SOPHIA COLLEGE FOR WOMEN (EMPOWERED AUTONOMOUS)

Affiliated to the University of Mumbai

Programme: Science

Microbiology

S.Y.B.Sc. MICROBIOLOGY (Major)

Syllabus for the Academic Year 2025-2026 based on the National Education Policy 2020

SOPHIA COLLEGE FOR WOMEN (EMPOWERED AUTONOMOUS)

DEPARTMENT OF MICROBIOLOGY

COURSE DETAILS FOR MAJOR:

	SEMESTER 3			SEMESTER 4	
TITLE	Major 3 Environmental Microbiology	Major 4 Basics of Biochemistry and Genetics		Major 5 Industrial, Dairy and Food Microbiology	Major 6 Epidemiology, Immunology and Diagnostic Microbiology
TYPE OF COURSE	Major	Major		Major	Major
CREDITS	4	4		4	4

Preamble:

The department of Microbiology at Sophia College was founded in 1966. Microbiology is the study of life and tentative life forms that cannot be viewed by the unaided eye. The microscopic life encompasses bacteria, protozoa, algae, fungi, and viruses. These organisms impact many aspects of plant, animal and human life and progress.

The Undergraduate curriculum provides fundamental and applied aspects of Microbial life that impacts the rest of the biosphere.

The instructions methodology focuses on providing the fundamental basic information on Microbiology and progressing to the advances. Furthermore, there is emphasis on developing critical and analytical thinking and reasoning skills through problem solving in keeping with the changing times. The courses provide training in Genetics, Biochemistry, Medical Microbiology, Immunology, Bioprocess technology, Food Science and Environmental Science. This interdisciplinary approach helps learners meet the requirements of higher education, research and industry.

PROGRAMME OBJECTIVES

PO1	To introduce the learners to Basic and Applied Microbiology.
PO2	To build a strong knowledge base in the learner as well as impart sound practical skills in the subject.
PO3	To provide opportunities for logical thinking, and critical reasoning, such that the learners can handle the demands of higher education, industry and research.
PO4	To impart soft skills in learners thereby enhancing employability.

PROGRAMME SPECIFIC OUTCOMES

PSO1	The learners will gain and apply knowledge of Genetics, Virology, Microbial Biochemistry, Medical Microbiology, Immunology, Cell Biology, Bioprocess technology, Environmental Microbiology, Food and Dairy Microbiology, etc to solve problems.
PSO2	The learners will acquire basic knowledge about scientific methodology, plan and execute experiments using good laboratory practices, and interpret the experimental results effectively.
PSO3	The students will undertake research projects, internships, visit industries, in order to become ready for higher studies, industry and research.
PSO4	The students will do value added courses in order to enhance their soft skills and employability.

Programme: SCIENCES **Microbiology Major 3**	**Semester –3**
Course Title: Environmental Microbiology	**Course Code:** SMCB233MJ

COURSE OBJECTIVES:

It aims to

1. provide students with the knowledge of pathogenic microorganisms and their products in air, launching of bioaerosols, their spread and deposition on surfaces, and promote an understanding of the various methods of studying soil microorganisms.
2. facilitate understanding of various types of microorganisms present in water, techniques for assessing water quality, and strategies for purifying drinking water, familiarize students with the complex interactions between plants and soil microorganisms in the rhizosphere.
3. provide students with the knowledge of the various methods for studying soil microorganisms, encompassing microscopic, cultural, physiological, immunological, and nucleic acid-based techniques.
4. facilitate students' understanding of the critical roles microorganisms play in environmental systems, emphasizing their functional diversity and involvement in key processes such as wastewater treatment and ecological balance.

COURSE OUTCOMES:

At the end of the course, the learner will be able to

1. comprehend the details regarding airborne pathogenic microorganisms, their airborne transmission routes, including entry, spread, and deposition mechanisms on surfaces.
2. apply knowledge of diverse methodologies for analysing soil microorganisms including microscopic, cultural, physiological, immunological, and nucleic acid-based approaches.
3. analyze the types of microorganisms present in water sources and evaluate methods for assessing water quality, propose appropriate purification techniques for the treatment of drinking water based on an understanding of microbial contaminants and their removal.
4. explain the processes for treatment of wastewater, interpret the intricate interactions between plants and soil microorganisms within the rhizosphere, elucidating their roles in nutrient cycling,

plant growth promotion, and disease suppression and explain the concept of ecosystem services and the role played by microorganisms in maintaining ecosystem balance.			
Theory Lectures per week (1 Lecture is 60 minutes)		**2**	
Total number of Hours in a Semester		**30**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**1 hr**	**30 marks**
	Continuous Assessment	**-**	**20 marks**

