

ALAGAPPA UNIVERSITY, KARAIKUDI
NEW SYLLABUS UNDER CBCS PATTERN (w.e.f. 2017-18)

B.Sc. BIOCHEMISTRY – PROGRAMME STRUCTURE

Sem	Part	Course Code	Title of the Course	Cr.	Hrs./ Week	Marks		
						Int.	Ext.	Total
I	I	711T	Tamil / Other Languages – I	3	6	25	75	100
	II	712E	English – I	3	6	25	75	100
	III	7BBC1C1	Core – I – Bio-Molecules	4	4	25	75	100
		7BBC1C2	Core – II - Cell Biology	4	5	25	75	100
		---	Core – III – Laboratory course I – Analytical Biochemistry	-	3*	-	-	-
			Allied – I (Theory only) (or)	5	5	25	75	100
			Allied – I (Theory cum Practical)	4	3	15	60	75
			Allied Practical – I	--	2**	--	--	--
	IV	7NME1A/ 7NME1B/ 7NME1C	(1) Non-Major Elective – I (A) தமிழ் மொழியின் அடிப்படைகள்/ (B) இக்கால இலக்கியம்/(C)Communicative English	2	1	25	75	100
		Total(Allied -Theory only)		21	30	-	-	600
		Total(Allied -Theory cum Practical)		20				575
II	I	721T	Tamil/other languages – II	3	6	25	75	100
	II	722E	English – II	3	6	25	75	100
	III	7BBC2P1	Core – III – Laboratory Course I – Analytical Biochemistry	4	3	40	60	100
		7BBC2C1	Core – IV – Analytical Biochemistry	4	4	25	75	100
		7BBC2C2	Core – V Intermediatory Metabolism	4	4	25	75	100
			Allied – II (Theory only) (or)	5	5	25	75	100
			Allied – II (Theory cum Practical)	4	3	15	60	75
			Allied Practical – I	2	2	20	30	50
	IV	7BES2	(3) Environmental Studies	2	2	25	75	100
		Total (Allied-Theory only)		25	30	-	-	700
		Total(Allied-Theory cum Practical)		26				725
III	I	731T	Tamil /other languages – III	3	6	25	75	100
	II	732E	English – III	3	6	25	75	100
	III	7BBC3C1	Core – VI – Enzymology	4	5	25	75	100
		---	Core – VII – Laboratory course II – Biochemistry Technique	-	5*	--	--	---
			Allied – III (Theory only) (or)	5	5	25	75	100
			Allied – III (Theory cum Practical)	4	3	15	60	75
			Allied Practical – II	--	2**	--	--	--
	IV	7NME3A/ 7NME3B/ 7NME3C	(1) Non-major Elective – II (A)இலக்கியமும் மொழிப் பயன்பாடும்/ (B) பழந்தமிழ் இலக்கியங்களும் இலக்கியவரலாறும்/ (C)Effective Employability Skills	2	1	25	75	100
		7SBS3A1/ 7SBS3A2/ 7SBS3A3	(2) Skill Based Subjects – I	2	2	25	75	100
	V	7BEA3	Extension activities	1	-	100	--	100

		Total(Allied-Theory only)		20	30	-	-	700
		Total(Allied-Theory cum Practical)		19				675
IV	I	741T	Tamil /other languages – IV	3	6	25	75	100
	II	742E	English – IV	3	6	25	75	100
	III	7BBC4P1	Core – VII – Laboratory Course II – Biochemistry Technique	4	4	40	60	100
		7BBC4C1	Core – VIII – Human Physiology	4	5	25	75	100
			Allied – IV (Theory only) (or)	5	5	25	75	100
			Allied – IV (Theory cum Practical)	4	3	15	60	75
		Allied Practical - II	2	2	20	30	50	
	IV	7SBS4B1/ 7SBS4B2/ 7SBS4B3	(2) Skill Based Subjects – II	2	2	25	75	100
7BVE4/ 7BMY4/ 7BWS4		(4) Value Education / Manavalakalai Yoga / Women’s Studies	2	2	25	75	100	
		Total(Allied-Theory only)		23	30	-	-	700
		Total(Allied-Theory cum Practical)		24				725
V	III	7BBC5C1	Core – IX – Molecular Biology	4	5	25	75	100
		7BBC5C2	Core – X – Clinical Biochemistry	4	5	25	75	100
		7BBC5C3	Core – XI – Human Genetics	4	5	25	75	100
		-----	Core – XII – Laboratory Course III – Basic Microbiology and Immunology	-	3*	--	--	---
		-----	Core – XIII – Laboratory Course IV – Basic Clinical Biochemistry	-	3*	--	--	---
		7BBCE1A/ 7BBCE1B	Elective – I – A) Microbiology & Immunology (or) B) Diagnostic Biochemistry	5	5	25	75	100
	IV	7SBS5A4/ 7SBS5A5/ 7SBS5A6/ 7SBS5A7	(2) Skill Based Subjects – I	2	2	25	75	100
		(2) Skill Based Subjects – I	2	2	25	75	100	
	Total			21	30	--	--	600
VI	III	7BBC6P1	Core – XII – Laboratory course III – Basic Microbiology and Immunology	4	3	40	60	100
		7BBC6P2	Core–XIII–Laboratory Course IV – Basic Clinical Biochemistry	4	3	40	60	100
		7BBC6C1	Core – XIV – Nutrition Biochemistry	4	5	25	75	100
		7BBC6C2	Core – XV – Plant Biochemistry	4	5	25	75	100
		7BBCE2A/ 7BBCE2B	Elective – II – A)Biotechnology (or) B) Drug Biochemistry	5	5	25	75	100
		7BBCE3A/ 7BBCEPR	Elective – III – A) Biostatistics & Bioinformatics(or) B) Mini Project	5	5	25	75	100
	IV	7SBS6B4/ 7SBS6B5/ 7SBS6B6/ 7SBS6B7	(2) Skill Based Subjects – II	2	2	25	75	100
		(2) Skill Based Subjects – II	2	2	25	75	100	
Total				30	30	--	--	800
Grand Total				140	180	--	--	4100

