

Biochemistry (जैव रसायन)

Year	Paper No.	Course Code	Title of the Course	Credits	Compulsory Elective
Compulsory Core Course विषय केन्द्रित अनिवार्य पाठ्यक्रम					
प्रथम वर्ष	257	UGBCH-01	Introduction to Biochemistry	3 3 2 } 8	अनिवार्य
	258	UGBCH-02	Intermediary Metabolism		
	264	UGBCH-(L)1	Practical Based on UGBCH-01 & 02		
द्वितीय वर्ष	259	UGBCH-03	Bio Analytical Techniques	3 3 2 } 8	अनिवार्य
	260	UGBCH-04	Nutritional Biochemistry		
	265	UGBCH-(L)2	Practical Based on UGBCH-03 & 04		
तृतीय वर्ष	262	UGBCH-07	Enzymology	3 3 2 } 8	अनिवार्य
	263	UGBCH-08	Plant Biochemistry		
	266	UGBCH-(L-4)	Practical Based on UGBCH-07 & 08		
Discipline-Centric Elective Course/ विषय केन्द्रित वैकल्पिक पाठ्यक्रम (Select any two papers)					
	261	UGBCH-06	Immunology	4	वैकल्पिक
	2780	UGBCH-09	Statistical Methods	4	
	2781	UGBCH-10	Biophysical Chemistry	4	
	2782	UGBCH- 11	Spectroscopy	4	
Compulsory Foundation Course अनिवार्य आधार पाठ्यक्रम					
प्रथम वर्ष	2700	UGFODL	Foundation Course in Open and Distance Learning मुक्त एवं दूरस्थ शिक्षा में आधार पाठ्यक्रम	नॉन क्रेडिट	अनिवार्य

द्वितीय वर्ष	012	CHEQ/EA	Foundation Course in Environment Awareness पर्यावरण सम्बन्धी योग्यता प्रदायी आधार पाठ्यक्रम	नॉन क्रेडिट	अनिवार्य
तृतीय वर्ष	003	UGFIT	Foundation Course in Information Technology सूचना एवं प्रौद्योगिकी में आधार पाठ्यक्रम	नॉन क्रेडिट	अनिवार्य
वैकल्पिक आधार पाठ्यक्रम / Elective foundation Course					
प्रथम वर्ष	001	UGFHS	Foundation Course in Humanities and Social Science मानविकी एवं समाज विज्ञान में आधार पाठ्यक्रम	4	वैकल्पिक
द्वितीय वर्ष	004	UGFEG	Foundation Course in English अंग्रेजी में आधार पाठ्यक्रम	4	
	or 005	or UGFHD	Foundation Course in Hindi हिन्दी में आधार पाठ्यक्रम	or 4	
तृतीय वर्ष	2501	DM	Foundation Course in Disaster Management आपदा प्रबंधन में आधार पाठ्यक्रम	4	
	or 007	or AOCHE	अथवा Human Environment मानव पर्यावरण में आधार पाठ्यक्रम	or 4	
	or 009	Or AOCNC	अथवा Nutrition for the Community समुदाय एवं पोषण आधार पाठ्यक्रम	or 4	
	or 2701	Or SWM	अथवा Solid waste Management ठोस अपशिष्ट का प्रबंधन	or 4	
Skill Based Programmes/ कौशल विकास कार्यक्रम (द्वितीय अथवा तृतीय वर्ष में)					
द्वितीय वर्ष अथवा तृतीय वर्ष में	2651 or 2652 or 2654 or 2655	UGSSC-01 or UGSSC-02 or UGSSC-04 or UGSSC-05	Microsoft Office and Internet or Introduction to Yoga & Its Stream or Diet Therapy or Public Health & Hygiene	8 or 8 or 8 or 8	वैकल्पिक

