DEPARTMENT OF MICROBIOLOGY				*CLASS: I B.Sc. Microbiology*				
Semester	**Course Type**	**Course Code**	**Course Title**	**Credits**	**Contact Hours/week**	**CIA**	**Ext**	**Total**
II	Major Core	20U2RMC3	Microbial Taxonomy	3	3	25	75	100

Course Objectives:

1. To impart basic knowledge on microbial diversity and classification.
2. To enable the students to explore the structural variation among the microbes.
3. To relate the structure of a microbe to its uses
4. To classify microbes based on its characteristic features
5. To emphasize the significance of these microbes in day to-day life.

Unit-I: History and Criteria of Classification

Position of microorganisms in living world, Principles of binomial nomenclature. Woese's three kingdom classification, Whittaker's five kingdom concept. Criteria used for classification, taxonomic groups, species concept. Criteria used for classification of bacteria, fungi ,algae and viruses.

Unit-II: Taxonomy of Bacteria

Bacterial nomenclature and taxonomy- Methods of Classification: intuitive methods, numerical taxonomy, genetic approach. Introduction to Bergey's system of classification. Economic importance of bacteria. General characteristics, morphology, ultra structure and reproduction of *Staphylococcus aureus* and *Escherchia coli*.

Unit-III: Taxonomy of Fungi

General criteria for classification of fungi by Alexopoulos and Mims. General characteristics, morphology, ultra structure and reproduction of *Aspergillus niger*and *Candida.* Economic importance of fungi.

Unit-IV: Taxonomy of Algae

Classification of Algae by Bloom, Fritsch. General characteristics, morphology, ultra structure and reproduction of algae – *Spirogyra* and *Anabaena.* Economic importance of algae.

Unit-V: Taxonomy of Viruses

Principles of Virus taxonomy, characteristics used in nomenclature & classification of animal, plant viruses and bacteriophage – Influenza, TMV and M13 viruses. Virions and Prions.

Books for Study

1. Prescott M. (2005). Microbiology. 6th Edition, Tata McGraw – Hill, New Delhi.
2. Dubey RC and Maheswari DK (2005). A text book of Microbiology, Revised Multicolour Edition, Published by S. Chand & Company Limited, New Delhi.
3. Dube, H.C. (2007). A textbook of fungi, bacteria and viruses. Agrobios India.
4. Atlas and Bartha (1997). Microbial ecology. 4th edition. Pearson education, New York.
5. Saravanan. P. (2017). Virology. MJP Publishers, Chennai.

Books for Reference

1. Albert G Moat and John W Foster (2004). Microbial Physiology. 4th Edition, John Wiley & Sons, New York.
2. Robert F Boyd (1984). General Microbiology. Times Mirror / Mosby College Publishers, St. Louis.
3. Garrity, G.M., Boone, D.R. and Castenholz, R.W. (2001). Bergey's Manual of Systematic Bacteriology, 2nd ed., vol. 1, Springer-Verlag, New York.
4. Alexopoulos, C.J. Charles W. Mims, Introductory Mycology, 3rd Edition, John Wiley & Sons, US.
5. Purohit SS (2005). Microbiology – Fundamentals and Applications. Reprinted & Published by Student Edition, Behind Nasrani Cinema, Chopasani Road, Jodhpur.
6. Pelczar TR, Chan ECS &Kreig NR (2006) Microbiology. 5th Edition, Tata McGraw – Hill, New Delhi.
7. Schlegel, H.G., (1993).General Microbiology, Seventh edition, Cambridge University Press, UK.

Web Resources

1. https://www.periobasics.com/basic-microbiology.
2. https://www.microbiologynutsandbolts.co.basic-concepts.
3. https://www.microbiologyinfo.com/category/basic-microbiology
4. https://www. Microbiology - Overview -youtube.com
5. https://www. Introduction to microbiology. youtube.com

Pedagogy

Chalk and talk, PPT, Group discussion, Seminar, Screening of educational videos and quiz

Course Learning Outcomes (CLO):

On completion of this course the students will be able to

	Course Learning Outcome	Knowledge Level
CLO-1	Define the criteria used for classification of bacteria, fungi, algae and viruses.	Up to K2
CLO-2	Discuss the pros and cons of various classification methods and Classify bacteria	Up to K3
CLO-3	Discuss the characteristics used in nomenclature and classification of fungi with suitable examples.	Up to K2
CLO-4	Compare and contrast the methods of classification of algae, structural organization and economic importance of algae.	Up to K3
CLO-5	Analyse the various characteristics used in nomenclature and classification of animal, plant viruses and bacteriophage.	Up to K4