**** University Examinations will be held in the even semester**

B.Sc. BIOCHEMISTRY
I YEAR – I SEMESTER
COURSE CODE: 7BBC1C1

CORE COURSE - I – BIO-MOLECULES

Unit I GENERAL INTRODUCTION

Structure of atoms and molecules - chemical bonds such as Van der Waals, electrostatic, hydrogen and covalent bond. Properties of water- its importance for living organisms. Acid and bases-Lewis concept of acid and bases, titrable acidity, pH, pOH, buffer, pH of body fluids, buffer in body fluids, Red blood cells, white blood cells, tissues and its role. Measurement of pH by indicator and glass electrode.

Unit II CARBOHYDRATES

Monosaccharides: Definition, Classification, Structure of Open – Chain, Haworth and Fischer formula, Stereoisomerism, Optical isomerism, Reactions of functional groups of sugars: Aldehyde, Keto and Hydroxyl groups.

Di, Tri, and Oligosaccharides: Occurrence, Composition, Structure and Biological role of Sucrose, Lactose, Maltose, Raffinose.

Polysaccharides: Occurrence, Composition, Structure and Biological role of Cellulose, Chitin, Inulin, Starch, Glycogen.,

Unit III PROTEINS

Chemistry of monomeric units of proteins: Classification of Amino acids based on its side chains, Structure of Amino acids, Zwitterion, pKa and Optical properties of aminoacids. Essential aminoacids. Isoelectric pH , acid base properties of amino acids. Formation of peptide bond

Structure: Hierarchical structure of proteins: Primary structure – peptide bond and its characteristics, Secondary structure – alpha-helix and Beta-pleated sheets, Tertiary structure: Myoglobin , Quaternary structure – Hemoglobin.

Unit IV LIPIDS

Lipids: Definition and classification. Fatty acids: introduction, classification, nomenclature, structure and properties of saturated and unsaturated fatty acids. Essential fatty acids. Triacylglycerols: nomenclature, physical properties, chemical properties and characterization of fats - hydrolysis, saponification value, acid value, rancidity of fats, Reichert-Meissel number. Glycerolipids, glycerophospholipids, sphingolipids, sterol lipids.

Unit V NUCLEIC ACIDS AND VITAMINS

Nucleic acids: Bases, nucleosides and nucleotides, polynucleotide. Structure, types and biological role of DNA and RNA

Vitamins: Source, Structure, deficiency diseases and biochemical functions of water soluble and fat soluble vitamins and their coenzyme activity.

Text Books:

1. Biochemistry by N.Arumugam, Saras Publications,3rd edition (2010)(For Unit 1,2 &3)
2. Biochemistry by U.Sathyanarayana, Allied Books Publishers, 4th edition, 2007, (For Unit 4 &5)

Books for Reference:

1. Biochemistry (4th Edition) – Geoffrey Zubay
2. Biochemistry – Stryer
3. Principles of Biochemistry – Lehninger
4. Harper's Biochemistry
5. Fundamentals of Biochemistry – Voet & Voet
6. Fundamentals of Biochemistry – J.L. Jain
7. Biochemistry (2nd Edition) – Ian D.K. Halkerston
8. Nucleic acids: Structure, Properties and Functions – Victor A. Bloomfield
9. Biochemistry by Lubert Stryer, Free man Publishers Ltd, 5th edition (2002)
10. Biochemistry by Voet & Voet, Wiley Publications, 2nd Edition (2003)



**I YEAR – I SEMESTER
COURSE CODE: 7BBC1C2**

CORE COURSE - II - CELL BIOLOGY

Unit I Structure and molecules of Cells

Characteristic features of prokaryote and eukaryotes, Structure of eukaryotic cells, Structure of Plasma membrane - phospho lipid bilayer and Fluid mosaic model; Functions of plasma membrane- transport of small molecules - passive diffusion, facilitated diffusion and carrier proteins. Ion channels; Active transport driven by ATP and Ion gradients. Membrane lipids and membrane proteins; Composition of the Cell- Carbohydrate, Lipid, Nucleic acids and Proteins. Cytoplasmic matrix and chemical composition of cytosol.

Unit II Structure and functions of cell organelles

Morphology; ultrastructure and functions of Endoplasmic Reticulum (ER), Golgi apparatus, Cytoskeleton, Vesicle, Ribosome, Lysosome, Microbodies, Peroxisomes and Glyoxysomes, centrioles, Cilia, flagella, Mitochondria, Nucleus and nucleolus.

Unit III Nucleic acids and Organization

Internal organization of nucleus, Chromosomes- ultrastructure, composition and karyotyping single stranded and multi stranded hypotheses, folded-fibre model and nucleosome concept, nucleosome and solenoid model of chromatin, solenoid models, functions ; giant chromosomes – polytene chromosomes, lampbrush chromosomes. DNA replication, Central dogma- Transcription and translation.

Unit IV Metabolism, cell division and growth

Cell metabolism-catalytic activity of enzymes, metabolic energy, functions of adenosine triphosphate (ATP); oxidation of carbohydrates – glycolysis, oxidative decarboxylation, Krebs cycle, respiratory chain and oxidative phosphorylation.

Cell cycle and mitosis - general events of interphase, prophase, metaphase, anaphase, telophase, Meiosis- kinds of meiosis, process of meiosis, heterotypic division or first meiotic division, homotypic or second meiotic division significance of mitosis; meiosis.

Unit V Cancer

The Biology of Cancer, types, causes; properties of cancer cells; Genetics of cancer- Role and identification of tumor suppressor genes and oncogenes. Functions of tumor suppressor gene and oncogenes products; Apoptosis and cancer.

