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 / 6th**
Course Name	**Biophysics & Instrumentation**	**Course Code:**	**MB307**	**Type:**	**Theory**
Credits	**04**			**Total Sessions Hours:**	**60 Hours**
Evaluation Spread	**Internal Continuous Assessment:**	**50 Marks**		**End Term Exam:**	**50 Marks**
Type of Course	○ Compulsory	◉ Core		○ Creative	○ Life Skill
Course Objectives	This module will help students to understand following; a. Types of Chromatography b. Electrophoresis c. Principle of centrifugation d. Sedimentation factors e. Different microscopy techniques f. X-ray diffraction g. Different spectroscopy techniques				
Course Outcomes (CO): *After the successful course completion, learners will develop following attributes:*					
Course Outcome (CO)	**Attributes**				
CO1	Upon completion the students will learn about basic techniques of separation and identification of materials.				
CO2	They will be able to learn about the principle and instrumentation of centrifugation& microscopy with its types.				
CO3	Students will understand the principles of X-ray crystallography along with the concept of different crystal structure.				
CO4	They will gain knowledge about the different spectroscopy techniques such as Raman spectroscopy, NMR spectroscopy & Absorption spectroscopy				
Pedagogy	Interactive, discussion-bases, 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	**Separation & Identification of Materials** • Concept of Chromatography (Partition Chromatography) • Paper Chromatography, Adsorption Chromatography			15	CO1

	• TLC, GLC, Ion Exchange Chromatography, Gel Chromatography, HPLC, Affinity Chromatography); • Electrophoresis (Gel Electrophoresis, Paper Electrophoresis) **Activity:** Demonstration of gel electrophoresis with its working and principle.		
Unit 2	**Centrifugation & Microscopy** • Basic Principle of Centrifugation, Instrumentation of Ultracentrifuge • Factors affecting Sedimentation velocity • Standard Sedimentation Coefficient • Sedimentation equilibrium Centrifugation • Light microscopy, Bright & Dark Field microscopy,Fluorescence microscopy • Phase Contrast microscopy, TEM and SEM **Activity:**Demonstration of Centrifugation and Light Microscopy	15	CO2
Unit 3	**X-Ray Crystallography** • X-ray diffraction • Bragg equation • Reciprocal lattice • Miller indices & Unit cell • Concept of different crystal structure, determination of crystal structure **Activity:** Class discussion on X-ray diffraction and determination of crystal structure.	15	CO3
Unit 4	**Spectroscopy** • Raman Spectroscopy • Quantum mechanical reason of Raman effect • Experimental technique of Raman effect • Basic concept of Pure Rotational & Vibrational • Raman spectra of simple molecule (linear molecule) • NMR Spectroscopy – Basic principle of NMR spectroscopy • Absorption Spectroscopy –Beer-Lambert law • Instrumentation for measuring the absorbance of visible light • Factors affecting the absorption properties of a Chromophore. **Activity:** Demonstration of Absorption Spectroscopy –Beer-Lambert law	15	CO4

CO-PO and PSO Mapping

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

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

Suggested Readings:

Text- Books	1. Karp G. (2010) Cell and Molecular Biology: Concepts and Experiments 6th edition. John Wiley & Sons. Inc.
Reference Books	1. Karp G. (2010) Cell and Molecular Biology: Concepts and Experiments6th edition. John Wiley & Sons. Inc 2. Nigam A and Ayyagari A. 2007. Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw Hill

Para Text	**Unit 1:** **1. https://www.youtube.com/watch?v=2R2iq_XR1IY** **https://www.youtube.com/watch?v=SnbXQTTHGs4** **https://www.youtube.com/watch?v=ED8LHLQJvWU** **Unit 2:** **1. https://www.youtube.com/watch?v=nJUuab-d3NQ** **https://www.youtube.com/watch?v=ncr-9iMEzwU** **https://www.youtube.com/watch?v=doxGqBOp5MM** **Unit 3:** **1. https://www.youtube.com/watch?v=wRgrsfZaeAg** **Unit4:** **1.** **https://www.youtube.com/watch?v=gGRMtq7hvHc**

Recapitulation & Examination Pattern

Internal Continuous Assessment:

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 **0.5 mark.** **Section B:** Contains **07** descriptive questions out of which **05** questions are to be attempted. Each question carries **03 marks**.
Activity	10	Will be decieded 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** mark.
Assignment/ Presentation	05	Assignmet to be made on topics and instruction given by subject teacher
Attendance	05	As per policy
Total Marks	**50**	

Course created by: **Dr. Manaal Zahera** **Signature:**	**Approved by: Dr. Amita Jain** **Signature:**