b>Microbiology : Basics and Scopes</b>	03
<b>II</b>	MB-201 (Theory)	<b>Microbial Physiology</b>	04
	MB-201 (Practical)	<b>Microbial Physiology</b>	03

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## SYLLABUS FORMAT OF SEMESTER 1 AND SEMESTER 2

Stream	Paper	Unit	Title of Unit	Credit	Lectures	Marks		
						External	Internal	
B.Sc. Sem-1 (UG) Paper- 101	<b>MB-101- Microbiology : Basics and Scopes THEORY CREDIT (04)</b>	1	<b>MICROBIOLOGY : SCOPE AND HISTORY</b>	0.8	12	70	14	30
		2	<b>MICROSCOPY AND SPECIMEN PREPARATION</b>	0.8	12		14	
		3	<b>PROKARYOTIC CELL: STRUCTURE AND FUNCTION</b>	0.8	12		14	
		4	<b>MICROBIAL NUTRITION</b>	0.8	12		14	
		5	<b>MICROBIAL GROWTH</b>	0.8	12		14	
	<b>Total</b>				<b>04</b>	<b>60</b>	<b>100</b>	
		<b>MB101 PRACTICAL CREDIT (03)</b>	<b>INSTRUMENTATION, STAINING, ISOLATION, ENUMERATION AND GROWTH CURVE OF BACTERIA</b>	03	30	35	15	
<b>Total</b>				<b>03</b>	<b>30</b>	<b>50</b>		
B.Sc. Sem-1 (UG) Paper- 201	<b>MB- 201 Microbial PhysiologyTHEORY CREDIT (04)</b>	1	<b>CHEMISTRY FOR MICROBIOLOGIST</b>	0.8	12	70	14	30
		2	<b>INTRODUCTION TO BIOMOLECULES</b>	0.8	12		14	
		3	<b>ENZYMES</b>	0.8	12		14	
		4	<b>CONTROL OF MICROORGANISMS BY PHYSICAL AND CHEMICAL AGENTS</b>	0.8	12		14	
		5	<b>ANTIBIOTICS AND THEIR MODE OF ACTION</b>	0.8	12		14	
	<b>Total</b>				<b>04</b>	<b>60</b>	<b>100</b>	
		<b>MB201 PRACTICAL CREDIT (03)</b>	<b>QUALITATIVE AND QUANTITATIVE ANALYSIS OF BIOMOLECULES, ENZYME ASSAY, ANTIMICROBIAL ACTIVITY , TOTAL YEAST COUNT</b>	03	30	35	15	
<b>Total</b>				<b>03</b>	<b>30</b>	<b>50</b>		

## GENERAL INSTRUCTIONS

- 1) The Medium of Instruction will be English for Theory and practical course
- 2) There will be 6 Lectures / Week / Theory Paper / Semester.
- 3) Each Lecture (Period) will be of 55 Mins. (1 Period = 55 Mins).
- 4) There will be 2 Practical / Week / Paper / Batch. Each Practical will be of 3 Periods (1 Period 55 Mins.).
- 5) Each Semester Theory Paper will be of FIVE Units. There will be 60 Hrs. of Theory teaching / Paper / Semester.
- 6) Each Theory Paper / Semester will be of 100 Marks. There will be 30 marks for internal evaluation and 70 marks for external evaluation. Each Practical Paper / Semester will be of 50 Marks. So, Total Marks of Theory and Practical for each Paper will be 150. (100+50 = 150)

### Instructions to the Candidates for Practical Examination:

- 1) The practical examination will be conducted for TWO (2) days.
- 2) The Time duration of practical examination will be of FOUR (4) hrs on both the days.
- 3) All the students have to remain present at the examination centre 15 minutes before the scheduled time for examination.
- 4) Students have to carry with them Certified journal, I-card or examination receipt, Slide box, Apron and all other necessary requirements for examination.
- 5) Candidate should not leave the laboratory without the permission of examiner.
- 6) Use of calculator is allowed but the use of Mobile phones is strictly prohibited.
- 7) The candidate has to leave the laboratory only after the submission of all the answer sheets of the exercises performed.

## SKELETON OF THEORY EXAMINATION (EXTERNAL)

QUESTION 1 – UNIT 1		
Q 1 A	Objective type questions	4 Marks
Q 1 B	Answer in brief(Any 1 out of 2)	3 Marks
Q 1 C	Write a note on(Any 1 out of 2)	7 Marks
QUESTION 2 – UNIT 2		
Q 2 A	Objective type questions	4 Marks
Q 2 B	Answer in brief (Any 1 out of 2)	3 Marks
Q 2C	Write a note on (Any 1 out of 2)	7 Marks
QUESTION 3– UNIT 3		
Q 3 A	Objective type questions	4 Marks
Q 3 B	Answer in brief (Any 1 out of 2)	3 Marks
Q 3 C	Write a note on (Any 1 out of 2)	7 Marks
QUESTION 4 – UNIT 4		
Q 4 A	Objective type questions	4 Marks
Q 4 B	Answer in brief (Any 1 out of 2)	3 Marks
Q 4 C	Write a note on (Any 1 out of 2)	7 Marks
QUESTION 5 – UNIT 5		
Q 5 A	Objective type questions	4 Marks
Q 5 B	Answer in brief (Any 1 out of 2)	3 Marks
Q 5 C	Write a note on (Any 1 out of 2)	7 Marks
<b>TOTAL MARKS : 70 TOTAL TIME : 2½ HOURS</b>		

## SKELETON OF PRACTICAL EXAMINATION (EXTERNAL)

**SEMESTER – I and II : MB 101 and MB 201**

### SECTION- I: EXAMINER –I (EXTERNAL)

Ex. No.	Detail of Exercise	Marks	Day to begin the exercise
1	Perform any one from the given list of exercises as per the instruction of the examiner exercise	10	1 <sup>st</sup> Day
5	Viva-voce	04	1 <sup>st</sup> / 2 <sup>nd</sup> Day
6	Certified Journal	03	1 <sup>st</sup> / 2 <sup>nd</sup> Day
<b>Total Marks</b>			<b>17</b>

### SECTION- II: EXAMINER –II (INTERNAL)

Ex. No.	Detail of Exercise	Marks	Day to begin the exercise
2	Perform any one from the given list of exercises as per the instruction of the examiner exercise	10	1 <sup>st</sup> / 2 <sup>nd</sup> Day
3	Spotting	04	1 <sup>st</sup> / 2 <sup>nd</sup> Day
4	Viva-voce	04	1 <sup>st</sup> / 2 <sup>nd</sup> Day
<b>Total Marks</b>			<b>18</b>



## INTERNAL EVALUATION FOR MB 101 AND MB 201 (THEORY)

No.	Pattern of Internal Evaluation	Marks
1	Assignment	10
	MCQ Test	10
	Seminar/Presentation	10
OR		
2	MCQ Test	30
OR		
3	Assignment	10
	MCQ Test	20
OR		
4	Seminar/Presentation	10
	MCQ Test	20

## INTERNAL EVALUATION FOR MB 101 AND MB 201 (PRACTICAL)

No.	Pattern of Internal Evaluation	Marks
1	Reagent Preparation/Calculation	05
2	Practical Performance/Test	05
3	Viva	05

## LIST OF INSTRUMENTS FOR MICROBIOLOGY SEMESTER 1 AND 2

No.	Name of Instrument
1	Compound Microscopes
2	Autoclave
3	Incubator
4	Hot air oven
5	Vortex mixer
6	Water bath
7	Heating mantle
8	Magnetic stirrer
9	UV chamber
10	Inoculation chamber
11	pH meter
12	Colony counter
13	Refrigerator
14	Bunsen burner
15	Micrometer (stage and ocular)
16	Colorimeter
17	Membrane filter set
18	Centrifuge
19	Electronic shaker Incubator
20	Electronic Analytical Balance
21	Double-pan Analytical Balance
22	Spectrophotometer
23	Computers

<b>24</b>	<b>Water distillation system</b>
<b>25</b>	<b>Haemocytometers</b>
<b>26</b>	<b>Inspissator</b>

**BHAKTA KAVI NARSINH MEHTA UNIVERSITY**  
**SYLLABUS FOR MICROBIOLOGY SEMESTER - II**  
(With effect from November, 2018)  
**MB-201- MICROBIAL PHYSIOLOGY(THEORY)**

**UNIT 1 (CREDIT-0.8, TEACHING HOURS-12, MARKS-14)**

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**CHEMISTRY FOR THE MICROBIOLOGIST**

- 1.1 Chemicals, Elements and structure of Atoms
- 1.2 Molecules and Chemical bonds
- 1.3 Chemical reactions
- 1.4 Water and pH
- 1.5 The essence of biochemistry for microbiologist

**UNIT 2 (CREDIT-0.8, TEACHING HOURS-12, MARKS-14)**

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**INTRODUCTION TO BIOMOLECULES**

- 2.1 Classification, Structures and Biological function of Carbohydrates
- 2.2 Classification, Structures and Biological function of Lipids
- 2.3 Classification, Structures and Biological function of Proteins
- 2.4 Classification, Structures and Biological function of Nucleic acids