Books for Reference:

1. The Cell: A Molecular Approach, Fourth Edition (2007) By Geoffrey M. Cooper and Robert E. Hausman.
2. Cell And Molecular Biology: Concepts And Experiments, 6th Edition (2010) By Gerald Karp.
3. Molecular Biology of The Cell, Fourth Edition (2002) By Bruce Alberts Et Al.,
4. Cell Biology, Genetics, Molecular Biology, Evolution And Ecology (2005) By P.S. Verma And V.K. Agarwal.



**I YEAR – I/II SEMESTER
COURSE CODE: 7BBC2P1**

**CORE COURSE - III – LABORATORY COURSE – I –
ANALYTICAL BIOCHEMISTRY
(University Examination will be held in the second semester only)**

1. Preparation of Buffers- Phosphate, Acetate and Citrate
2. Determination of pH of Buffer Solution using Indicators and pH meter
3. Titration Curve of Amino acids
4. Verification of Beer – Lambert’s Law
5. Qualitative Analysis of Biomolecules
 - i. Qualitative Analysis of Carbohydrates
 - Monosaccharide’s :- Pentose, Glucose, Fructose, Mannose
 - Disaccharides : - Sucrose, Maltose, Lactose
 - Polysaccharides :- Starch, Dextrin and Glycogen
 - ii. Qualitative Analysis of Lipids
 - iii. Qualitative Analysis of Amino acids and Proteins
 - Aliphatic :- Histidine, Arginine, & Proline
 - Aromatic:- Tyrosine, Tryptophan, Phenylalanine
 - Sulphur containing aminoacids:- cysteine, cystine & methionine
6. Biochemical Preparation
 - i. Starch from Potato
 - ii. Casein from Milk
7. Separation of Amino Acids by Circular Chromatography
8. Isolation of glycogen from goat liver



**I YEAR – II SEMESTER
COURSE CODE: 7BBC2C1**

CORE COURSE - IV– ANALYTICAL BIOCHEMISTRY

Unit I CENTRIFUGATION

Basic principles: Sedimentation principle, relative centrifugal force, revolutions per minute, RCF Vs RPM, G-force; types of rotors; Preparative and analytical centrifuges; — Density gradient centrifugation; Application of analytical ultra centrifuge; Swedberg value; safety aspects in the ultra centrifuge.

Unit II CHROMATOGRAPHY

General principles – column, paper and thin layer chromatography – Adsorption – Affinity – Ion exchange – Exclusion – Gas – Liquid Chromatography and HPLC. Application and selection of chromatography method for biology.

Unit III ELECTROPHORESIS

Theory of electrophoresis, types of electrophoresis: moving boundary and zone electrophoresis, paper electrophoresis, cellulose acetate strip and polyacrylamide gel electrophoresis. SDS-PAGE- vertical and horizontal electrophoresis and their applications. Agarose gel electrophoresis and its applications. Isoelectric focusing-theory and applications.

Unit IV COLORIMETRY AND SPECTROPHOTOMETRY

Beer-Lambert law and its limitations, Light absorption and transmission, Extinction coefficient. UV and visible absorption spectroscopy, Fourier Transform Infra red spectroscopy, Atomic absorption spectrophotometer. Biochemical applications of spectrophotometers. Principle and Application of fluorimetry.

Unit V NUCLEAR CHEMISTRY

Radio isotopes, units of radio activity, half life, β and γ - emitters. Detection and measurement of radioactivity - Methods based upon ionization – GM counter, excitation – Scintillation counter. Autoradiography – Application of radio isotopes in the elucidation of metabolic pathways, clinical scanning and radio dating, radio immuno assay. Biological hazards of radiation and safety measures in handling radio isotopes.

Text Books:

1. Analytical Biochemistry by P.Asokan, Chinna Publications, 2nd edition, (2005) (For Unit 1, 2 & 3)
2. Biophysical chemistry – Principles and Techniques by Upathayaye and Nath, Himalaya Publishers, 3rd edition, (2002) (For Unit 4 & 5)

Books for Reference:

1. Practical Biochemistry – Wilson & Walker
2. Instrumental Analysis using Spectroscopy – Meloon
3. A biologist's Guide to Principles and Techniques of Practical Biochemistry – Wilson&Goulding
4. Hand Book of Instrumental techniques for analytical chemist – Frank Settle.
5. Biochromatography Theory and Practice – M.A. Vijayalakshmi
6. Principles and techniques of practical Biochemistry by Wilson and Walker University Press, Cambridge, 5th editon (2000)



**I YEAR – II SEMESTER
COURSE CODE: 7BBC2C2**

CORE COURSE - V – INTERMEDIATORY METABOLISM

Unit I CARBOHYDRATE METABOLISM

Glycolysis – aerobic and anaerobic, energetic of glycolysis. TCA cycle – amphibolic nature, energetics of TCA cycle. Glyoxalate cycle. Pentose phosphate pathway. Glycogenesis. Glycogenolysis. Gluconeogenesis and cori cycle (in liver)

Unit II BIOENERGETICS

Introduction to bioenergetics. High energy compounds (ATP, phosphocreatinine, phosphoenol pyruvate, glucose-6-phosphate). Exergonic and endergonic reactions. Role of ATP/ADP cycle in transfer of high-energy phosphate. Substrate-level phosphorylation Mitochondrion: Structure of mitochondrial membranes, Mitochondrial enzymes. Electron transport chain and oxidative phosphorylation – Theories of ATPase- Uncouplers of oxidative phosphorylation.

Unit III AMINO ACID METABOLISM

A brief account of amino acid metabolism: Glucogenic and ketogenic amino acids - Deamination, Transamination. Metabolism of glucogenic (glycine, cysteine, proline); ketogenic (leucine, lysine) and both glucogenic and ketogenic amino acids (phenylalanine) , Reactions of Urea cycle and its disorders.