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

Mapping of Course Learning Outcome with Programme Specific Outcome:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CLO1	1	2	2	1	3	1	2
CLO2	1	1	1	2	2	1	1
CLO3	2	1	1	1	3	1	1
CLO4	2	2	1	1	2	3	1
CLO5	1	1	2	3	2	1	2

Advance application–3; Intermediate level –2; Basic level –1

Mapping of Course Outcome with Programme Outcome:

	PO1	PO2	PO3	PO4	PO5
CLO1	1	2	2	1	3
CLO2	1	2	1	2	2
CLO3	2	1	3	1	3
CLO4	2	1	3	1	3
CLO5	1	1	3	3	3

Advance application–3; Intermediate level –2; Basic level –1

Lesson Plan:

Units	Description	Staff	Hours	Mode
I History and Criteria of Classification	a) Position of microorganisms in living world		1	Chalk and Talk
	b) Principles of binomial nomenclature. Woese's three kingdom classification		2	PPT
	c) Whittaker's five kingdom concept		2	Lecture
	d) Criteria used for classification, taxonomic groups, species concept.		2	Chalk and Talk
	e) Criteria used for classification of bacteria, fungi, algae and viruses.		2	Chalk and Talk
II Taxonomy of Bacteria	a) Bacterial nomenclature and taxonomy- Methods of Classification: intuitive methods, numerical taxonomy, genetic approach.		2	Chalk and Talk
	b) Introduction to Bergey's system of classification. Economic importance of bacteria.		3	PPT
	c) General characteristics, morphology, ultra structure and reproduction of *Staphylococcus aureus*		2	Demonstration
	d) General characteristics, morphology, ultra structure and reproduction of *Escherchia coli*.		2	Discussion
III Taxonomy of Fungi	a) General criteria for classification of fungi by Alexopoulos and Mims and their economic importance.		3	Chalk and Talk
	b) General characteristics, morphology, ultra structure and reproduction of *Aspergillus niger*		3	Chalk and talk, Discussion
	c) General characteristics, morphology, ultra structure and reproduction of *Candida*.		3	PPT
IV Taxonomy of Algae	a) Classification of algae by Bloom and their economic importance		2	PPT
	b) Classification of algae by Fritsch and their economic importance		2	Chalk and Talk
	c) General characteristics, morphology, ultra structure and reproduction of algae – *Spirogyra*		2	PPT
	d) General characteristics, morphology, ultra structure and reproduction of algae –*Anabaena*		3	PPT
V Taxonomy of Viruses	a) Principles of Virus taxonomy, characteristics used in nomenclature & classification of animal, plant viruses and bacteriophage		3	PPT
	b) Influenza virus		3	PPT Discussion
	c) TMV and M13 viruses.		2	PPT Discussion
	d) Virions and Prions		1	PPT Discussion
Total			**45 Hours**	

Learning Outcome Based Education & Assessment (LOBE)

Blue Print

Articulation Mapping – K Levels with Courses Learning Outcomes (CLOs)

S. No.	CLOs	K-Level	Section A		Section B		Section C (Either / or Choice)	Section D (Open Choice)
			MCQs		Short Answers			
			No. of Questions	K-Level	No. of Questions	K-Level		
1.	CLO 1	Up to K 2	2	K1 & K2	1	K1	2 (K1&K1)	1(K2)
2.	CLO 2	Up to K 3	2	K1 & K2	1	K1	2 (K2&K2)	1(K3)
3.	CLO 3	Up to K 2	2	K1 & K2	1	K2	2 (K2&K2)	1(K2)
4.	CLO 4	Up to K 3	2	K1 & K2	1	K2	2 (K3&K3)	1(K3)
5.	CLO 5	Up to K 4	2	K1 & K2	1	K2	2 (K4&K4)	1(K4)
No. of Questions to be asked			10		5		10	5
No. of Questions to be answered			10		5		5	3
Marks for each Question			1		2		5	10
Total Marks for each Section			10		10		25	30

K1 –Remembering and recalling facts with specific answers

K2 – Basic understanding of facts and stating main ideas with general answers

K3 – Application oriented – Solving Problems

K4 – Examining, analyzing, presentation and make interferences with evidences

Distribution of Section-wise Marks with K Levels

K Levels	Section A (No Choice)	Section B (No Choice)	Section C (Either/or)	Section D (Open Choice)	Total Marks	% of Marks without choice	Consolidated
K1	5	4	10	-	**19**	15.83	**58%**
K2	5	6	20	20	**51**	42.5	
K3	-	-	10	20	**30**	25	**25%**
K4	-	-	10	10	**20**	16.67	**17%**
Total Marks	10	10	50	50	**120**	100.00	**100%**

Course designers:

1. **Dr. A.P. Asha Kannan**