Name of the Programme: M.Sc. Marine Biotechnology

Course Code: GBT-505

Title of the Course: LAB III: BIOCHEMICAL AND ANALYTICAL TECHNIQUES

Number of Credits: 3

Effective from AY: 2022 - 23

Pre-requisites for the Course:	No prerequisite is required	
Course Objectives:	The objective of this laboratory course is 1) to introduce students to experimentation in Biochemistry. 2) to teach the utility of these experimental methods in a problem-oriented manner.	
Content:	1. UV-Visible spectroscopic analysis 2. Estimation of proteins by Lowry/Bradford's method 3. Estimation of reducing sugars 4. Enzyme assay 5. Ammonium sulfate precipitation and dialysis 6. Specific activity, fold purification, percentage yield of enzyme 7. Protein subunit molecular weight determination by SDS-PAGE 8. Thin-layer chromatography	**No of hours** 45
	9. Column chromatographic techniques: ion exchange/Affinity/Gel filtration 10. Biochemical assays using ELISA plate reader. 11. Compound and Fluorescence microscopy demonstration 12. Analysis of a biological specimen by SEM. 13. Fluorescence imaging of fixed stained and live cells. 14. Demonstration of fluorescence spectroscopy. 15. Density gradient ultracentrifugation.	45
Pedagogy:	Hands-on experiments in the laboratory, Demonstrations, videos, tutorials	

References/ Readings:	1. A. de Paula. Physical Chemistry for the Life Sciences (2nd Edition). W.H. Freeman, 2011. 2. A. de Paula., Physical Chemistry for the Life Sciences (3rd Edition). W. H. Freeman, 2015. 3. R. Boyer, Modern experimental biochemistry. Pearson Education India, 2000. 4. L. Friedrich and J. W. Engels, Bioanalytics: Analytical Methods and Concepts in Biochemistry and Molecular Biology. Wiley-VCH publisher, 2018. 5. J.F. James , An Introduction to practical laboratory optics, Cambridge University press, 2017. 6. J. Jayaraman, Laboratory Manual of Biochemistry. New Age International Private Limited, 2011. 7. G. John Biological Centrifugation CRC Press, 2020. 8. K. E. van Holde, C. Johnson, P. S. Ho., Principles of Physical Biochemistry, 2nd Edn., Prentice Hall, 2005. 9. P. Mu, & D. T. Plummer, Introduction to practical biochemistry. Tata McGraw-Hill Education, 2001. 10. B. S. Prakash, Bisen, Laboratory Protocols in Applied Life Sciences., Taylor and Francis Publisher, 2014. 11. S. W. Tinoco, and Puglisi. Physical Chemistry: Principles and Applications in the Biological Sciences. Prentice Hall, Inc., 2013. 12. K. Ulrich, Fluorescence microscopy: From Principle to application, Wiley Int., 2017. 13. K. Wilson, J. Walker, (Eds)., Principles and techniques of biochemistry and molecular biology. Cambridge university press, 2010.
Course Outcomes:	1. Students will be able to understand and apply the biochemistry knowledge gained to analyze biochemical samples. 2. Students will get familiarize with basic laboratory instruments and understand principles underlying measurements and using those instruments for experiments in biochemistry. 3. Students will be able to use various instruments to analyze structure of biochemical molecules. 4. Students will be able to use the experimental methods to design biochemical experiments for the research purpose.

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