Sarvajanik University

Faculty of Science

B.Sc. (Hons)

Faculty: Science	Department: All
Program: B.Sc. (Hons)	Type: Major
Subject: Foundation Majors in Applied Sciences-1	Credits: 4
Semester: 1	
Course description: The objectives of this course are to provide students with fundamental scientific knowledge of basic Biotechnological, Chemistry, Environmental Science and Microbiology concepts. It will help students in creating a strong foundation necessary for science based careers.	
Student Learning Outcome: ● Obtained ideas on various branches Biotechnology, Chemistry, Environmental Science and Microbiology. ● Students will be acquainted with the historical account and development. ● Able to learn scientific principles and scope of Biotechnology, Chemistry, Environmental Science and Microbiology. ● Will be aware of general characteristics and able to gather knowledge about Biotechnology, Chemistry, Environmental Science and Microbiology.	

Unit-1 Basic Biotechnology-1: **(8 hrs)**

1.1 History and introduction to Biotechnology
1.2 Definition of Biotechnology, Traditional and New
1.3 The World of Biotechnology- Red, Green, White and Blue Biotechnology
1.4 Biotechnology-an Interdisciplinary Pursuit
1.5 Biotechnology- a three-component central core

Unit-2 Biotechnology in India **(7 hrs)**

2.1 Role of GSBTM, STBI and GBRC
2.2 Gujarat Biotechnology Policy 2022-27
2.3 Introduction to DBT, Its Mandate and Strategy
2.4 Autonomous and Public sector undertakings of DBT
2.5 BIRAC and ABLE

Unit-3: Foundation of chemistry **(7 hrs)**

3.1Qualitative observation Vs quantitative observation
3.2 Theory vs law
3.3 Mass vs weight, Density: Solid, liquid, gas

3.4 Physical changes and chemical changes
3.5 Chemical bonds (Types, bond length, bond energy)

Unit-4 Recapitulation of basics of organic chemistry **(8 hrs)**

4.1 Introduction to natural and synthetic organic compounds
4.2 Hybridisation: Shapes of molecules, effect on resonance structure
4.3 Electronic displacements and their applications: Inductive, electromeric, resonance and mesomeric effects and hyperconjugation
4.4 Homolytic and Heterolytic fission with suitable examples
4.5 Electrophiles and Nucleophiles, Curly arrow rule
4.6 Types, shape and relative stability of Carbocations, Carbanions, Free radicals and Carbenes
4.7 Introduction to types of organic reactions: Addition, Elimination and Substitution reactions.

Unit-5 Natural Resources and Management **(7 hrs)**

5.1 Classification of natural resources; renewable and non-renewable resources
5.2 Resource degradation & resource conservation; resource availability and factors influencing its availability
5.3 Types of resources: Land resources; Water resources; Fisheries and other marine resources; Energy resources; Mineral resources
5.4 Impact on natural resources: Human impact; ecological, social and economic dimension of resource management

Unit-6 Ecology and Environment **(8 hrs)**

6.1 Types, classification, structure and function of Ecology
6.2 classification, characterization and importance of population and population dynamics and population ecology
6.3 Concept of Community Ecology and Ecological Succession
6.4 Auto ecology of Species and Ecological Amplitude

Unit-7 Introduction and major themes of Microbiology **(7 hrs)**

7.1Microbiology & it's important
7.2 Structure and Activities of Microbial cell
7.3 Evolution and Diversity of Microbial Cell
7.4 Microorganisms and Their Environment
7.5 The Impact of Microorganisms on Humans

Unit-8 Microbiology in historical context **(8 hrs)**

8.1 The Discovery of Microorganisms
8.2 Pasteur & Spontaneous Generation
8.3 Koch, Infectious Disease and Pure Cultures
8.4 The Rise of Microbial Diversity

References and Textbooks: (With Author, Edition, Publishers, ISBN)

Biotechnology:

- John Smith., (2009). Biotechnology, Cambridge Press. ISBN 9780521711937
- Ratledge, C., & Kristiansen, B., (2006). *Basic Biotechnology*, Cambridge University Press. ISBN 9780521549585
- R.C. Dubey (2014) Advanced Biotechnology S.Chand ISBN 81-219-4290-X
- Sobti and Pachauri (2009) Essential of Biotechnology, Ane Books Pvt. Ltd. ISBN-81-8052-160-5

Chemistry:

- Organic Chemistry, Volume-1,2, I.L.Finar, 6 th Edn., 2002, , Pearson
- Organic Chemistry, Seventh Edition, By R.T.Morrison, R.N.Boyd, S.K. Bhattacharjee 2010, Pearson
- Advance Organic Chemistry, Arun Bahl and B S Bahl, 2012, S.Chand
- Organic Chemistry, W.H. Perkin and F. S. Kipping, 2012, Nabu Press

Environmental Science:

- P. D. Sharma (Rastogi Publications, New Delhi), Ecology and Environment. ISBN: 8171338143.
- Keller E.A (2012): Introduction to Environmental Geology, Pearson Publication, USA.
- Sagar Rajendra (2014): Geochemistry and Environmental Geology, Anmol Publications Pvt. Ltd., New Delhi.
- Francois Ramade 1984. Ecology of Natural Resources. John Wiley & Sons Ltd ISBN-13: 978-0471906254.

Microbiology:

- Brock, T. D., Madigan, M. T., Martinko, J. M., & Parker, J. (2014). Brock biology of microorganisms.14th edi., Upper Saddle River (NJ): Prentice-Hall.
- M. K.Cowan and H. Smith. (2018). Microbiology: Systems Approach, 5th edi., McGraw-Hill Publishing Company