नोट- 1. प्रथम चयनित विषय का विषय केन्द्रित वैकल्पिक पाठ्यक्रम (8 क्रेडिट का) प्रथम वर्ष में, द्वितीय चयनित विषय का विषय केन्द्रित वैकल्पिक पाठ्यक्रम (8 क्रेडिट का) द्वितीय वर्ष में तथा उसी प्रकार

तृतीय विषय का विषय केन्द्रित वैकल्पिक पाठ्यक्रम (8 क्रेडिट का) तृतीय वर्ष में अध्ययन करना होगा।

2. कौशल विकास कार्यक्रमों के अन्तर्गत चयनित विषयों में सम्बन्धित एक-एक 08 क्रेडिट का पाठ्यक्रम द्वितीय एवं तृतीय वर्ष में पढ़ना अनिवार्य है।

B.Sc. (BIOCHEMISTRY)
UGBCH -01(INTRODUCTION TO BIOCHEMISTRY)

Block-I

Unit-01 History and Scope of Biochemistry

Block-II

Unit-01 Amino Acids: Structure and functions

Unit-02 Proteins: Basic molecules of life, nature peptide conformation structure, classification and

Block III

Unit-01 Carbohydrates: General Structure, Structural details of glucose, Starch and classification and function, Glycogen

Unit-02 Lipids: Classification, role of fatty saturated and unsaturated fatty acids in lipid biosynthesis.

Block IV

Unit-01 Nucleic Acids: Purines, Pyrimidines, Nucleosides types and functions of RNA & DNA

Unit-02 Vitamins: Types and functions.

UGBCH -02(INTERMEDIARY METABOLISM)

Block-I

Unit-01 Bioenergetics: Introduction and its role

Unit-02 Metabolism of carbohydrates: Glycolysis, Krebs's cycle, electron transport system in mitochondria, Oxidative phosphorylation and mechanism of ATP synthesis

Block –II

Unit-01 Photosynthesis: Pigments of Photosynthesis, Oxygenic and an Oxygenic Photosynthesis, Photo system I and photo system II, Cyclic and non-cyclic photo phosphorylation, calvin cycle.

Block-III

Unit-01 Protein Biosynthesis: transcription, role of ribosome's in protein synthesis, translation, genetic code, protein processing, difference in protein synthesizing machinery in prokaryotes and eukaryotes.

Block-IV

Unit-01 Metabolism of lipids; catabolism of triglycerides, biosynthesis of cholesterol, B-Oxidation of fatty acids.

UGBCH -03(BIO ANALYTICAL TECHNIQUES)

Block-I

Chromatography

Unit-01 Principals of partition chromatography; exchange, gel filtration chromatography, chromatography (HPCL) oaper, thin layer. Ion High pressure liquid.

Block II

Spectroscopy

Unit-01 Concepts of Spectroscopy , Beer-Lambert's law, Visible and UV Spectroscopy, Applications of colorimetry.

Block-III

Electrophoresis

Unit-01 Principles of Electrophoresis, Separation of proteins by PAGE and SDS-PAGE, Agarose gel Electrophoresis of separation of nucleic acids.

Block-IV

Centrifugation

Unit-01 Principles of Centrifugation, Differential Centrifugation, Applications of Centrifugation and Density Gradient.

UGBCH -04(NUTRITIONAL BIOCHEMISTRY)

Block-I

Elements of Nutrition

Unit-01 Dietary requirements of carbohydrates, lipids and proteins. Essential amino acids, essential fatty acids and their physiological functions. Malnutrition.

Block-II

Basal Metabolic Rate (BMR)

Unit-01 Concept of BMR, Factors affecting BMR, Measurement of fuel value of foods.

Block-III

Minerals

Unit-01 Nutrition importance of dietary calcium, phosphorus, magnesium, iron, iodine, zinc and copper.

Block-IV

Vitamins

Unit-01 Biochemical functions, requirements and deficiency diseases associated with vitamin B Complex, C and A,D,E, and K Vitamins.

