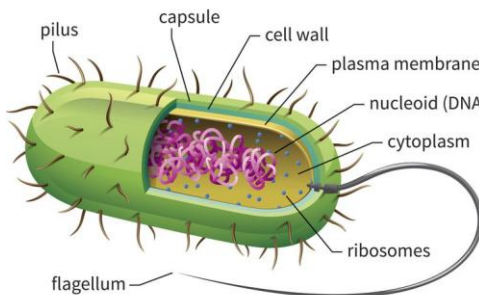


BHAKTA KAVI NARSINH MEHTA UNIVERSITY JUNAGADH



COURSE STRUCTURE & SYLLABUS FOR UNDERGRADUATE PROGRAMME IN MICROBIOLOGY



(CORE COURSE FOR SEMESTER I)
(As per Choice Based Credit System as recommended by UGC)

Effective from June – 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 Metha 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

COURSE STRUCTURE FOR UG PROGRAM AND CREDIT SYSTEM

**SKELETON OF COMPLETE COURSE CONTENT OF
 UNDER GRADUATE MICROBIOLOGY (SEMESTER I)**

SEMESTER	PAPER NO. & CODE	TITLE OF THE PAPER	CREDIT
I	MB-101 (Theory)	Microbiology : Basics and Scopes	04
	MB-101 (Practical)	Microbiology : Basics and Scopes	03

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SYLLABUS FORMAT OF SEMESTER 1

Stream	Paper	Unit	Title of Unit	Credit	Lectures	Marks		
						External	Internal	
B.Sc. Sem-1 (UG) Paper- 101	MB-101- Microbiology : Basics and Scopes THEORY CREDIT (04)	1	MICROBIOLOGY : SCOPE AND HISTORY	0.8	12	70	14	30
		2	MICROSCOPY AND SPECIMEN PREPARATION	0.8	12		14	
		3	PROKARYOTIC CELL: STRUCTURE AND FUNCTION	0.8	12		14	
		4	MICROBIAL NUTRITION	0.8	12		14	
		5	MICROBIAL GROWTH	0.8	12		14	
	Total			04	60	100		
	MB101 PRACTICAL CREDIT (03)	INSTRUMENTATION, STAINING, ISOLATION, ENUMERATION AND GROWTH CURVE OF BACTERIA	03	30	35	15		
Total			03	30	50			

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
TOTAL MARKS : 70 TOTAL TIME : 2½ HOURS		

SKELETON OF PRACTICAL EXAMINATION (EXTERNAL)

SEMESTER – I and II : MB 101

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 st Day
5	Viva-voce	04	1 st / 2 nd Day
6	Certified Journal	03	1 st / 2 nd Day
Total Marks			17

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 st / 2 nd Day
3	Spotting	04	1 st / 2 nd Day
4	Viva-voce	04	1 st / 2 nd Day
Total Marks			18

INTERNAL EVALUATION FOR MB 101 (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 (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

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
24	Water distillation system
25	Haemocytometers
26	Inspissator

BHAKTA KAVI NARSINH MEHTA UNIVERSITY
SYLLABUS FOR MICROBIOLOGY SEMESTER - I
(With effect from June 2018)
MB-101- MICROBIOLOGY : BASICS AND SCOPES
(THEORY)

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

MICROBIOLOGY : SCOPE AND HISTORY

- 1.1 Microbiology as a field of Biology
- 1.2 The Place of Microorganisms in the living world
- 1.3 Introduction to Groups of Microorganisms
- 1.4 Distribution of Microorganisms in Nature
- 1.5 Applied areas of Microbiology
- 1.6 Spontaneous generation versus Biogenesis
- 1.7 Germ Theory of disease
- 1.8 Eminent scientists of Microbiology

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

MICROSCOPY AND SPECIMEN PREPARATION

- 2.1 Bright field Microscopy – Principle, Construction and Working
- 2.2 Dark field Microscopy - Principle, Construction and Working
- 2.3 Fluorescent Microscopy - Principle, Construction and Working
- 2.4 Phase Contrast Microscopy - Principle, Construction and Working
- 2.5 Electron Microscopy – Types, working and Limitations
- 2.6 Introduction to Confocal Microscopy
- 2.7 Introduction to Stains, Mordents, Decolorizers and Fixatives
- 2.8 Preparations for Light Microscope Examinations