UNIT 1 Air and Soil Microbiology (1 Credit)	1.1	Air Microbiology a. Number and kinds of organisms in the air; droplet nuclei - aerosol, some important airborne pathogens and toxins b. Aeromicrobiological pathway c. Methods to study airborne microorganisms d. Air sanitation e. Clean rooms and clean room standards	15 hours
	1.2	Soil Microbiology a. Terrestrial environments, types of organisms and their activities b. Carbon, Nitrogen and Sulfur cycles. c. Plant-microbial interactions in rhizosphere- root nodulation, mycorrhiza and soil microorganisms as biocontrol agents d. Methods to study soil microorganisms- microscopic, cultural, physiological, immunological and nucleic acid-based methods	
UNIT 2 Fresh and Wastewater	2.1	Freshwater Microbiology a. Niches and Microenvironment, freshwater habitats and microorganisms, oxygen relationships in freshwater environments	15 hours

Microbiology (1 Credit)		b. Biological indicators of water pollution, bacteriological assessment of water quality and water borne diseases. c. Purification of drinking water	
	2.2	Wastewater Microbiology a. Types of wastewater b. Sewage treatment i. Primary, Secondary and Tertiary treatment ii. BOD, COD and TOC iii. Oxidation ponds and Septic tanks iv. Disposal of treated effluent and sludge	

Programme: SCIENCES **Microbiology Major 3 Practical**	**Semester –3**
Course Title: Environmental Microbiology Practical	**Course Code:** SMCB233MJP

COURSE OUTCOMES:

The learner will be able to

1. carry out microbial analysis of air of various environments like laboratories, media preparation rooms, classrooms etc study the variation in the number and types of microbial flora and calculate the gravity sedimentation rate.
2. use the liquid impinger (air sampler) to collect the air sample of a laboratory or any other room and determine the count of the bacteria and yeast present in the same.
3. determine the efficacy of air sterilants and surgical/facial masks
4. study and analyze different microbial groups present in the soil (bacteria, fungi and actinomycetes)
5. use appropriate media, for example, McBeth medium and Congo red-cellulose agar for cellulose degraders, Starkey's medium for sulfate reducers, and mineral medium for nitrifiers for the enrichment of these groups in order to study their morphological and metabolic activities.
6. prepare Winogradsky's column in order to study microbiological diversity in specific environments like soil and water.
7. study microorganisms in soil by a physiological method called soil respiration.
8. collect drinking water samples, perform presumptive, confirmed and completed tests and examine and interpret whether the samples are fecally contaminated or not.
9. determine the BOD and COD of waste waters and analyze the results.

Lectures per week (1 Lecture is 120 minutes)		**2**	
Total number of Hours in a Semester		**60**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**3 hrs**	**50 marks**
	Continuous Assessment	**-**	**-**

	1	Determination of air quality by gravity sedimentation method.	60 hours
	2	Enumeration of microorganisms in air by liquid impingement.	
	3	Study of efficacy of air sterilants	
	4	Efficacy of facial masks	
	5	Study of soil microflora- bacteria, fungi and Actinomycetes	
	6	Enrichment and isolation of cellulose degraders	
	7	Enrichment and isolation of Nitrosifiers and Nitrifiers.	
	8	Enrichment and isolation of sulphate reducers.	
	9	Setting of Winogradsky's column and microbial analysis.	
	10	Soil respiration method	
	11	Microbiological analysis of drinking water.	
	12	Determination of BOD.	
	13	Determination of COD	

Programme: SCIENCES **Microbiology Major 4**	**Semester – 3**
Course Title: Basics of Biochemistry and Genetics	**Course Code:** SMCB234MJ

COURSE OBJECTIVES:

It aims to

1. classify and describe the structure, and function of various biomolecules
2. describe the prokaryotic and eukaryotic chromosomes, and their packaging
3. describe the molecular details of gene expression i.e transcription and translation and genetic code

COURSE OUTCOMES:

At the end of the course, learner will be able to

1. explain, and describe various types of biomolecules and recall their significance.
2. explain the supercoiling in bacteria and nucleosome packaging in eukaryotes
3. explain the DNA transcription, translation and genetic code, and compare and contrast gene expression in bacteria and eukaryotes
4. apply the fundamentals of gene expression (transcription, translation) in understanding concepts in the fields of molecular biology, regulation of gene expression and virology in subsequent semesters

Theory Lectures per week (1 Lecture is 60 minutes)		**2**	
Total number of Hours in a Semester		**30**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**1 hr**	**30 marks**
	Continuous Assessment	**-**	**20 marks**

UNIT 1	1.1	Biomolecules	15 hours

Biomolecules and Basic Genetics (1 Credit)		a. Carbohydrates: Monosaccharides, Glycosidic bond, Disaccharides, Polysaccharides, sugar derivatives (Glycoproteins, Peptidoglycan, LPS) b. Proteins: Amino acids- structure, classification, Peptide bond formation, Different level of structural organization of proteins (primary, secondary, tertiary and quaternary) c. Lipids: Fatty acid nomenclature, Acyl linkage, Classification of lipids, Storage and structural lipids. d. Nucleic acids: Purines and Pyrimidines, nucleosides and nucleotides, DNA- significance of phosphodiester linkage and hydrogen bond, Chargaff's rules, X-ray Diffraction studies and Rosalind Franklin's work, Structure of DNA (Watson and Crick model), Forms of DNA (A, B and Z), Properties of DNA - Absorption of UV light, Sedimentation behavior and Denaturation-Renaturation, RNA - Structure and types.	
	1.2	Basic Genetics Chromosomes a. Prokaryotic chromosomes, Supercoiling- negative and positive supercoiling and topoisomerases. a. Eukaryotic chromosomes- structure of chromatin, histones and nonhistones, nucleosome and nucleosome packaging, centromere, telomere and its sequences	
UNIT 2 Gene expression and the Genetic Code (1 Credit)	2.1	Gene expression a. Central dogma - Overview b. Transcription- Introduction c. Transcription in bacteria - Initiation (promoter, consensus sequence, structure and function of RNA polymerase enzyme - holoenzyme and core enzyme, sigma factor), elongation, termination - Rho-dependent and Rho-independent termination mechanisms	15 hours

		d. Transcription in Eukaryotes - Eukaryotic RNA polymerases, promoters, production of mature mRNA in eukaryotes (processing) - 5' and 3' modifications, splicing (briefly) comparison of transcription in prokaryotes and eukaryotes. e. Translation - Initiation, elongation and termination of translation	
	2.2	The Genetic code a. Deciphering the Genetic code b. Characteristics of the genetic code c. Exceptions to the Genetic code	

Programme: SCIENCES **Microbiology Major 4 Practical**		**Semester –3**	
Course Title: Basics of Biochemistry and Genetics Practical		**Course Code:** SMCB234MJP	
COURSE OUTCOMES: The learner will be able to 1. apply the qualitative tests to detect the presence of biomolecules in various samples 2. determine the concentration of reducing sugars, proteins, DNA and RNA using colorimetric methods like DNSA, Biuret, Diphenylamine and Orcinol methods respectively 3. develop skills to use a UV-visible spectrophotometer 4. extract DNA from onions and check its purity using Uv-visible spectrophotometer. 5. search and review literature to write an assignment on discovery of the genetic material.			
Lectures per week (1 Lecture is 120 minutes)		**2**	
Total number of Hours in a Semester		**60**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**3 hrs**	**50 marks**

	Continuous Assessment	-	-

	1	Qualitative detection of carbohydrates by Molisch test and Benedict test	60 hours
	2	Qualitative detection of amino acids by Ninhydrin test	
	3	Qualitative detection of proteins by Biuret test	
	4	Qualitative detection of DNA by Diphenylamine test	
	5	Qualitative detection of RNA by Orcinol test	
	6	Colorimetry- Determination of lambda max and verification of Beer-Lambert's law	
	7	Estimation of reducing sugars by DNSA method	
	8	Estimation of proteins by Biuret method.	
	9	Estimation of DNA by Diphenylamine method.	
	10	Estimation of RNA by Orcinol method.	
	11	UV-visible spectrophotometry	
	12	Isolation of genomic DNA from onion and its confirmation using UV-visible spectrophotometer.	
	13	Assignment on Search for the Genetic material- Griffith's transformation experiment, Avery's transformation experiment and Hershey and Chase's Bacteriophage experiment. Questions will be asked on this during viva.	