Unit IV LIPID METABOLISM

Oxidation of fatty acids: Even number carbon atoms, α , β and ω – oxidations, energetic of β -oxidation – ketone body metabolism, glycerol metabolism – biosynthesis of fatty acids, Triglycerides and Phospholipids. Cholesterol metabolism.

Unit V NUCLEIC ACID METABOLISM

Structures of purines and pyrimidines. Biosynthesis and catabolism of nucleotides – Biosynthesis of nucleotide coenzymes – inhibitors of nucleotide biosynthesis

Text Books:

1. Understanding enzymes by Trevor Palmer, Prentice Hall Publishers, 4th edition (1997) (For Unit 1, 2 &3)
2. Enzymes by P.Asokan, Chinna publications , 2nd edition, (2005) (For unit 4 & 5)
3. Biochemistry by Harper,Mc Graw Hill publishers,25th edition(2003)(For Unit 1,2 & 3)
4. Biochemistry by U.Satyanarayana, Allied Book Publishers, 3rd edition (2006) (For Unit 4 & 5).

Books for Reference:

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|---------------------------------|---|-------------|
| 1. Fundamentals of Biochemistry | – | Voet & Voet |
| 2. Principles of Biochemistry | – | Lehninger |
| 3. Biochemistry | – | Stryer |

4. Biochemistry – Zubay
5. Herper's Biochemistry (25th Edition)
6. Textbook of Biochemistry – Devlin
7. Enzymes by Dixon and webb, Academic Press, New York (1982)
8. Fundamentals of Biochemistry by J.L.Jain,S.Chand & Company Ltd,4th edition (2005).
9. Biochemistry by S.Nagini, Scitech Publications (2007)



**II YEAR – III SEMESTER
COURSE CODE: 7BBC3C1**

CORE COURSE - VI – ENZYMOLOGY

Unit I INTRODUCTION

History, general characteristics, nomenclature, IUB enzyme classification with examples, significance of numbering system. Definitions with examples of holoenzymes, oligomeric enzymes and multienzyme complexes. Enzyme specificity.

Unit II ENZYME CATALYSIS

Role of co-factors in enzyme catalysis: NAD/NADP⁺, FMN/FAD, CoA, biotin, lipoamide, TPP, pyridoxal phosphate, THF and metal ions with special emphasis on co-enzyme functions. Acid-base catalysis, covalent catalysis, proximity and orientation effects, strain and distortion theory. Mechanism of actions of chymotrypsin, carboxypeptidase, Ribonuclease and lysozyme.

Unit III ENZYME KINETICS

Enzyme kinetics – MM equation, LB plot, Eadie and Hofstee plot, Factors affecting enzyme activity, Enzyme catalysis – covalent catalysis, acid base catalysis. Bisubstrate reactions. Enzyme inhibition. Allosteric regulation.

Unit IV ENZYME PURIFICATION

Importance of Enzyme purification. Strategies for purification- yield, catalytic activity and purity. Homogenization in enzyme purification; Techniques for separation- size based methods (centrifugation, size exclusion chromatography, dialysis, ultrafiltration), polarity based method (Ion-exchange chromatography), solubility based precipitation methods (change in pH, ionic strength, dielectric constant), ligand based method (ligand affinity chromatography)

Unit V INDUSTRIAL AND CLINICAL APPLICATION OF ENZYMES

Immobilization of enzymes and their industrial applications. Production of glucose from starch, cellulose and dextrin; use of lactase in dairy industry; production of glucose – fructose syrup from sucrose; use of proteases in food, detergent, leather and textile industry; medical application of enzymes; use of glucose oxidase in enzyme electrodes.

Text Books:

1. Understanding enzymes by Trevor Palmer, Prentice Hall Publishers, 4th edition (1997)(For Unit 1, 2 &3)
2. Enzymes by P.Asokan, Chinna publications , 2nd edition, (2005) (For unit 4 & 5)

Books for Reference:

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|-------------------------------|---|---------------------------------|
| 1. Enzymes | – | Malcolm Dixon |
| 2. Understanding of Enzymes | – | Trevor Palmer |
| 3. Biochemistry | – | Geoffrey Zubay |
| 4. Biochemistry | – | Lubert Stryer |
| 5. Enzymes by Dixon and webb, | | Academic Press, New York (1982) |



II YEAR – III / IV SEMESTER
COURSE CODE: 7BBC4P1

CORE COURSE - VII – LABORATORY COURSE – II –
BIOCHEMISTRY TECHNIQUE
(University Examination will be held in fourth semester only)

1. Estimation of Reducing Sugar by Dinitro salicylic acid method
2. Estimation of Protein by Lowry's method
3. Estimation of Free amino acids by Ninhydrin method
4. Estimation of Cholesterol by Zak's method
5. Estimation of DNA by Di-phenyl amine method
6. Estimation of RNA Orcinol method
7. Estimation of Haemoglobin by Drabkin's Method
8. Estimation of Iron by 2,2'-Bipyridyl method
9. Estimation of Vitamin 'C'
10. Estimation of Chlorophyll
11. Estimation of Cellulose.
12. Determination of Acid Number
13. Determination of Saponification Number
14. Determination of Total Activity of Salivary amylase
15. Determination of Total Activity of Alkaline Phosphatase



**II YEAR – IV SEMESTER
COURSE CODE: 7BBC4C1**

CORE COURSE - VIII – HUMAN PHYSIOLOGY

Unit I BLOOD AND BODY FLUIDS

Extra cellular fluid – plasma, interstitial fluid and transcellular fluid: Lymph and blood composition, functions, osmolarity of the body fluids, ionic composition, electrolytes and body buffers. Blood cells, hemoglobin, haemopoiesis, and coagulation and blood groups.

