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DR. D. Y. PATIL BIOTECHNOLOGY & BIOINFORMATICS INSTITUTE

TATHAWADE, PUNE

SYLLABUS FOR

SEMESTER I

**B. TECH BIOTECHNOLOGY, B. TECH MEDICAL BIOTECHNOLOGY, M. TECH (INT.)
BIOTECHNOLOGY**

(BATCH 2018-19)

DR. D.Y. PATIL VIDYAPEETH, PUNE
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B. TECH BIOTECHNOLOGY, B. TECH MEDICAL BIOTECHNOLOGY, M. TECH
(INT.) BIOTECHNOLOGY

Academic year 2018-2019

SEMESTER I						
Course Code	Course Name	L	T	P	Hr	Cr
BS 101	Physics	3	0	2	5	4
BS 102	Chemistry	3	0	4	7	5
BT 101	Electronics & Instrumentation Engineering	3	0	2	5	4
BI 101	Computers & C Programming	3	0	4	7	5
HU 101	Communication Skills	1	2	0	3	3
BS 103	Maths I – Mathematics	3	1	0	4	4
BT 102	Engineering Graphics	2	0	2	4	3
HU 102	Disaster Management*	0	1	0	1	-
Total		18	4	14	36	28
<i>*Audit course, attendance is must</i>						

TITLE OF THE COURSE: CHEMISTRY**COURSE CODE: BS 102****MARKS: 200****L T P Hr C****3 0 4 7 5****OBJECTIVES:**

The objective of the course is:

- The objective of this course is to familiarize the student with the different concepts of physical and organic chemistry.
- The students will learn the structures of organic molecules as: alkanes, alkenes, alkynes, aliphatic and aromatic molecules and the stereochemistry behind the molecules with its importance in day today life
- They would learn the Basic concepts and principles with respect to physical chemistry, the bioenergetics of different reactions and the principles and applications of radioactivity.

LEARNING OUTCOME:

At the end of this course student should be able to understand basic principles of chemistry, develop skills in handling organic molecules and learn different principles in chemistry. This is essential for undertaking practical training in Biotechnology at the later stage.

PREREQUISITES

This is the first introductory course and there are no prerequisites.

Course Description

Sr no	Topics	Description	Hrs.
1	Introduction to organic chemistry	Functional groups, Chemistry of alkanes, alkenes, alkynes, aromatic, alicyclic and heterocyclic compounds	7
2	Stereochemistry	Stereo isomers, Enantiomers, Chiral centers/ Optical activity, Geometric isomers Meso- isomers, Conformational isomers, Stereochemistry of Cyclic Aliphatic compounds	8
3	Reaction mechanisms	Nucleophilic (SN1, SN2 , Electrophilic E1 and E2)	3
4	Basic concepts and principles of Physical Chemistry	Osmosis- Diffusion, Osmotic Pressure, Theories of Osmosis. Viscosity –Introduction & Types of viscometer. Colloids-Lyophilic & Lyophobic sols, Optical properties, Electrical properties of sols, Gold number. Donnan Equilibrium. Phase rule-Phase,	11

		Components & Degree of freedom. Derivation of Phase rule. Phase diagram. Water system. Acid-bases- Three concepts of acids & bases, pH meter & types of electrodes ,Buffer solution, Acid base indicator , Law of mass action, Numerical.	
5	Bioenergetics	First & Second laws of Thermodynamics, Internal energy, Enthalpy, Entropy, concept of free energy, Standard free energy change of a chemical reaction, ATP & high energy phosphates compounds. Chemical equilibrium constant, Nernst equation	6
6	Basic principles of radioactive isotopes	Isotopes in Biology- Properties, Half-life, Radioactive decay. Measurement of radioactivity-Methods based on Gas ionization (Ionization chamber, Proportional counter, Geiger counter), Photographic methods, Methods based on Excitation (Liquid & solid Scintillation counting), Quenching. Use of Isotopes-Tritium, Iodine-131, Nitrogen-15, Oxygen-18, Carbon-14, Phosphorus-32, Sulphur-35.	9
Total Lectures			45

Methodology

The course will be covered through lectures, demonstration and practicals.

EVALUATION SCHEME (THEORY)

Examination	Duration	Marks
I Internal	60 minutes	20
II Internal	45 minutes	15
Attendance		5
End Semester Exam	2 hours 30 minutes	60
Total		100

BOOKS RECOMMENDED:

1. Organic Chemistry by R. T. Morrison and R. N. Boyd, 7th Edition, Prentice Hall, 2011.
2. Organic Chemistry by I. L Finnar, 6th Edition Pearson Publications, 2002.
3. Physical Chemistry by A. Peter and P. Julio De 7th Edition, Oxford University Press, 2010.
4. Essentials of Physical Chemistry by B.S. Bahl & A. Tuli, S Chand & Co. 2000.
5. Biophysical Chemistry by A. Upadhyay, K. Upadhyay & N. Nath., Himalayan Publishing House. 2005.

Sr. No.	Name of the experiment	Learning objective
1	Acid-Base Titration	To understand the concept of titration and how to calculate the strength of acid and base.
3	Back Titration	To analyze the concentration of analyte based upon chemical reaction.
4	Qualitative Analysis	The practical will help in detection of functional groups present in the chemical compound. (Can be combined with other small practicals-at least 4-5 samples)
5	Determination of optical activity using a Polarimeter	Help them to analyze the degree of rotation of plane polarised light
6	Viscosity, Osmosis and Diffusion techniques	To analyze the physical properties of compound by measuring i) hypotonic, isotonic and hypertonic nature ii) thickness, sticky and semifluid consistency
7	Demonstrate the procedure for determining Melting/Boiling point	The practical will teach them how to analyze the transition point from solid to liquid and ii) liquid to vapor phase.
8	To determine the pH of a solution using a polarimeter	It will guide them to measure the pH of a solution in terms of H ⁺ ion concentration and to understand importance of pH in biological experiments.
9	Study of exothermic and endothermic reactions.	To understand the concept of thermodynamics of reaction based upon the absorption or release of heat energy.
10.	Conductivity meter	Measuring the electrical conductivity of a solution. Applications in hydroponics, aquaculture and freshwater systems
11	Determine the heat of combustion of ethyl alcohol	To measure the amount of heat energy released during a chemical reaction.
12	Determine the heat of neutralization of strong acid and strong base	To measure the change in enthalpy in a neutralization reaction to form water and a salt.

BOOKS RECOMMENDED:

1. Practical Organic Chemistry: Qualitative Analysis by S.P. Bhutani, A.Chhikara, ANE Books, 2009.
2. Laboratory Manuals in Biochemistry by J. Jayaraman, New Age International Private Ltd., 2000.
3. Experimental Physical Chemistry, By V. D. Athawale, P. Mathur, New Age International Private Ltd., 2000.
4. College Practical Chemistry, By V. K. Ahluwalia, S. Dhingra, Universities Press, 2005.

PRACTICAL EVALUATION SCHEME**Examination**

Practical	: 20 marks
Attendance	: 10 marks
Journal writing	: 10 marks
End semester examination:	60
Total	:100