ASSESSMENT DETAILS:

- Continuous Assessment (CA): Any one activity / assignment / test of 20 marks
- Summative Assessment (SA): Theory exam of 30 marks – One hour duration
- Practical exam of 50 marks – Three hours duration

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Programme: SCIENCES **Microbiology Major 5**	**Semester –4**
Course Title: Industrial, Dairy and Food Microbiology	**Course Code:** SMCB245MJ

COURSE OBJECTIVES:

It aims to

1. provide an overview of the industrial microbiology, understand the types of screening
2. describe the classical design of a fermenter and its various components
3. understand the role of each of the media components and the process of inoculum preparation
4. describe and discuss the different types of fermentations and processes
5. understand the biotechnological importance of microorganisms for production of food, milk and dairy products
6. know about the microbial spoilage of, milk and dairy products
7. learn about the methods used for microbiological analysis of food, milk and dairy products and prevention of microbial spoilage of food, milk and dairy products

COURSE OUTCOMES:

At the end of the course, learner will be able to

1. outline the process of industrial microbiology, classify primary and secondary screening methods, explain the design of a fermenter and identify the functions of its parts
2. explain the significance of each of the media components of a fermentation, distinguish between different types of fermentations and apply this knowledge in understanding other concepts of bioprocess technology in future semesters
3. explain the importance of microorganisms in the production of dairy products and describe the methods used to prevent the spoilage of food, milk and milk products
4. select appropriate methods for microbiological analysis of food, milk and milk products.

Theory Lectures per week (1 Lecture is 60 minutes)		**2**	
Total number of Hours in a Semester		**30**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**1 hr**	**30 marks**

	Continuous Assessment	**-**	**20 marks**

UNIT 1 Industrial Microbiology (1 Credit)	1.1	Overview a. of an industrial process (upstream and downstream processing) b. Industrially important microbial products along with the associated microorganisms	15 hours
	1.2	Screening a. Desirable characteristics of industrial strain b. Principles and methods of primary and secondary screening	
	1.3	Fermenter design Basic parts of a mechanically agitated fermenter/ classic design	
	1.4	Media for industrial fermentations a. Introduction b. Media components: - Carbon source, nitrogen source, amino acids and vitamins, minerals, water, buffers, antifoam agents, precursors, inhibitors and inducers	
	1.5	Types of fermentations a. Submerged b. Aerobic c. Anaerobic d. Solid state fermentations e. Surface fermentations	
	1.6	Types of fermentation processes (mode of operation) a. Batch b. Continuous c. Fed-batch fermentation process	
UNIT 2 Dairy & Food Microbiology (1 Credit)	2.1	Milk Definition, Sources of contamination of milk, human pathogens associated with milk, effects of microbial contamination on milk quality and Control of microorganisms in milk, Pasteurization of milk-LTLT, HTST and UHT	15 hours
	2.2	(i) Production of a. Butter	

		b. Cheese- Types of cheese, production of Cheddar and Cottage cheese c. Yogurt- Types, production of plain yogurt (ii) Assessment of quality of milk (Overview) a. Rapid platform test and organoleptic tests b. Microbiological analysis of milk.:- SPC, Coliform count, Laboratory Pasteurisation Count, Psychrophiles and Thermophilic count.	
	2.3	Microbial growth and spoilage in foods a. Intrinsic and extrinsic factors influencing growth of microorganisms in food. b. Overview of the spoilage of food	
	2.4	General principles of food preservation (principle of each method and process used with example of foods) a. High temperature b. Low temperature c. Drying d. Radiations e. Food additives and preservatives (salt, sugar and organic acids only)	
	2.5	(i) Food Safety a. Introduction to principles of HACCP b. Food borne diseases and intoxications (differences) (ii) Methods of detection of microorganisms in food: a. Sampling of food and homogenisation methods b. Overview of Cultural methods, Microscopic methods, Physical methods, Chemical methods, Bioassay methods	

SOPHIA COLLEGE FOR WOMEN (EMPOWERED AUTONOMOUS)

Programme: SCIENCES **Microbiology Major 5 Practical**	**Semester–4**
Course Title: Industrial, Dairy and Food Microbiology Practical	**Course Code:** SMCB245MJP

COURSE OUTCOMES:

The learner will be able to

1. screen soil samples for microorganisms capable of producing antibiotics using Crowded plate and Wilkins agar methods and determine the antibacterial spectrum.
2. enrich, cultivate and detect amino acid producers from soil samples
3. perform MBRT, RRT, DMC, microbiological analysis of raw and pasteurized milk and examine the quality of the samples
4. correlate the concepts learnt during the lectures with the industrial visit
5. use starch agar, Gorodkowa's agar, and milk agar for isolation and detection of amylolytic, lipolytic, and proteolytic food spoilage causing microorganisms respectively.
6. determine the MIC of salt and sugar for microorganisms and apply the results obtained for preservation of food.

