Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-5 (B.Sc.)

Subject: Mycology & Virology- BSCMB15317

Type of course: Major

Prerequisite: Basic knowledge of Cellular structure of fungi and viruses, their classification

Rationale: This course equips students with knowledge of fungi and viruses, critical for diagnosing and treating infections. It prepares students for careers in microbiology, medicine, and public health, focusing on disease mechanisms and emerging pathogens.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				SEE		CCE			
CI	T	P	C	Theory	Practical	MSE	LWA/V	ALA	
3	0	2	4	75	25	30	20	50	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voice; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities

3 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory
1 Credits * 25 Marks = 25 Marks (each credit carries 25 Marks) Practical
SEE 100 Marks will be converted in to 50 Marks
CCE 100 Marks will be converted in to 50 Marks
It is compulsory to pass in each individual component.

GYANMANJARI INNOVATIVE UNIVERSITY BHAVNAGAR

Course Content:

Unit No	Course content	Hrs	% Weightage
1	**Chapter-1: Introduction to Fungi** • Importance of fungi: Primary and secondary metabolites of fungi and its importance. • General characteristics: Somatic structure, ultra-structure of fungal cell, hyphal modification. • Reproduction of fungi: Asexual and sexual reproduction • Physiology of fungi • Cultivation of fungi: Cultivation media and methods, slide culture technique, prevention of bacterial contamination, Preservation of fungi.	10	25
2	**Chapter-2: Fungi: Classification, Diversity, and Symbiotic Associations** • Fungal classification: Criteria used for classification. • Brief outline of different classes of fungi: Structure, habitat, reproduction/life cycle and economic importance: • Oomycetes • Zygomycetes • Ascomycetes, • Basidiomycetes • Fungi and their association with other organisms: Lichens, Mycorrhizas, Fungi With nematodes, Fungi With insects	10	25
3	**Chapter-3: Introduction to Virology** • General characteristics and structural organization of virus • Virus reproduction: Lytic and lysogenic cycle • Cultivation of viruses: Animal cultivation Cultivation in embryonated eggs, in vitro culture: Cell Lines, primary and secondary cell lines, continuous cell lines, cytopathic effects, Cultivation of bacteriophages. • Virus assay: Hemagglutination assay, plaque assay, Dose response curve • Baltimore classification of viruses. • Sub-viral entities: Viroids, virusoids, prions, latent, slow viruses.	15	25

4	**Chapter-4: Viruses of Bacteria, Plants, and Human** • Viruses of Bacteria: Virulent Double standed DNA phages: One step growth curve experiment, burst size, Phage adsorption and penetration, Synthesis of Phage Nucleic Acids and Proteins, early and late events, Assembly of Phage Particles, Release of Phage Particles. • Viruses of Plants: Introduction and replication of TMV • Viruses of Human: Overview on: Influenza, structure, pathogenesis and concept of antigenic shift and antigenic drift.	10	25

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Fungal Disease Case Study** Faculty will Assign fungal disease that affects plants (in group of 5 students). Students will observe the symptoms of plants in actual field photograph and upload it to GMIU web portal.	10
2	**Life Cycle chart Preparation** Faculty will assign a class of fungi, student need to prepare a diagram on the life cycle of that class and upload it to GMIU web Portal.	10
3	**Evaluation of Viral count** Faculty will provide hypothetical viral count data from a plaque assay (e.g., a table showing different concentrations of viruses). Student need to evaluate the virus count based on the data and upload the evaluation report on to the GMIU web Portal.	10
4	**Virus Caricature Crafting** Student need to Craft structural model on virus given by faculty (in group of 5 students) and upload the photo on to the GMIU web Portal.	10
5	**Attendance**	10
Total		**50**

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	20%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Gain a comprehensive understanding of fungi, focusing on their metabolites used in medicine, food, and agriculture, as well as their cell structure, hyphal modifications, and reproduction.
CO2	Classify the diversity of fungal classes, and their symbiotic relationships with other organisms.
CO3	Characterize the structure and reproduction cycles of viruses, including techniques for cultivation, purification, assays, and exploration of sub-viral entities.
CO4	Assess virus-host interactions and the mechanisms involved in viral infection processes.

List of Practical:

Sr. No	Descriptions	Unit No	Hrs
1.	To Study the Asexual and Sexual Reproduction in Fungi.	1	2
2.	To isolate the fungi by slide culture technique.	2	2
3.	To Isolate and identify Fungi from Environmental Samples such as soil, air, water and food.	1	2
4.	To isolate the plant pathogenic fungi from infected plants.	2	3
5.	To Demonstrate the Role of Fungi in plant Infections.	2	2
6.	Isolation and characterization of plant endophytic fungi.	1	3

7.	To investigate the synergistic effect of fungal isolates when cultured together.	2	6
8.	To determine the presence and concentration of bacteriophages using the plaque assay method.	3	6
9.	To Demonstrate the Role of viruses in plant Infections.	4	2
10.	To study viral replication cycle: lytic and lysogenic cycle.	3	2
Total			**30**

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] Alexopoulos, C. J., Mims, C. W., & Blackwell, M. (1996). *Introductory mycology* (4th ed.). Wiley.
[2] O'Donnell, K. (2013). *Fungi: Biology and applications*. Wiley-Blackwell.
[3] Webster, J., & Weber, R. (2007). *The fungi: Biology and taxonomy* (3rd ed.). Academic Press.
[4] Dube, H. C. (2012). *Fundamentals of mycology* (1st ed.). Cambridge University Press.
[5] Flatt, S. J., Desrosiers, M. F., & Howley, P. M. (Eds.). (2013). *Principles of virology* (2nd ed.). ASM Press.
[6] Knipe, D. M., & Howley, P. M. (Eds.). (2013). *Virology: Molecular biology and pathogenesis*. Lippincott Williams & Wilkins.
[7] Murray, P. R., Rosenthal, K. S., & Pfaller, M. A. (2015). *Medical microbiology* (8th ed.). Elsevier.
[8] Knipe, D. M., & Howley, P. M. (Eds.). (2016). *Fields virology* (6th ed.). Lippincott Williams & Wilkins.