Unit II DIGESTIVE SYSTEM

Structure of digestive system. Composition, function and regulation of saliva, gastric, pancreatic, intestinal and bile secretions – digestion and absorption of carbohydrates, lipids, proteins, nucleic acids, minerals and vitamins.

Unit III EXCRETORY SYSTEM

Structure of nephron, formation of urine, glomerular filtration, tubular reabsorption of glucose, water and electrolyte balance – role of kidney and hormones in their maintenance.

Unit IV ENDOCRINE SYSTEM

A brief outline of various endocrine glands and their physiological roles; Biosynthesis, storage and secretion of both peptide and steroid hormones. Amino acids as hormones. Feed back regulation of hormone secretion, hormone receptors and their activation, mechanisms of intracellular and extra cellular hormone action.

Unit V RESPIRATORY SYSTEM

Anatomy and physiology of respiration, exchange of gases between lung and blood and between blood and tissues. Role of lung and kidney in acid base balance. Acidosis and alkalosis.

Text Books:

1. Human Physiology by Chatterjee, Medical Allied Publications, 3rd edition, 2004 (for Unit 1 & 2)
2. Animal Physiology by N. Arumugam, Saras Publications, 2nd edition, 2008 (For Unit 3, 4 & 5)

Books for Reference:

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|--|---|-------------------------|
| 1. Human Physiology: Vol. I & II | – | C.C. Chatterjee |
| 2. Functions of the Human Body | – | Guyton, A.C., |
| 3. The living body | – | Best C.H. & Taylor N.B. |
| 4. Human Physiology – Systemic & Applied | – | Sahalya |
| 5. Human Physiology | – | Stuart Erafox |
| 6. Human Physiology | – | Rhoades |
| 7. Handbook of Physiology | – | Jefferson |
| 8. Human Physiology by Guyton, Saunders Publishing Ltd, 9 th edition (2004). | | |
| 9. Physiology and Biochemistry by R.A. Agarwal, S.Chand Company Publishers, 3 rd edition (1986) | | |



**III YEAR – V SEMESTER
COURSE CODE: 7BBC5C1**

CORE COURSE - IX – MOLECULAR BIOLOGY

Unit I BASICS OF MOLECULAR BIOLOGY

Nucleic acids structure: DNA as genetic material, Watson-Crick model, A, B and Z forms of DNA; RNA types, distinctions between RNA and DNA. Experimental evidence – Griffith, McLeod, McCarty and Avery, Herschey-Chase experiments. Definition of gene, organization of genes and non-coding DNA in prokaryotes. Eukaryotes- unique, moderately repetitive and highly repetitive DNA sequence, satellite DNA, Cot value

Unit II DNA REPLICATION

DNA replication in prokaryotes, mode of replication, Semiconservative modes of replication. An overview of replication – replication eye, replication forks, semi discontinuous replication, Okazaki fragments, RNA primers – Enzymes of replication – DNA polymerases I, II, III, Topoisomerases, Helicases binding proteins and ligases. Role of Telomeres in eukaryotic DNA replication, Inhibitors of replication.

Unit III TRANSCRIPTION

Steps in prokaryotic transcription: initiation, elongation, termination, and the factors involved in transcription. Difference between prokaryotic and eukaryotic transcription. Factors involved in eukaryotic transcription. Post transcriptional processes and its importance. Inhibitors of transcription.

Unit IV TRANSLATION

Genetic code, degeneracy, codon usage, wobble hypothesis. Ribosome – Prokaryotic and Eukaryotic origin. Steps in translation – Initiation, elongation, termination, and the factors (both Prokaryotes and Eukaryotes) involved in translation, Inhibitors of Translation. Post translational modification: Formation of disulphide bonds, proteolytic cleavage, protein glycosylation – N linked oligosaccharides, O linked oligosaccharides Acetylation and Methylation.

Unit V DNA Damage and repair

DNA damage by chemical and physical agents. Mutation – definition, type of mutations (spontaneous, induced and point mutation). Types of repair mechanisms: Base excision repair (BER), Nucleotide excision repair (NER), Mismatch repair (MMR), Double-strand break repair, Non-homologous end joining, Homologous recombination, and SOS repair.

Gene regulation – Lac operon and Tryptophan operon.

Text Books:

1. Cell Biology by S.C.Rastogi , New Age International Publishers, 3rd edition (2007) (For Unit 1 &2)
2. Molecular Biology by Freifelder, Narosa Publishing House, 4th edition, (1999) (For Unit 3,4 &5)

Books for Reference:

1. Molecular Cell Biology (2007) by Harvey Lodish, Arnold Berk, Lawrence Zipursky, Paul Matsudaira, David Baltimore, James Darnell.
2. The Cell by Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, Keith Roberts, and James D. Watson.
3. Biochemistry by Zubay 4th Edition.
4. Molecular Biology by David Freifelder.
5. Biochemistry and Molecular Biology by H. Ellicot and C. Ellicot.
6. Biochemistry and Molecular Biology by William .H.Elliot, Oxford University Press, 3rd edition (2007)
7. Concepts in Molecular Biology by S.C.Rastogi , New Age International publishers, 2nd edition (2005).



**III YEAR – V SEMESTER
COURSE CODE: 7BBC5C2**

CORE COURSE - X – CLINICAL BIOCHEMISTRY

Unit I DISORDERS OF CARBOHYDRATE METABOLISM

Sugar level in normal blood – Hypo and Hyperglycemia, Renal threshold, Glycosuria, Glucose tolerance test. Diabetes mellitus. Glycogen storage disease- types and characteristics. Galactosemia., Hereditary fructose intolerance. Mucopolysaccharidoses. Inborn errors of carbohydrate metabolism.

Unit II DISORDERS OF LIPID METABOLISM

Hypo and Hyper lipoproteinemias, disorders of triglycerides, Phospholipids and Cholesterol metabolism. Steatorrhea. Gaucher's disease- types and characteristics. Tay-Sachs disease. Niemann-Pick disease. Fabry's disease. Inborn errors of lipid metabolism.