UGBCH -05 (MICROBIOLOGY)

Block-I-History of Microbiology

Unit-01 Classification of Microbiology, Differences in prokaryotes and eukaryotes.

Block-II-Bacteria

Unit-01 Structure of bacterial cell, gram+ve and gram-ve bacteria, Microscopy- simple, compound, phase contrast and fluorescence microscopy.

Block-III-Methods for Isolation and Cultivation of Bacteria, and Fungi

Unit-01 Culture media, nutritional requirements and growth characteristics of bacteria

Block-IV

Role of Bacteria in Agriculture

Unit-01 Biological nitrogen fixation, microbes as Bio fertilizers, role of bacteria in N,P, S, C cycle.

Block-V

Genetic Recombination in Bacteria

Unit-01 Conjugation, Transduction, and Transformation.

Block-VI

Viruses

Unit-01 General Structure and Classification, properties of Viruses.

UGBCH -06(IMMUNOLOGY)

Block-I- Introduction to immune system

Unit-01 Innate and acquired immunity

Block-II-Nature of Antigen and Antibody

Unit-01 Criteria of Antigenicity, Haptens; Classification, types and functions of antibodies, antigenic determinants of immunoglobulins

Block III-Diversity in Immune System

Unit-01 Clonal Selection theory, concept of antigen specific receptor, generation of antibody diversity, T-Cell receptor diversity.

Block-IV-Measurement of antigen-antibody Interactions

Unit-01 Agglutination, Precipitations, opsonization, gel diffusion (Ouchterlony double immune diffusion), Enzyme linked immunosorbent assay

Block-V-Disorders of Immune Responses

Unit-01 Autoimmunity and Acquired immunodeficiency, immune tolerance and hypersensitivity

UGBCH -07(ENZYMOLOGY)

Block-I-Classification and Kinetics of Enzymes

Unit-01 Enzymes classification, Concept of ES Complex, Michaelis- Menten equation, Different plots for the determination of K_m , V_{max} and their physiological significances.

Block-II-Enzyme Inhibition

Unit-01 Reversible and irreversible inhibition, competitive, non-competitive and un-competitive inhibition.

Block-III-Mechanism of Enzyme Action

Unit-01 Acid-base catalysis, chemical modification of active site group; mechanism of action of chymotrypsin and lysozyme

Block-IV-Enzyme Regulation

Unit-01 General Mechanisms of enzyme regulation, feed back inhibition, Allosteric enzymes, positive and negative cooperatively with special reference to aspartate transcarbamoylase and phosphofructo kinase.

Block-V-Multienzyme System

Unit-01 Enzyme- enzyme, mechanism of action and regulation of pyruvate dehydrogenase, isoenzymes.

UGBCH -08(PLANT BIOCHEMISTRY)

Block-I-Electron Transport System in Plants

Unit-01 Oxidative phosphorylation, mitochondrial respiratory complexes, organisation of electron carriers, mechanism of ATP Synthesis .

Block II-Nitrogen Metabolism

Unit-01 Assimilation of nitrate, enzyme of nitrate reduction and their regulation, incorporation and assimilation of ammonia into organic compounds.

Block III-Photosynthesis

Unit-01 Photosynthetic apparatus and pigments involved in photosynthesis, photosystems, Hill reaction, generation of NADPH and ATP, light harvesting complexes, path of carbon in photosynthesis, C₃ and C₄ pathway of carbon reduction, photorespiration

Block IV-Secondary Plant Metabolism

Unit -01 Classification and biosynthesis of Terpenes, Lignins, Waxes and Alkaloids

Block- V-Stress Metabolism in Plants

Unit-01 A biotic and biotic Stress; Salinity, Water Stress, Chilling, Heat, Pathogenesis, Heavy metals and their impact on plant growth and metabolism

UGBCH-09(N)/UGSTAT-01

Statistical Methods

BLOCK – I . Data Collection and Its Representation

Unit-I- Data Collection and Tabulation :

Meanings, Definitions and Applications of Statistics, Measurements and Scale, Measurements of qualitative data, Methods of data collection, Types of data.