Lectures per week (1 Lecture is 120 minutes)		**2**	
Total number of Hours in a Semester		**60**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**3 hrs**	**50**
	Continuous Assessment	**-**	

	1	Isolation of antibiotic producers from soil using Crowded plate technique and Wilkins overlay method.	60 hours
	2	Determination of antibacterial spectrum by a. Agar strip method b. Agar streak method	
	3	Enrichment, isolation and detection of amino acid producers from soil	
	4	Rapid platform tests for determining the quality of raw and pasteurized milk samples:	

		a. Methylene blue dye reduction test. b. Resazurin reduction test. c. Direct microscopic count.	
	5	Microbiological analysis of raw and pasteurized milk	
	6	Visit to any industry/Gowardhan Dairy.	
	7	Isolation and study of food spoilage causing microorganisms - amylolytic, lipolytic, and proteolytic	
	8	Determination of minimum inhibitory concentration of salt	
	9	Determination of minimum inhibitory concentration of sugar (for yeast)	
	10	Assignment on Methods of detecting microorganisms in food	

Programme: SCIENCES **Microbiology Major 6**	**Semester –4**
Course Title: Epidemiology, Immunology and Diagnostic Microbiology	**Course Code:** SMCB246MJ

COURSE OBJECTIVES:

It aims to

1. outline the basics of medical microbiology, and distinguish between infection and a disease,
2. explain the role of normal flora in a human host and recognize the relationship between the normal microbiota and the host
3. summarize etiology of infectious diseases and Koch's postulates, classify the terms associated with infectious diseases, different stages of the disease and discuss the extent of the involvement of the host.
4. discuss the terms associated with epidemiology and significance of public health surveillance
5. describe the spread of an infection and categorize different types of reservoirs and modes of transmission
6. recognize the importance of public health measures in control and eradication of diseases and emerging and reemerging infections.
7. categorize different biosafety levels and recognize the importance of biosafety in microbiology.

8. discuss basic immunology, and illustrate the functioning and importance of the innate immune system, including the anatomical and physiological barriers, mechanisms of phagocytosis, and the inflammatory response.
9. outline the process of hematopoiesis, and categorize the different types of the immune cells and understand their role.
10. identify pathogens from various clinical specimens and apply the laboratory methods for the identification and characterization of microorganisms.

COURSE OUTCOMES:

At the end of the course, learner will be able to

1. describe the fundamentals of medical microbiology, explain the significance of normal flora and their relationship with the host, describe how diseases spread, categorize the various types of reservoirs and modes of transmission, outline the principles of epidemiology, recall the importance of public health surveillance and herd immunity, identify public health measures employed to control and eradicate diseases, emerging and re-emerging infectious diseases, and analyze real-world case studies of epidemics and pandemics.
2. describe the basics of immunology, how the innate immune system functions, identify the function of various immune cells and explain and classify different growth-dependent, rapid, molecular and serological methods for identification of pathogens.

Theory Lectures per week (1 Lecture is 60 minutes)		**2**	
Total number of Hours in a Semester		**30**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**1 hr**	**30 marks**
	Continuous Assessment	**-**	**20 marks**

UNIT 1 Principles of Disease and	1.1	Principles of Disease a. Pathology, Infection and Disease	15 hours