Unit III DISORDERS OF AMINO ACID AND PROTEIN METABOLISM

Amino acid metabolism in starvation, Disorders of plasma protein – γ -globulinemia, proteinuria. urea, uric acid, creatinine, ammonia. Uremia, Uremia and Porphyrria. Maple syrup urine disease. Phenylketonuria . Homocystinuria. Tyrosinemia. Inborn errors of amino acid metabolism.

Unit IV DISORDERS OF NUCLEIC ACID METABOLISM

Gout, Lesch – Nyan syndrome, orotic aciduria, Dihydropyrimidine dehydrogenase deficiency. Dihydropyrimidinuria. Adenosine phosphoribosyl transferase deficiency, Adenosine deaminase deficiency and xanthinuria.

Unit V IMMUNOLOGICAL DISORDERS

Disorders of Immunoglobulin synthesis, allergy (types, causes and physiology) and Hypersensitivity reactions and its types, Autoimmune diseases (Rheumatoid arthritis, Graves disease, Type I diabetes, Systemic lupus erythematosus) .

Text Books:

1. Medical Biochemistry by N.V.Bhagavan, Elsevier Publishers (2002) (For Unit 1 &2)
2. Text Book of Biochemistry by M.N.Chatterjee, Jaypee Publishers (2006) (For Unit 3, 4 &5)

Books for Reference:

1. Physiological Chemistry – Hawk's
2. Practical Clinical Biochemistry – Harold Varley
3. Clinical Biochemistry – Tietz
4. Biochemistry – Chatterjee
5. Practical Clinical chemistry methods and Interpretations – Chawla
6. Fundamentals of Biochemistry by Ambika shanmugam, S.Chand Publishers (1986)
7. Medical Laboratory Technology by Mukherjee, Tata Mc Graw Publishers (1988)



**III YEAR – V SEMESTER
COURSE CODE: 7BBC5C3**

CORE COURSE - XI - HUMAN GENETICS

Unit I BASICS OF GENETICS AND GENE EXPRESSION

Introduction to genetics – Scope and significance of genetics, DNA – Types and structures, RNA – Types and functions, gene expression – Eukaryotic transcription - RNA splicing and processing, Overview of translation – mechanism - Post-translational modifications.

Unit II ORGANIZATION OF CHROMOSOMES AND CHROMOSOMAL ABNORMALITIES

Chromosomes – Structure and Functions, Organization of chromosomes, Chromosome banding, Karyotyping, Chromosomal abnormalities, Sex linked inheritance – Hemophilia, color blindness, Lesch-Nyhan syndrome, Sex chromosome abnormalities – Trisomy X, Klinefelter syndrome, Turner syndrome.

Unit III MENDELIAN PRINCIPLES AND CHROMOSOME MAPPING

Principle of Genetic Transmission – Mendel's Law of dominance, segregation and independent assortment, Chromosome mapping – Linkage and crossing over – molecular mechanism of crossing over, Mapping with molecular markers – Single nucleotide polymorphisms.

Unit IV TRANSPOSONS, MUTATION AND REPAIR MECHANISMS

Transposons – Eukaryotic transposable elements - mechanism of transposition - DNA transposons – retrotransposons - transposable elements in human genome (LINEs and SINEs), Mutation – mechanism (base analogs, intercalating agents) and types, DNA repair mechanisms – Photoreactivation - excision repair –SOS repair

Unit V POPULATION GENETICS, CANCER AND HUMAN GENOME PROJECT

Population genetics – Genetic pool - Hardy-Weinberg law of equilibrium - genetic drift and population size, Pedigree analysis, allelic frequency, selection, Cancer genetics – Oncogenes, proto-oncogenes - tumor suppressor genes, Outline of Human genome project.

Books for Reference:

1. Human molecular genetics, Second Edition (1999) by Strachan T, Read A.P.
2. Introduction to genetic analysis, Tenth Edition (2012) by Anthony J.F. Griffiths, Susan R. Wessler, Sean B. Carroll and John Doebley.
3. A textbook of Human Genetics (2011) by Amita Sarkar.
4. Genetics- Analysis of genes & genome, Fifth Edition (2000) by D.L. Hartl and E.W. Jones EW
5. Genes VIII (2004) by Benjamin Lewin
6. Genetics – A conceptual approach, Fourth Edition (2012) by Benjamin A. Pierce
7. Molecular Biology of the Gene, Fifth Edition (2004) by James D Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine and Richard Losick, Benjamin Cummings.



III YEAR – V / VI SEMESTER
COURSE CODE: 7BBC6P1

CORE COURSE - XII – LABORATORY COURSE – III –
BASIC MICROBIOLOGY AND IMMUNOLOGY

(University Examination will be held in sixth semester only)

1. Separation of Blood and Serum
 - a. Estimation of proteins from serum by Lowry Method
 - b. Determination of albumin and A/G ratio on Serum
2. Estimate the following constituents in Blood and Serum
 - a. Blood Urea
 - b. Blood Sugar
 - c. Blood Cholesterol
 - d. Serum Creatinine
 - e. Serum Inorganic Phosphorus
3. Urine Qualitative Analysis / Normal / Abnormal Constituents
 - a. Estimation of Urea in Urine
 - b. Estimation of Creatinine in Urine
 - c. Estimation of Chloride in Urine
 - d. Determination of titrable acidity in Urine
4. Separation of Plant Pigments by Column Chromatography
5. Separation of serum protein from paper electrophoresis.
6. Preparation of Yoghurt
7. Production of Saukrauet
8. Mushroom cultivation.