Unit-II- Representation of Data- I (Diagrammatical representation):

Frequency distribution, Tabulation of data, Diagrammatical Representation of data, Bar diagram, Multiple bar diagram, Divided bar diagram, Percentage bar diagram, Pie chart, Pictogram, leaf chart,

Unit-II- Representation of Data- I (Graphical representation):

Graphical representation of frequency distribution, Histogram, Frequency polygon, Frequency curve, Ogive.

BLOCK – II . Measures of Central Tendency and Dispersion

Unit-I- Measures of Central Tendency :

Types of measures of central tendency, Arithmetic mean, Fundamental Theorems on Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Percentiles, Deciles, and Quartiles.

Unit-II- Measures of Dispersion :

Types of measures of Dispersion, Range, Mean Deviation, Variance and Standard deviation, Effect of change of origin and scale, Relationship between measures of central tendency and measures of dispersion, Coefficient of variation.

BLOCK – II . Moments, Skewness and Kurtosis

Unit-I- Moments, Raw Moments and Central Moments :

Definition of moments, raw moments for ungrouped data, raw moments for grouped data, Central moments, Factorial moments, Interrelationship between various moments, effect of change of origin and scale on moments, Charlier's checks, Sheppard's correction for moments.

Unit-II- Skewness and Kurtosis :

Definition of skewness, Measures of skewness, Pearson's coefficient, Bowley's coefficients, Kurtosis, Measures of Kurtosis, effect of change of origin and scale.

UGBCH-10/ UGCHE -05

Bio-Physical Chemistry

Organic Chemistry-I

Block-I Fundamental Concept

Unit-1 Bonding, Functional Group Classification and Nomenclature

Unit-2 Stereochemistry-I- Isomerism, Geometrical & Optical Isomerism

Unit-3 Stereochemistry-II Configuration and Fischer Projection Formulas, Asymmetric Synthesis, Walden Inversion, Conformational Isomers, Ethane, Butane, and Cyclic Systems

Unit-4 Effect of Molecular Architecture on Physical Properties- General Ideas about the Spectroscopy, Ultraviolet Spectroscopy, Nuclear Magnetic Resonance Spectroscopy Mass Spectrometry

Unit-5 Structure Reactivity Relationships

UGBCH-11(N)/UGCHE-10

Spectroscopy

Block-I Basic Concept and Rotational Spectra

Unit-01 Spectra of Atoms

Unit-02 Symmetry of Molecules

Unit-03 Rotational Spectra

Block-II IR and Raman Spectra

Unit-04 Vibrational Spectra of Diatomic Molecules

Unit-05 Infrared Spectra of Polyatomic Molecules

Unit-06 Raman Spectroscopy

Block-III Electronic Spectra and Instrumentation

Unit-07 Electronic Spectra-I Born-Oppenheimer Approximation, Electronic States of Diatomic Molecules, Franck-Condon, Principal, Electronic Spectra, Polyatomic Molecules, Carbonyl Chromophore

Unit-08 Electronic Spectra-II Models for Metal, ligand and Interactions, Crystal field theory, Deexcitation Processes in electronic Spectroscopy

Unit-09 Optical Spectroscopy: Instrumentation and Sampling

Block-IV Resonance Spectroscopy and Mass Spectrometry

Unit-10	Nuclear Magnetic Resonance Spectroscopy
Unit-11	Electron Spin Resonance Spectroscopy
Unit-12	Mass Spectrometry
Unit-13	Exercises in Problem Solving using IR, UV, NMR and Mass Spectral Techniques

UGBCH-(L)-1

Practical's based on UGBCH-01 &02

UGBCH-(L)-2

Practical's based on UGBCH-05 &06

UGBCH-(L)-3

Practical's based on UGBCH-07 &08