Epidemiology (1 Credit)		b. Normal flora, Relationships between the normal microbiota and the host, Opportunistic microorganisms c. The Etiology of Infectious Diseases- Koch's postulates, Exceptions to Koch's postulates d. Classifying Infectious diseases i. Terms- Symptoms, signs, syndrome, communicable disease, contagious disease, non-communicable disease. ii. Severity or duration of a disease - acute disease, chronic disease, subacute disease, and latency iii. Extent of Host Involvement- Local infection, systemic infection, focal infection, Sepsis, Septicemia, bacteremia, Toxemia, viremia, primary infection, secondary infection e. Patterns of disease- predisposing factors, development of a disease f. The spread of infection: i. Reservoirs of infection- Human reservoirs, Animal reservoirs, and Non-living reservoirs ii. Transmission of disease- Contact transmission, Vehicle transmission, and Vectors g. Nosocomial Infections - Briefly	
	1.2	Epidemiology a. Epidemiological Terminology: Epidemiology, sporadic disease, endemic disease, hyper endemic disease, outbreak, epidemic disease, index case, pandemic disease b. Public Health Surveillance; Remote sensing and Geographic information system c. Measuring infectious disease frequency- Prevalence rate, Morbidity rate and Mortality rate d. Types of epidemics- Common source and propagated epidemics, Herd immunity and R_0	

		e. Public health measures- Controls directed against Common vehicles and major reservoirs, Immunization, Isolation, Quarantine and Surveillance, Pathogen eradication (Smallpox) f. Emerging and Re-emerging Infectious Diseases: a. Factors favoring its development	
	1.3	Biosafety - Biosafety levels of pathogens with examples and care needed to handle them, Biosafety cabinets	
UNIT 2 Immunology & Diagnostic Microbiology (1 Credit)	2.1	Basics of Immunology a. Innate Immune System - Anatomic barrier, Physiological barrier, Phagocytosis, Inflammatory Response b. Hematopoiesis c. Cells of the Immune system. i. Leukocytes: Neutrophils, Macrophages, Dendritic Cells ii. Lymphocytes: T Cells, B Cells, Natural Killer Cells.	15 hours
	2.2	Diagnostic Microbiology a. Overview of the Clinical Microbiology Laboratory. b. Identification of microorganisms from specimens: i. Microscopy ii. Growth-Dependent Identification Methods c. Rapid Methods of Identification: i. Mechanized/ automated systems ii. Manual biochemical systems iii. Immunological systems d. Bacteriophage Typing e. Molecular Methods and Analysis of Metabolic Products: i. Nucleic Acid –Based Detection Methods ii. Sanger Sequencing	

		iii. Next-Generation Sequencing (NGS) iv. Gas liquid Chromatography f. Serology i. Precipitation reaction - Single radial immunodiffusion ii. Agglutination iii. Enzyme immunoassays- ELISA (Indirect, Sandwich) iv. Western blot technique	

Programme: SCIENCES **Microbiology Major 6 Practical**		**Semester–4**	
Course Title: Epidemiology, Immunology and Diagnostic Microbiology Practical		**Course Code:** SMCB246MJP	
COURSE OUTCOMES: The learner will be able to 1. study the normal flora and recognize its importance 2. develop skills to use the biosafety cabinet 3. use MacConkey's agar, Salmonella Shigella agar, XLD agar, Salt Mannitol agar, and CLED agar in order to selectively isolate a group of microorganisms. 4. perform the Indole test, Methyl Red test, Voges Proskauer test, Citrate utilization test, sugar fermentation test, lysine decarboxylase test, H_2S detection test, TSI agar, Phenylalanine deaminase test, Urease test, nitrate reduction test, catalase test and oxidase test in order to identify a microorganism. 5. apply the selective media and biochemical tests in subsequent semesters to identify pathogens from clinical and natural samples			
Lectures per week (1 Lecture is 120 minutes)		**2**	
Total number of Hours in a Semester		**60**	
Credits		**2**	
Evaluation System	**Summative Assessment**	**3 hrs**	**50**

	Continuous Assessment	-	-

	1	Study of Normal flora	60 hours
	2	To learn the use of a biosafety cabinet.	
	3	Use of selective and Differential Solid Media: a. MacConkey's agar b. Salmonella Shigella agar c. Xylose Lysine Deoxycholate agar d. Salt Mannitol agar e. Cystine Lactose Electrolyte Deficient agar	
	4	Use of Biochemical media/tests for identification of pathogens: a. Indole test b. Methyl red test c. Voges Proskauer test d. Citrate utilization test e. Carbohydrate/Sugar fermentation f. Lysine decarboxylase test g. TSI agar h. H_2S detection test i. Phenylalanine deaminase test j. Urease test k. Nitrate reduction test l. Oxidase test m. Catalase test	

ASSESSMENT DETAILS:

1. Continuous Assessment (CA): Any one activity / assignment / test of 20 marks
2. Summative Assessment (SA): Theory exam of 30 marks – One hour duration
3. Practical exam of 50 marks – Three hours duration

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