Text Books:

1. Immunology by N.Arumugam, Saras Publications (2009)
2. Immunology by Kuby , Freeman Publishers, 6th edition (2008)
3. Microbiology by N.Arumugam, Saras Publications , (2005)

Books for Reference:

1. Immunology by Roit, Wiley Black well publishers, 12 th edition (2009)
2. Immunology by Tizard, Elsevier Publishers, 8th edition (2010).
3. Microbiology by Michael Pelczar, Tata Mc Graw Hill Publications (2010)
4. Madigan et al. Brock Biology of microorganisms 10th ed. Prentice Hall, 2002.
5. Davis et al Microbiology 4th ed. Lippincott Williams and Wilkins, 1989.
6. Joklik et al. Zinsser's Microbiology Mc Graw-Hill Professional, 1995.



III YEAR – V / VI SEMESTER
COURSE CODE: 7BBC6P2

CORE COURSE - XIII – LABORATORY COURSE – IV -
BASIC CLINICAL BIOCHEMISTRY

(University Examination will be held in sixth semester only)

1. Cleaning of Glassware
2. Preparation of Simple Culture Media
3. Selection of Suitable Culture Media
4. Staining Techniques
 - a. Smear Preparation and Fixation
 - b. Simple Staining, Grams Staining, Negative Staining and Spores Staining
5. Determination of Bacterial Growth curve.
6. Isolation of Microbes:- Serial dilution technique and Streak plate technique
7. Biochemical Reactions of Bacteria
 - a) Starch Hydrolysis b) Casein Hydrolysis.
8. Estimation of Acidity in milk.
9. Microbial quality of milk-methylene blue reduction test.
10. ABO Blood Grouping, Rh factor typing, RBC, WBC Count, ESR.
11. Estimation of Haemoglobin by Sahle's Method.
12. Antigen Preparation.
13. Enumeration of Bacterial count on food products.
14. Determination of Microbial Quality of Milk.
15. Ammonium Sulphate precipitation in protein.



**III YEAR – V SEMESTER
COURSE CODE: 7BBCE1A**

ELECTIVE COURSE - I (A) – MICROBIOLOGY & IMMUNOLOGY

Unit I ORGANISATION AND STRUCTURE OF MICROORGANISMS

General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology and mode of reproduction and economic importance.

Prokaryotic organization – Cytoplasmic membrane and their functions – Mesosomes, cell wall – Gram positive and Gram negative bacteria and their reactions, capsule and slime layers– flagella and cilia – bacterial chromosome, plasmids, ribosomes, reserved food – endospore.

Unit II BACTERIAL NUTRITION

Growth and reproduction – autotrophic and heterotrophic nutrition – bacteria photosynthesis – chemolithotrophy, bacterial metabolism – fermentation – homofermentative and heterofermentative types – binary fission – other modes of reproduction – conjugation – transformation – transduction – sporulation – kinetics of bacterial growth – normal growth curve.

Unit III APPLIED, FOOD & INDUSTRIAL MICROBIOLOGY

Food spoilage, food poisoning and food borne infection. Use of microbes in industries, ethanol production, organic acid (lactic and citric acid) production, antibiotics (Pencillin and Streptomycin) production.

Microorganism and milk: Sources of microorganism, fermentation of milk, specific fermentation of milk souring, gassiness, aroma and flavor, proteolysis, alkali production, ripeness, sweet curding, bitter flavour and miscellaneous fermentations.

Unit IV IMMUNOLOGY

Introduction to cells and organs of the immune system. Immunity (Innate, Acquired), antigen (Immunogen, Hapten, T-cells dependent and independent antigens), antibodies (types and structure), host resistance. Antigen – Antibody interactions: Affinity and Avidity, Epitope, paratope, Idiotypes. Vaccines. Immunodiagnostics - ELISA and RIA, immuno Electrophoresis

**Unit V COMPLEMENT SYSTEM AND TRANSPLANTATION
IMMUNOLOGY**

Components of the Complement system; Activation pathways (Classical, Alternative and Lectin pathways); Biological consequences of complement activation

Transplantation – Organization of MHC locus (Mice & Human); Structure and Functions of MHC I & II molecules. Graft rejection, transplantation antigens, HLA and mechanism of graft rejection and tissue typing. Prevention of graft rejection – immuno suppressive agents and immuno surveillance.

Books for Reference:

- | | | |
|---------------------------------------|---|-------------------------------|
| 1. Microbiology (5 th Edn) | – | Michael J. Pelezar |
| 2. Microbiology | – | Engine W. Nester Roberts |
| 3. Microbiology | – | Pelzar and Reig |
| 4. Immunology | – | Janis Kuby |
| 5. Immunology | – | Eli Benjamini |
| 6. Cellular and Molecular Immunology | – | Abut K. Abbas & A.K. Lichtman |
| 7. Immunology | – | Richard M. Hyde |
| 8. Immunology | – | Goldsby |
| 9. Introduction to Microbiology | – | Ingraham. |



**III YEAR – V SEMESTER
COURSE CODE: 7BBCE1B**

ELECTIVE COURSE - I (B) –DIAGNOSTIC BIOCHEMISTRY

Unit I

Clinical chemistry tests- Blood group, glycosylated haemoglobin, fructosamine, GTT, uric acid, Ca, P, Fe, Cu, CSF analysis.

Unit II

Enzymes: Acid phosphatases, LDH, CPK, CPK_MB, Alpha amylase, Hormones- T3, TSH, LH. Immunoglobulins- IgA, IgM, IgE.

Unit III

Serodiagnostic procedures- precipitation tests, VDRL test, Vidal test, (Slide and tube method) Brucella agglutination test, ASO test, RA test, CRP test.
Complement fixation test, skin test- Montaux test, Lepramin test.

Unit IV

Complete haemogram, complete urine analysis, complete motion analysis, semen analysis.

Unit V

Blood bank, blood group and Rh factor, Coomb's test, Coagulation studies, Prothrombin test (PT), Partial PT, Plasma fibrinogen.
Test for amino acidurias- Test for phenyl ketonuria, DNPH, Test for keto acids, sodium nitroprusside test for Cystinuria and homocysteine.

