

Lecture Plan							
Name of the College: Government College of Arts, Science and Commerce. Sanquelim - Goa							
Name of Faculty: Ms. Mithali Halarnkar				Subject: Zoology			
Paper code: ZOO-221 Bioinstrumentation			Program: S.Y. BSc		Division: A		
Academic year: 2025 - 26		Semester: IV			Total Lectures: 45		
Course Objectives: At the end of the course, students will be able to: 1. Understanding the principles, working mechanisms. 2. Applications of various Bio-instruments. 3. Familiarising the principles, operation, and applications of Imaging, separation and spectrophotometric techniques 4. Imparting hands-on experience with instruments.							
Expected Course Outcome: At the end of the course, students will be able to: 1. Understand the importance of instrumentation in biological research. 2. Explain the principles and applications of spectroscopic techniques and microscopy. 3. Apply a range of spectroscopic, chromatographic, electrophoretic, and microscopic techniques to analyze and characterize biomolecules, demonstrating a foundation in bioanalytical methods. 4. Critically evaluate experimental setups, troubleshoot potential issues, and adapt bioinstrumentation techniques to address specific research questions.							
Month	Lecture From	Lecture To	No. of lectures allotted	Topic, Subtopic to be covered	Exercise/Assignment	ICT Tools	Reference books

Decem ber	01/12/2 025	06/12 /2025	03	Module I : Introduction	Yes	Powerpoint presentation, Google classroom, you tube,	1 1. A.J. Ninfa, D.P. Ballou, Fundamental Laboratory Approaches for Biochemistry and Biotechnology, Fitzgerald science press, Inc., 2009. 2. B. Notting, Methods in Modern Biophysics, Springer Verlag Berlin Heidelberg New York, 2009.	
				Module I : Principles of microscopy				
				Module I : Light microscopy				
Decem ber	07/12/2 025	13/12 /2025	03	Module I : Fluorescence microscopy				3. G.G. Hammes, Spectroscopy for the Biological Sciences, John Wiley & Sons Inc. 2005. 4. J.D. Enderle, Bioinstrumentation. Morgan & Claypool Publishers, 2006. 5. K. Wilson, J. Walker, Principles and Techniques of Biochemistry and Molecular Biology, (6th edition), Cambridge University Press, 2018.
				Module I : Electron Microscopy				
				Module I : Flow cytometry				
Decem ber	14/12/2 025	20/12 /2025	02	Module I : Chromosome banding				
				Module I : FISH				
Decem ber	21/12/2 025	27/12 /2025	01	Module I : Transmission electron microscopy	Yes	Powerpoint presentation, Google classroom, you tube,		
Dec - Jan	28/12/2 025	03/01 /2026	01	Module I : Scanning electron microscopy				
Januar y	04/01/2 026	10/01 /2026	03	Module I : Sample preparation for electron microscopy				
				Module I : cryofixation				
				Module I : Negative staining				
Januar y	11/01/2 025	17/01 /2026	03	Module I : Freeze Fracture				
				Module I : Freeze etching	Yes	Powerpoint presentation, Google classroom, you tube,		
				ISA				
Januar y	18/01/2 026	24/01 /2026	03	Module II : PH meter (1)				
				Module II : PH meter (2)				
				Module II : Centrifuge : Principle				
Januar y	25/01/2 026	31/01 /2026	02	Module II : Centrifuge : types and Rotors				
				Module II : Centrifuge : differential and density gradient	Yes			
Februa ry	01/02/2 026	07/02 /2026	03	Module II : Centrifuge application				
				Module II : Spectrophotometry				
				Module II : Spectrophotometry principle				

Februa ry	08/02/2 026	14/02 /2026	03	Module II : Spectrophotometry techniques			
				Module II : Spectrophotometry UV and visible spectrophotometry			
				ISA			
Februa ry	15/01/2 026	21/02 /2026	03	Module II : Spectrophotometry single beam			
				Module II : Spectrophotometry double beam			
				Module II : Spectrophotometry double wavelength			
Februa ry	22/02/2 026	28/02 /2026	03	Module III : introduction to chromatography			
				Module III: Chromatographic techniques - Principle			
				Module III: Chromatography application			
March	01/03/2 026	07/03 /2026	03	Module III: thin layer chromatography	Yes	Powerpoint presentation, Google classroom, you tube,	
				Module III: paper chromatogrphy			
				Module III: affinity chromatography			
March	08/03/2 026	14/03 /2026	03	Module III: gas chromatography			
				Module III: ion exchange chromatography			
				ISA			
March	15/03/2 026	21/03 /2026	03	Module III: HPLC			
				Module III: HPLC			
				Module III: Applications of chromatographic techniques			
March	22/03/2 026	28/03 /2026	03	Module III: Applications of chromatographic techniques			
				Module III: Principles of electrophoresis			
				Module III: Sonication			
March	29/03/2 025	30/03 /2026	01	REVISION			

* Assessment Rubrics		
	Compon ent	Max Mark s
	ISA 2	7.5
	ISA 3	7.5
	Semester End Exam	60