

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
INSTRUCTION DIVISION
SECOND SEMESTER: 2012-2013
Course Handout (Part-II)

Date: 8/01/2016

In addition to Part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course).

Course No. : BIO F244

Course Title : Instrumental Methods of Analysis

Instructor-in-charge : UMA S. DUBEY

Team of Instructors : Ashish Runthala, Pankaj Kumar Shama, Shilpi Garg, Sudeshna Mukherji and Sandhya Mehrotra & Uma S. Dubey

1. Scope & Objective of the Course:

The advent of dedicated bio-instruments and computers has facilitated an explosive progress in the instrumental methods of analysis in Biology. Large number of data points, whether they are physicochemical or biological, can be collected, stored, manipulated and analyzed at a high precision with the help of modern sophisticated instruments having high sensitivity, selectivity, and extremely low detection limit. This course aims at providing a sufficient background of these instruments, their handling and application, in the field of molecular biology, structural biology and Biotechnology.

2. Text Book:

T1. "Instrumental Methods of Analysis", B.Sivasankar, Oxford Higher education 2012

T2. Lab Manual for PHA C391 IMA, Mahesh *et. al.*, 2008

Reference Book

R1. "Instrumental Methods of Analysis", Williard *et. al.*, CBS Publication, New Delhi, 7th ed., 1998

R2. "Handbook of Analytical instruments", R.S. Khandpur, Tata Mc Graw-Hill, 2nd edition, 2006.

3.a) Lab Components:

Experiments:

Exp 1: Qualitative and quantitative analysis of sample using spectroscopy.

Exp 2: Flame photometric analysis of alkaline earth metals in bacterial cells

Exp3: Spectrofluorimetry estimation of unknown conc. of quinine sulphate and fluorescence quenching of quinine sulphate by KI

Exp 4: Atomic absorption spectrophotometric analysis of elements

Exp 5: Polarimetric analysis of samples possessing optical activity

Exp 6: Separation of amino acids using High Voltage EP.

Exp 7: Identification of carbohydrates using TLC

Exp 8: Detection of antigen using an ELISA reader

Exp 9: Amplification of DNA using PCR & Agarose gel electrophoresis

Exp 10: Separation of proteins using Polyacrylamide gel electrophoresis followed by Gel documentation

Exp 11: Analyzing the chemical structure of molecules using FTIR.

Demonstrations

1. Demonstration of Gas Liquid Chromatography
2. Separation of drugs using HPLC.
3. Purification of complex mixture using FPLC.

Note: Minor changes are possible subject to availability to chemicals/ Instructors/ Instrument working

3. Course Plan :

No	Learning Objectives	Topic to be covered	Ref. to the Book
1	Introduction	Introduction to Instrumental Methods	T-1, T2, R-1
2	Spectroscopy	Characteristic of atomic and molecular spectroscopy	T-1, T2, R-1
3	Spectroscopy	Visible and Ultraviolet Spectroscopy	T-1, T-2, R-2
4	Spectroscopy	Fluorescence Spectroscopy	T-1, R-1, R-2
5	Spectroscopy	Flame Emission Spectroscopy	T-1, R-1, R-2
6	Spectroscopy	Atomic Absorption Spectroscopy	T-1, R-1, R-2
7	Spectroscopy	Infrared Spectrophotometry	T-1, R-1, R-2
8	Polarimetry	Polarimetry	T2
9	Electrophoresis	Introduction to Electrophoresis	T-2, R-1
10	Electrophoresis	High Voltage Electrophoresis	T-1
11	Electrophoresis	PAGE & Agarose gel electrophoresis	T-1
12	Thermo cycler	Polymerase Chain Reaction	T-1
13	Chromatography	Thin Layer Chromatography	T1, Lecture Notes
14	Chromatography	Gas Chromatography	T-1, R-1, R-2
15	Chromatography	High-Performance liquid Chromatography	T-1, R-1, R-2

Note: If requires, extra reading material will be provided to the students.

4. Evaluation Scheme:

No.	Evaluation Component	Duration	Weightage	Date & Time	Venue
1.	<u>Laboratory Evaluation-1:</u> Evaluation will be based on 1 st cycle experiments, punctuality, records, and participation and Viva.	-	15%	Continuous	IMA Lab
2.	<u>Lab Quiz 1</u>		10%	To be Announced	
3.	Mid Sem	1.30 H	10%	16/3 2:00 -3:30 PM	
4.	Multiple quizzes in Class	-	10%	To be announced	Class Room
5.	<u>Laboratory Evaluation-2:</u> Evaluation will be based on 2 nd cycle experiments, attendance, records, participation and viva.	-	15%	Continuous	IMA Lab
6.	Lab Quiz 2	-	10%	To be announced	-
7.	Lab comprehensive examination	-	15%	To be announced	IMA Lab
8.	Comprehensive Exam	2 hrs	15%	9/5 FN	

5. Guidelines to Writing Lab Reports:

The report must have to be written on hardbound, covered practical files. It should include the followings: Objective, Principle, Material required, Procedure, Inference, Precautions & Application.

6. Chamber Consultation Hours: To be announced in class/by respective instructors

7. Make-up Policy: Make-ups will be granted only in the case of hospitalization after submission of medical certificate. Prior permission is required for any other emergency situations.

**Instructor-in-charge
BIO F244**