Department of Liberal Education
Era University, Lucknow
Course Outline
Effective From: 2023-24

Name of the Program	**B.A. / B.Sc. (LIBERAL EDUCATION)**			**Year/ Semester:**	**3rd Year/5th semester**
Course Name	Fundamental Microbiology	**Course Code:**	**BCH306**	**Type:**	**Theory**
Credits	**04**			**Total Sessions Hours:**	**60 Hours**
Evaluation Spread	**Internal Continuous Assesment:**	**50 Marks**		**End Term Exam:**	**50 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	.biochemistry is incomplete without the knowledge of micro-organisms, their role in food processing, in diseases and staying healthy. His course would provide in understanding the classification, nature of microorganisms and their role in human health.				
Course Outcomes(CO): *After the successful course completion,learners will develop following attributes:*					
Course Outcome (CO)	**Attributes**				
CO1	The students would learn about the various forms of microorganisms, their history on earth, stories about discovery and their classification.				
CO2	The students would understand the nutritional requirement and other factors that regulate microbial growth, ways to detect them, specially through staining. The students would get introduced to microorganisms living in extreme conditions and their importance.				
CO3	The students would get enlightened about pathogenicity of microorganisms, and ways to control their invasion into food and our body as well as their uses in various industries.				
CO4	Recombination in prokaryotes in harnessing them for making useful products is and important aspect of microbiology which the students would be informed about. The students would also get introduced to the nomenclature, classification, biochemical composition and pathogenicity of viruses.				
Pedagogy	Interactive, discussion-based, student-centered, presentation.				
Internal Evaluation Mode	Mid-term Examination: 20 Marks Activity: 10 Marks Class test: 05 Marks Online Test/Objective Test: 05 Marks Assignments/Presentation: 05 Marks Attendance: 05 Marks				

Session Details	Topic	Hours	Mapped CO
Unit 1	**History and scope of Microbiology:** • Various forms of microorganisms (bacteria, fungi, viruses, protozoa, PPLOs); • Spontaneous generation versus biogenesis • Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Alexander Fleming **Classification of microbiology** • Classical classification • Nutritional classification of microorganisms **Nature of the microbial cell surface** Gram positive and Gram negative bacteria **Activity:** Learning about microbiology laboratory requirements by a visit to the laboratory	13	CO1
Unit 2	**Microbial nutrition and growth:** • The definition of growth, mathematical expression of growth, growth curve, measurement of growth and growth yields, • synchronous growth, continuous culture, Diauxic growth, • culture collection and maintenance of cultures. **Stains and staining techniques:** • Principles of staining, • Types of stains – simple stains, structural stains and differential stain- Mechanism of gram staining, acid fast staining, negative staining, capsule staining, flagella staining, endospore staining. **Microbes in extreme environments and microbial interactions**: • Thermophiles, halophiles, alkalophiles, acidophiles; • symbiosis and antibiosis among microbial population, • nitrogen fixing microbes in agriculture and forestry **Activity:** Staining of microbial slides and observing under microscope	17	CO1, CO2
Unit 3	**Recombination in Prokaryotes:** Conjugation, Transformation and Transduction, **Brief outline of virology:** • Discovery of virus, early development of virology nomenclature • Classification and taxonomy of viruses – based on host, nucleic acids and structure • Bacteriophage: Lytic and lysogenic cycle. • Antimicrobial Chemotherapy: General Characteristics of antimicrobial drugs	15	CO3

	Determining the level of microbial activity • Dilution susceptibility test and disc diffusion test • Range of activity and mechanism of action of penicillin, vancomycin and tetracycline. **Activity:** Collection of articles from various sources about viral outbreaks in history and its scientific analyses about causes, spreading , precautions, treatment and possible preventions in future and its presentation through PPTs		
Unit 4	**Control of Microorganisms** • Physical agents: Autoclave, Hot air oven, Laminar airflow and membrane filter. • Chemical agents: Alcohol, Halogens and Gaseous agents antibiotics, • Radiation Methods : UV rays **Pathogenicity of Microorganisms:** Introduction to pathogenic microbes: Bacteria, Viruses, Algae, protozoa and fungi **Microbial agents of disease:** General characteristics of common pathogenic microorganisms and major effect of the disease caused: • Bacterial (tuberculosis, gall, etc.), • Fungal (ring worm, candidiasis, dermatitis, etc.) • Protozoan (malaria, filarial, sleeping sickness, giardiasis. etc.) • Viral: Dengue, Polio, Japanese Encephalitis, CORONA, SARS, Hepatitis, HPV, HIV, AIDS etc & Zoontotic viruses **Industrial uses of microorganism:** • Agricultural • Dairy • Alcoholic beverage industr • Pharmaceuticals • Bakery and other food preservation **Activity:** Collection of water from various sources and study it for presence of microorganism	15	CO4

CO-PO and PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	2	2	2	1	2	2	2	3	2	1
CO2	3	2	2	2	2	2	3	1	3	2	3	2	2	2
CO3	3	2	2	2	2	3	2	2	3	2	2	2	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2	2		2

Strongcontribution-3, Averagecontribution-2, Lowcontribution-1

Suggested Readings:

Text-Books	1. Ananthanarayanan R and Panicker C K. Textbook of Microbiology. Orient Longman. Latest Edition.
Reference Books	1. Microbiology.Pelczar MJ,Chan ECS and Krieg NR, Tata McGraw-Hill Publication, Latest Edition

	2. Text book of Microbiology. Baveja, CP. Arya publications.Latest Edition. 3. Medical Microbiology Ken S.Rosenthal, Patrick R.Murray, and Michael A.Pfaller, Elsevier .7th Edition
Para Text	• https://www.futurelearn.com/courses/basic-concepts-in-microbiology-and-clinical-pharmacology-of-antimicrobials • Investigation Aims to Identify Unknown Microbes in Space: https://www.nasa.gov/mission_pages/station/research/news/genes_in_space3

Recapitulation & Examination Pattern

Component	**Marks**	**Pattern**
Mid Semester	20	**Section A:** Contains **10** MCQs/Fill in the blanks/One Word Answer/ True-False type of questions. Each question carries **0.5Marks.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 Marks**.
Activity	10	Will be decided by subject teacher
Class Test	05	Contains **05 descriptive questions.** Each question carries **01** Mark.
Online Test/ Objective Test	05	Contains **10 multiple choice questions.** Each question carries **0.5**Marks.
Assignment/ Presentation	05	Assignment to be made on topics and instruction given by subject teacher.
Attendance	05	As per policy.
Total Marks	**50**	

Course created by: Dr. Ghazala Zaidi

Signature:

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Signature: