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/6th Semester**
Course Name	Applied Biochemistry , Laboratory Instrumentation and Techniques	**Course Code:**	**BCH305**	**Type:**	**Theory**
Credits	**03**			**Total Sessions Hours:**	**45 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**40 Marks**		**End Term Exam:**	**35 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	The objectives of this course are to understand application of knowledge of biochemistry for diagnosis and cure of various human ailments and for other industrial uses. This course also allows the student to learn the basic techniques and method of various instruments used in biochemistry laboratory such as centrifugation, microscopy, spectroscopy for the biomolecules.				
Course Outcomes(CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	**Attributes**				
CO1	The students should be able to understand various laboratory equipments and understand its principle, uses and proper maintenance. The students would have enough knowledge about specimen collection.				
CO2	The students would learn about the principal and application of various teniques used in biomedical and bio technique lab.				
CO3	The students should be able to understand the need, principle, methodology of various biochemical and knowledge of basic microbiological tests used for diagnosis of various diseases and the instruments used for the detection.				
CO4	The students should be able to learn about theradioactivity and its uses forhealthcare, alongwith knowledge about industrial biochemistry, quality assurance and laws related to healthcare				
Pedagogy	Interactive, discussion-based, student-centered, presentation.				

Internal Evaluation Mode	Mid-term Examination: 20 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	**Applied biochemistry:** • Introduction to organization of clinical laboratory, • Introduction to instrumentation and automation in clinical biochemistry laboratories. • Safety regulations and Good Laboratory Practices **Principles of specimen collection**: • Types of specimen for biochemical analysis. • Concepts of precision, accuracy, quality control, precautions and limitations. Collection of blood and storage. • Introduction to principles and methodology of diagnostics of the most common diseases/disorders in different organ systems, with physiological and pharmaceutical correlations.	12	CO1, CO3
Unit 2	**Chromatography:** Chromatography, Paper Chromatography, TLC, Ion Exchange Chromatography, Affinity Chromatography, Adsorption Chromatography, Partition Chromatography, Gel filtration, HPLC **Electrophoresis:** Principle and application of SDS-PAGE and Agarose gel Electrophoresis **Microscopy:** Principle and application of Light microscopy, Bright & Dark Field microscopy, Fluorescence microscopy, Phase Contrast microscopy, TEM, SEM.	12	CO2
Unit 3	**Centrifugation:** • Principle and application of Centrifugation, • Relative Centrifugal Field, Deferential centrifugation • Density gradient centrifugation. • Types of Centrifuge- Desktop, High Speed and Ultracentrifuge (Analytical and Preparative) **Spectroscopic techniques:** • Principle and law of absorption, Colorimetry • Absorption and emission spectroscopy • UV-visible spectroscopy, infra-red absorption spectroscopy and X-ray crystallography. **Fundamental Microbiological Techniques:** • Fumigation, Preparation of Laminar flow • Preparation of agar plates, media, plating and culture. • Ovens and Incubators	13	CO3, CO4

Unit 4	**Radioactivity** • Types, their importance in biological studies • Measure of radioactivity • GM counters and Scintillation counting. **Introduction to Industrial Biochemistry:** • Concept of fermentation and other techniques in food industry, • drug industry, • sanitation products, • textile and leather industry • waste disposal management **Quality Assurance:** • Concept of Quality Assurance • The principles of drug analyses, toxicological analyses and addiction analyses **Laws and regulations within healthcare**	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	2	2	2	2	2	1	3	3	2	2	2	1
CO2	3	2	2	2	2	2	2	1	3	2	2	2	2	1
CO3	3	3	3	2	2	3	3	2	3	3	2	2	2	2
CO4	3	2	2	2	2	2	2	2	3	2	2	2	2	2

Strongcontribution-3, Averagecontribution-2, Lowcontribution-1,

Suggested Readings:

Text-Books	1. Lehninger Principles of Biochemistry, Nelson & Cox. Macmillan Learning Publisher. 7th Edition/ Latest edition. 2. Principles and Techniques of Biochemistry and Molecular Biology. Keith Wilson, Cambridge University Press. 8th edition
Reference Books	1. Bioinstrumentation by Webster, Wiley India. Latest Edition. 2. Instrumental Methods Of Analysis In Biotechnology by Dinesh Kumar Chatanta and Prahlad Singh Mehra, Wiley India. Latest Edition
Para Text	• Instrumentation and analytical techniques: https://youtu.be/N-nDCPSm3us

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**.
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	**40**	

Course created by: Dr. Ghazala Zaidi **Signature:**	**Approved by: Prof. Sudhir Mehrotra** **Signature:**