



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science Department of Life Science B.Sc. (Major - Biotechnology)

SEMESTER III

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCBT301	Major	Basic Microbiology	60	20	20	30	20	4	-	4	6

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project / Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives: The objectives of this course are


- To introduce the field of microbiology and understand the significance and importance of microorganisms.
- To familiarize with general characters of prokaryotic and Eukaryotic microorganisms for conventional and molecular characterization using modern methods.
- To introduce students to the basics of microbial growth, nutrition, methods for control of microbes, gene transfer and host microbe interactions.


Student Learning Outcomes: Students should be able to:


- Identify major categories of microorganisms and analyze their classification, diversity, and ubiquity
- Demonstrate to culture and control the growth of microorganisms
- Understand the nutritional requirements of microorganisms, and the pattern of their growth and methods of controlling microbial growth
- Acquaintance with the diversity of viruses and techniques for their cultivation and identification
- Analyze the gene transfer mechanism in bacteria and evaluate interactions between microbes, hosts and environment.

Unit – I: History, Microbial Diversity and classification

History of Microbiology and major contributions; Microbial diversity-Structure and general characters of Bacteria, Archaea, Fungi and Algae, Protozoa. Bacterial Classification Systems; Advances in Bacterial Taxonomy using Ribotyping, r-RNA sequencing and fatty acid profiling.


**Chairperson
Board of Studies
Life Science**


**Chairperson
Faculty of Studies
Science**


**Controller of Examinations
SVVV, Indore**


**Joint Registrar
SVVV, Indore**



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Department of Life Science

B.Sc. (Major - Biotechnology)

BSCBT301 Basic Microbiology

Unit – II: Characteristics of Bacteria

Nutritional uptake mechanism in bacteria; Nutritional classes of Bacteria; Culture Media, Microbial Growth; Bacterial Growth Curve; Methods of Measurement; Factors affecting bacterial growth: Temperature, Oxygen, pH, Osmotic concentration, and water activity, Batch and Continuous Culture.

Bacterial genetics: mutation and recombination in bacteria, plasmids, transformation, transduction and conjugation; Operon concept.

Unit – III: Virology

Morphology and General Properties of Viruses, Viroids and Prions; Classification of Viruses; Plants and Animals Viruses; Bacteriophages – Morphology, Genome Organization and Life Cycle of T4, T7, M13, Lambda Phage; Cultivation of Viruses.

Unit – IV: Control of Microorganisms

Sterilization; Physical and Chemical Methods for Control of Microorganisms; Biological Control of Microorganisms; Antimicrobial agents and their Mechanism of action; Drug Resistance Mechanism; Antibiotic sensitivity testing.


Unit – V: Host-Microbe Interactions


Host-microbe interaction and their types; Rhizosphere and Phyllosphere Microorganisms; Symbiosis in Legumes and Ruminants, Plant Pathogens - Disease Symptoms, Transmission, Mechanism of Pathogenicity; Microbial Control of Insects and Pests.

Infectious Diseases in Humans – Mechanism of Pathogenesis; Host-pathogen interaction, Evasion of Host Defenses, Beneficial effects: Human microbiome, prebiotics and probiotics.


PRACTICAL

1. Isolation and characterization of microorganisms from extreme environments
2. Determination of bacterial growth rate and factors influencing it
3. Sterilization, disinfection and safety in microbiological laboratory
4. Preparation of media for cultivation of bacteria
5. Study of colony and growth characteristics of some common bacteria:
Bacillus, *E. coli*, *Staphylococcus*, *Streptococcus*, etc.
6. Preparation of bacterial smear and Gram's staining.
7. Enumeration of bacteria: standard plate count.


Chairperson
Board of Studies
Life Science


Chairperson
Faculty of Studies
Science


Controller of Examinations
SVVV, Indore


Joint Registrar
SVVV, Indore



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Department of Life Science


B.Sc. (Major - Biotechnology)


BSCBT301 Basic Microbiology


8. Antimicrobial sensitivity test and demonstration of drug resistance
9. Maintenance of stock cultures: slants, stabs and glycerol stock cultures
10. Determination of phenol co-efficient of antimicrobial agents
11. Determination of Minimum Inhibitory Concentration (MIC)
12. Isolation of Bacteriophages
13. Study of colony and growth characteristics of some common fungi: *Penicillium*, *Rhizopus*, *Mucor*, *Aspergillus sp.*

BOOKS

1. Pelczar, M. J., Reid, R. D., & Chan, E. C. (2001). Microbiology (5th Ed.). New York: McGraw-Hill.
2. Willey, J. M., Sherwood, L., Woolverton, C. J., Prescott, L. M., & Willey, J. M. (2011). Prescott's Microbiology (8th Ed, New York: McGraw-Hill.
3. Matthai, W., Berg, C. Y., & Black, J. G. (2005). Microbiology, Principles and Explorations. Boston, MA: John Wiley & Sons.
4. Cappuccino, J. G., & Welsh, C. (2016). Microbiology: a Laboratory Manual. Benjamin-Cummings Publishing Company.
5. Collins, C. H., Lyne, P. M., Grange, J. M., & Falkinham III, J. (2004). Collins and Lyne's Microbiological Methods (8th Ed.). Arnolds.
6. Tille, P. M., & Forbes, B. A., Bailey & Scott's Diagnostic Microbiology. (2018) 14th Edition


Chairperson
Board of Studies
Life Science


Chairperson
Faculty of Studies
Science


Controller of Examinations
SVVV, Indore


Joint Registrar
SVVV, Indore



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Department of Life Science

B.Sc. (Major - Biotechnology)

SEMESTER III

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCCH301	Minor	Organic Chemistry	60	20	20	30	20	4	-	4	6

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project / Participation in Class, given that no component shall exceed more than 10 marks.**

Course Educational Objectives (CEOs):

The course Organic chemistry aims to provide the student with:

1. To understand the chemistry of saturated, unsaturated, and aromatic hydrocarbons.
2. To acquire the knowledge about Bayer's strain theory, Regioselectivity, and Thermodynamic aspects of organic reactions, and applications of Saytzeff rule.
3. To discuss the properties of Cycloalkanes, Cycloalkenes and Dienes.
4. To acquaint the students with practical knowledge and industrial applications of Organic chemistry.


Course Outcomes (COs):


1. Students will gain the basic knowledge of IUPAC nomenclature of alkanes, alkenes, dienes, and physical, chemical properties of the commercially important molecules.
2. Students can be able to understand Aromaticity, Kekule structure, Huckel's rule, and Aromatic electrophilic substitution reactions with mechanism.
3. They can understand the chemistry of Biomolecules with structures, properties, and biological importance of Carbohydrates and Aminoacids.
4. They can learn the industrial utility of Organic chemistry and practical knowledge to become good chemist.

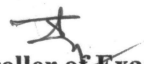
Syllabus

Unit I: Alkanes and Cycloalkanes

IUPAC nomenclature of branched and unbranched alkanes, the alkyl group, classification of carbon atom in alkanes, isomerism in alkanes, methods of preparation – Wurtz reaction, Kolbe reaction, Corey-House reaction, and decarboxylation of carboxylic acids. Physical properties and chemical reactions of alkanes. Mechanism of free radical halogenation of alkanes: orientation, reactivity, and selectivity. Cycloalkanes - nomenclature, preparation methods, chemical reactions. Bayer's strain theory and its limitations. Ring strain in small rings (Cyclopropane and cyclobutane). The case of cyclopropane ring, banana bonds.


Chairperson
Board of Studies
Life Science


Chairperson
Faculty of Studies
Science


Controller of Examinations
SVVV, Indore


Joint Registrar
SVVV, Indore



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Department of Life Science

B.Sc. (Major - Biotechnology)

BSCCH301 Organic Chemistry

Unit II: Alkenes and Cycloalkenes

IUPAC nomenclature of alkenes, methods of formation, mechanism and regioselectivity of dehydration of alcohols and dehydrohalogenation of alkyl halides. Saytzeff rule, Hofmann elimination, physical properties, and relative stabilities of alkenes. Chemical reactions of alkenes – hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroboration-oxidation, oxymercuration-reduction. Epoxidation, ozonolysis, hydration, hydroxylation, and oxidation with KMnO_4 . Polymerization of alkenes, Industrial applications of ethylene and propene. Methods of formation, physical properties, and chemical reactions of cycloalkenes.

UNIT III: Dienes and Alkynes

Nomenclature and classification of dienes: isolated, conjugated, and cumulated dienes, Structure of allenes and butadiene, methods of formation, chemical reaction – 1, 2 and 1, 4 additions, Diels-Alder reaction, and polymerization. Nomenclature, structure and bonding in alkynes, methods of formation, chemical reactions of alkynes, acidity of alkynes, hydroboration-oxidation, metal-ammonia reductions, oxidation, and polymerization.

UNIT IV: Arenes and Aromaticity

Nomenclature of benzene derivatives, Structure of benzene - Kekule structure, stability and carbon-carbon bond lengths of benzene, resonance structure, MO picture. Aromaticity: The Huckle rule, aromatic ions. Aromatic electrophilic substitution – general pattern of the mechanism, role of σ and π complexes, Mechanism of nitration, halogenation, sulphonation, mercuration and Friedel-Crafts reaction. Energy profile diagrams. Activating and deactivating substituents, orientation and ortho/para ratio, Birch reduction.

UNIT V: Biomolecules

[A] **Carbohydrates:** Introduction, classification, Osazone formation, epimerization, step-up and step-down reactions of monosaccharides, simple structures of glucose and fructose, Fischer's proof of configuration of D-glucose.


[B] **Amino acids:** Introduction of amino acid, Classification, and properties of amino acids, Zwitter ion, Isoelectric point, Strecker's and Gabriel phthalimide synthesis of amino acids.


Guidelines for Practical:

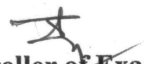
A two-credit lab is to be conducted by covering the most relevant and useful topics from above mentioned syllabus.