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

PROKARYOTIC CELL: STRUCTURE AND FUNCTION

- 3.1 Size, Shape and Arrangement of Bacteria
- 3.2 Bacterial Structures – External to Cell Wall : Capsule, Flagella, Pili, Prostheca, Sheath & Stalk

- 3.3 The cell wall of Bacteria – Structure and chemical composition of Gram negative and Gram positive Bacterial cell wall**
- 3.4 Bacterial Structures – Internal to Cell Wall : Cell Membrane, Protoplast, Spheroplast, Membranous intrusions and intracellular membrane system, Cytoplasm, Cytoplasmic inclusions and Vacuoles, Nuclear Material**
- 3.5 Bacterial Spores and Cyst – Types of spore, Structure and formation of Endospores (Sporogenesis).**

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

MICROBIAL NUTRITION

- 4.1 Nutritional requirements of bacteria**
- 4.2 Nutritional types of Bacteria**
- 4.3 Bacteriological Media**
- 4.4 Physical conditions required for growth**
- 4.5 Gaseous requirements and oxygen toxicity**
- 4.6 Selective methods**
- 4.7 Cultural characteristics**

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

MICROBIAL GROWTH

- 5.1 Reproduction of Bacteria : Modes of cell division and new cell formation**
- 5.2 Growth of Bacteria: Generation time, Growth rate**
- 5.3 Bacterial Growth Curve**
- 5.4 Synchronous growth and Continuous culture of Bacteria**

REFERENCE BOOKS (SEMESTER 1)

1. Prescott L.M., Microbiology 7th Edition, The McGraw–Hill Companies,
2. Pelczar, M.J., Chan E.C.S., Krieg, N.R., Microbiology, 5 Edition. Tata McGraw Hill Publication Co. Ltd. New Delhi.
3. Modi, H.A. Elementary Microbiology - Vol –I & II, Akta Prakashan, Nadiyad.
4. Powar and Daginawala, General Microbiology Vol-II. Himalaya Publishing House, Mumbai.
5. Purohit, S.S., Microbiology-Fundamentals and Applications-6th Edition, Agrobios Publications, Delhi.
6. Tortora, Funke & Case. Microbiology-An Introduction, 8 Edition, Pearson Education, Delhi.
7. Stanier, R.Y., Ingraham, J.L., Wheelis, M.L., Painter, R.K. General Microbiology, 5 Edition. MacMillan Press Ltd., London.
8. Frobisher M., Hinsdill, Crabtree and Goodherat Fundamentals of Microbiology, 9 Edition. W.B Saunders Co. USA.
9. Mani, A., Selwaraj, A.M., Narayanan L.M., and Arumngam, N., Microbiology, Saras Publication, Delhi

MB-101- MICROBIOLOGY: BASICS AND SCOPES(PRACTICAL)**Practical Hours – 3hrs/day for 2 days/Week****Total Credit – 3****= Total 6 hours/Week**

- 1) Principles, working and uses of the following laboratory instruments :
 - a) Microscope
 - b) Incubator
 - c) pH meter
 - d) Refrigerator
 - e) Colorimeter
 - f) Colony counter
- 2) Principles, working and uses of the following sterilizers:
 - a) Autoclave
 - b) Hot air oven
 - c) Steam sterilizer
 - d) Inspissator
 - e) Bacteriological filters.
- 3) Preparation of glassware for sterilization and disposal of laboratory media and cultures.
- 4) Preparation of Stains and Staining Reagents.
- 5) Study of Permanent Slides of Bacteria, Fungi, Algae and Protozoa.
- 6) Study of bacterial motility by hanging drop method.
- 7) Monochrome Staining:
 - a) Negative Staining
 - b) Positive Staining
- 8) Differential Staining : Gram's Staining
- 9) Special staining of bacteria:
 - a) Capsule staining – Hiss's method
 - b) Cell wall staining – Webb's method
 - c) Spore staining – Schaeffer's method
 - d) Metachromatic granule staining – Albert's method
 - e) Spirochete staining – Harrie's method
- 10) Isolation of bacteria by streak plate/pour plate and spread plate technique
- 11) Study of liquid/solidified culture media

REFERENCE BOOKS (SEMESTER 1 PRACTICALS)

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 and Techniques , Ane books, Delhi