**UNIT 3 (CREDIT-0.8, TEACHING HOURS-12, MARKS-14)**

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**ENZYMES**

- 3.1 Characteristics of Enzymes, Chemical & Physical Properties of Enzymes
- 3.2 Classification and Nomenclature of Enzymes
- 3.3 Enzyme activity: Nature & Mechanism of enzyme activity, Inhibition of enzymes
- 3.4 Mechanism and Regulation of Enzymes Activity
- 3.5 Mechanism and Regulation of Enzymes Synthesis
- 3.6 Differences between Prokaryotic & Eukaryotic Enzyme Regulation

**UNIT 4 (CREDIT-0.8, TEACHING HOURS-12, MARKS-14)**

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**CONTROL OF MICROORGANISMS BY PHYSICAL AND CHEMICAL AGENTS**

- 4.1 Fundamentals of Microbial Control**  
Principle and Types, Definition of Sterilization, Disinfectant, Antiseptic, Sanitizer, Germicide, Bactericide and Bacteriostasis.
- 4.2 Characteristics, Evaluation and Selection of Ideal antimicrobial agent**
- 4.3 Physical Agents of Microbial Control –**  
High Temperature, Low temperature, Desiccation, Osmotic Pressure, Radiation, Ultraviolet lights, X- rays, Gamma rays, Cathode rays, surface tension and interfacial tension, filtration.
- 4.4 Chemical Agents of Microbial Control –**  
Phenol and phenolic compound, Alcohol, Halogen, Heavy metals and their compounds, Dyes, Detergents, Quaternary ammonium compounds, Aldehydes, Gaseous sterilization
- 4.5 Phenol Coefficient Method for the evaluation of chemical antimicrobial agents.**

**UNIT 5 (CREDIT-0.8, TEACHING HOURS-12, MARKS-14)**

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**ANTIBIOTICS AND THEIR MODE OF ACTION**

- 5.1 Chemotherapeutic agents and Chemotherapy**
- 5.2 Characteristics of ideal chemotherapeutic agent**
- 5.3 Antibiotics and their mode of action : Inhibition of cell wall synthesis, Damage to cytoplasmic membrane, Inhibition of nucleic acid and protein synthesis, Inhibition of specific enzyme system**
- 5.4 Antifungal, antiviral and antitumor chemotherapeutic agents**
- 5.5 Microbiological assay of antibiotics**
- 5.6 Nonmedical uses of antibiotics**

## REFERENCE BOOKS (SEMESTER 2)

1. Atlas. R.M., Microbiology, 2 nd Edition. Wm. C. Brown Publishers
2. Satyanarayana. U., Biochemistry, Books and allied Pvt. Ltd.
3. Prescott L.M., Microbiology 7<sup>th</sup> Edition, The McGraw–Hill Companies,
4. Mathew, Van Holde & Ahern, Biochemistry,3 rd Edition. Pearson Education (Singapore) Pte. Ltd. India Branch, New Delhi
5. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5 Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
6. Powar and Daginawala, General Microbiology Vol-I. Himalaya Publishing House, Mumbai.
7. Purohit, S.S., Microbiology-Fundamentals and Applications-6<sup>th</sup> Edition, Agrobios Publications, Delhi.
8. Tortora, Funke & Case. Microbiology-An Introduction, 8 Edition, Pearson Education, Delhi

### MB-201 MICROBIAL PHYSIOLOGY(PRACTICAL)

Practical Hours – 3hrs/day for 2 days/Week

Total Credit – 3

= Total 6 hours/Week

- 1) **Qualitative analysis of Amino acids and Proteins**
- 2) **Qualitative analysis of Carbohydrates**
- 3) **Colorimetric estimation of Protein by Folin and Lowry's method**
- 4) **Titrimetric estimation of reducing Sugars by Cole's method**
- 5) **Colorimetric estimation of reducing sugar by DNSA method**
- 6) **Assay of Alpha – Amylase by iodometric method**
- 7) **Effect of Chemicals on growth of bacteria**
- 9) **Effect of Antibiotics on growth of bacteria : Agar ditch method and Agar cup Method.**
- 10) **Enumeration of bacterial number by viable count technique.**
- 11) **Growth curve of Bacteria by colorimetric method and determination of Generation time and Growth rate of *E. coli* by colorimetric method.**

### REFERENCE BOOKS (SEMESTER 2 PRACTICAL)

1. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-I, Aditya Publications, Ahmedabad, India.
2. Patel. R.J., Patel. K.R., Experimental Microbiology, Vol-II, Aditya Publications, Ahmedabad, India.
3. Dubey. R.C., Maheshwari. D.K., Practical Microbiology, S.Chand & Company Ltd., New Delhi
4. Konika Sharma., manual of Microbiology – Tools & Techniques, Ane Books, Delhi.