List of Textbooks:

1. Robert Thorn Morrison and Robert Neilson Boyd, Textbook of Organic Chemistry, Prentice Hall of India Pvt Ltd, New Delhi, 6th Edition, 1992.
2. Bhupinder M4. Arun Bahl, B. S. Bahl, Advanced Organic Chemistry, S. Chand & Company Ltd., New Delhi, 1st Edition, 2003.


Chairperson
Board of Studies
Life Science


Chairperson
Faculty of Studies
Science


Controller of Examinations
SVVV, Indore


Joint Registrar
SVVV, Indore



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Department of Life Science


B.Sc. (Major - Biotechnology)


BSCCH301 Organic Chemistry

3. James B Hedrickson Donald J. Cram and George S. Hammond, Organic Chemistry, McGraw-Hill Kogakusha, Ltd., 3rd Edition.
4. Arun Bahl, B. S. Bahl, Advanced Organic Chemistry, S. Chand & Company Ltd., New Delhi, 1st Edition, 2003.
5. I.L.Finar, Organic Chemistry Vol-I & Vol-II, Pearson Education Ltd, New Delhi, 5th Edition, 2016.
6. G.Marc Loudon, Organic Chemistry, Oxford University Press, 4th Indian edition, 2010.
7. P.S.Kalsi, Text book of Organic Chemistry, MacMillan, India Pvt. Ltd., 1999.

Reference Books:

1. Pine, S., Hendrickson, J. B., Cram, D.J., Hammond, S. Organic Chemistry, 8th Edition, McGraw-Hill, New York. 2012
2. John McMurry, Brooks Cole, Organic Chemistry, 6th Edition, John-Wiley International Edition.
3. Graham, T.W., Solomons, S., and Craig B. Fryhle, Organic Chemistry, 8th Edition, John-Wiley International Edition.
4. Francis A. Carey and Richard J. Sundberg, Advanced Organic Chemistry Part-A & B, 7th Edition, McGraw-Hill, 2015.


Chairperson
Board of Studies
Life Science


Chairperson
Faculty of Studies
Science


Controller of Examinations
SVVV, Indore


Joint Registrar
SVVV, Indore

SEMESTER IV

SUBJECT CODE	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
		THEORY			PRACTICAL		Th	T	P	CREDITS
		END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BBAI501	Human Values and Professional Ethics	60	20	20	-	-	3	1	-	4

Legends: L-Lecture; T-Tutorial/Teacher Guided Student Activity; P-Practical; C-Credit;

***Teacher Assessment** shall be based on following components: Quiz / Assignment / Project/ Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The objective of the course is to disseminate the theory and practice of moral code of conduct and familiarize the students with the concepts of "right" and "good" in individual, social and professional context

Course Outcomes:

1. Help the learners to determine what action or life is best to do or live.
2. Right conduct and good life.
3. To equip students with understanding of the ethical philosophies, principles, models that directly and indirectly affect business.

Course Content:

UNIT I: Human Value

1. Definition, Essence, Features and Sources
2. Sources and Classification
3. Hierarchy of Values
4. Values Across Culture

UNIT II: Morality

1. Definition, Moral Behaviour and Systems
2. Characteristics of Moral Standards
3. Values Vs Ethics Vs Morality
4. Impression Formation and Management

BBAI501 Human Values and Professional Ethics (for UG Programs)

UNIT III: Leadership in Indian Ethical Perspective

1. Leadership, Characteristics
2. Leadership in Business (Styles), Types of Leadership (Scriptural, Political, Business and Charismatic)
3. Leadership Behaviour, Leadership Transformation in Terms of Shastras (Upanishads, Smritis and Manu-smriti).

UNIT IV: Human Behavior – Indian Thoughts

1. Business Ethics its meaning and definition, need.
2. Types, Objectives, Sources, Relevance in Business organizations.
3. Theories of Ethics, Codes of Ethics.

UNIT V: Globalization and Ethics

1. Sources of Indian Ethos & its impact on human behavior
2. Corporate Citizenship and Social Responsibility – Concept (in Business),
3. Work Ethics and factors affecting work Ethics.

Suggested Readings

1. Beteille Andre (1991), Society and Politics in India, Athlone Press.
2. Chakraborty S. K. (1999), Values and Ethics for Organizations, oxford university press.
3. Fernando, A.C.(2009), Business Ethics - An Indian Perspective, Pearson Education :India.
4. Fleddermann, Charles D. (2012), "Engineering Ethics", Pearson Education / Prentice Hall.
5. Boatright, John R (2012), "Ethics and the Conduct of Business", Pearson Education, New Delhi.
6. Crane, Andrew and Matten Dirk (2015), Business Ethics, Oxford University Press Inc.: New York.
7. Murthy, C.S.V.(2016), Business Ethics – Text and Cases, Himalaya Publishing House Pvt. Ltd.: Mumbai.
8. Naagrajan, R.R (2016), Professional Ethics and Human Values, New Age International Publications: New Delhi.