Books for Reference:

1. Varley.H (1985), Practical Clinical Biochemistry, IV Edition
2. Tietz. N (1982), Fundamentals of Clinical Chemistry, W.B. Saunders Company
3. Jacques Wallach (1982), Interpretation of Diagnostic test – A Synopsis, V Edition, Little Brown and Company.
4. Jone Zilva & Pannall.P.R. , Clinical Chemistry, Diagnosis and treatment, PG Publishing Pvt. Ltd.



**III YEAR – VI SEMESTER
COURSE CODE: 7BBC6C1**

CORE COURSE - XIV – NUTRITION BIOCHEMISTRY

Unit I INTRODUCTION TO FOOD SCIENCE

Definition of foods and nutrition. Functions of food and its relation to nutritional and clinical health, Basic food groups: Energy giving foods, body building foods and protective foods. Essential nutrients, RDA for average Indian, analysis of food composition, food habits, food fads and fallacies.

Unit II ENERGY

Definition and unit of energy – Kcal, RQ, SDA. Basal metabolism, measurement of BMR, factors affecting BMR, regulation of body temperature, energy needs, total energy requirements, estimation of energy requirements and energy value of foods.

Unit III MINERAL AND VITAMIN NUTRITION

Essential micro and macro nutrients, distribution, sources, functions and abnormalities.

Vitamins: Definition, classification, sources, distribution, metabolism, function, abnormalities, minimum requirements and optimum allowances, assay of vitamins, deficiency and excess.

Unit IV BALANCED DIET FORMULATION

Assessment of nutritional status. Nutrition at various stages of growth and development: Diets for infants. Children, adolescent, pregnant women, lactating mothers and older persons. Nutritional therapy during stress, anemia, obesity, diabetes mellitus and allergy Protein nutritional Nitrogen balance, quality of food proteins and requirements, protein nutrition abnormalities, protein deficiency disorder, PEM

Unit V NUTRITIONAL DISORDERS

Nutritional challenges of the future: Food production and food storage, future foods, new protein foods, new fat foods and changing food habits.

Text books:

1. Nutrition and Dietetics by Shubhagini, Tata Mc Graw Publishers, 3rd edition, (2010) (ForUnit 1,2 &3)
2. Human Nutrition by B.Srilakshmi, New Age Publishers, 2nd edition (2008) (For unit 4&5)

Books for Reference:

1. Principles of Nutrition Determination Dietetics – Dr. M.S. Swaminathan
2. Advances Text Book on Food and Nutrition – Dr. M. Swaminathan Vol. I & II
3. Normal and Therapeutic Nutrition – Corine Robinson
4. Human Nutrition and Dietetics – Garon and James
5. Food Science by B.Srilakshmi, New Age Publishers, 5th edition (2010).



**III YEAR – VI SEMESTER
COURSE CODE: 7BBC6C2**

CORE COURSE - XV – PLANT BIOCHEMISTRY

Unit I PLANT CELL PHYSIOLOGY

Structure and biochemical aspects of plant cell membrane, primary and secondary cell walls, cell plate, plasmodesmata, vacuoles, meristematic cells. Water balance and transport in plants, osmosis and diffusion, water potential, measuring of water potential, osmotic potential, membrane potential, diffusion pressure deficit, solute transport, mass flow, transpiration.

Unit II PLANT NUTRITION

Essential mineral nutrients – Absorption, translocation and function, effects of toxicity and deficiency, N₂ cycle, Nitrogen fixation – symbiotic and a symbiotic nitrogen fixation – nitrogenase, nitrate assimilation, sulphur metabolism sulphate as a mineral nutrient, sulphate assimilation

Unit III PHOTOSYNTHESIS

Structure & function of chloroplast system. Photosynthetic pigments and their functions, Photo system I & II. Photosynthetic electron transport and photophosphorylation . Calvin cycle (C3 plants), Hatch slack pathway (C4 plants).

Unit IV PLANT GROWTH REGULATORS

Normal growth hormones – Auxins, GA, Cytokinins, Ethylene and Absciscic acid synthetic growth hormones.

Unit V PLANT PHYSIOLOGY AND REPRODUCTION

Physiology and reproduction: Brief account on physiology of germination / dormancy / photoperiodism / Vernalization.

Plant tissue culture (an elementary treatment)

Biochemistry of disease resistance in plants.

Text Books:

1. Plant physiology by M.Devlin, John Wiley Publications, 3rd Edition (1996) (For Unit 1)
2. Plant Physiology by S.N .Pandey, Vikas publishing House, 4th Edition (2008) (For Unit 2)

Books for Reference:

- | | | |
|---|---|--------------------|
| 1. Plant Biochemistry | – | Devlin and Witham |
| 2. Plant Biochemistry | – | Ross and Salisbury |
| 3. Plant Biochemistry – (3 rd Edn) | – | Bonner and Varner |
| 4. Plant Physiology | – | Hopkins |
| 5. Biochemistry (4 th Edn) | – | Geoffrey Zubay |



**III YEAR – VI SEMESTER
COURSE CODE: 7BBCE2A**

ELECTIVE COURSE - II (A) – BIOTECHNOLOGY

Unit I VECTORS

Plasmids and Cosmids, Types of vectors – Bacterial, Viral, Yeast and Plant vectors, Yeast artificial chromosomes and Bacterial artificial chromosomes, Agrobacterium plasmids. Expression and Integration vectors, Enzymes involved in cloning.

Unit II RECOMBINANT DNA TECHNOLOGY

Cloning strategies, cDNA Synthesis and Genomic library, Restriction enzymes and Digestion, Gene mapping, Restriction fragment length polymorphism, SSCP, Polymerase chain reaction, Sequencing methods, Marker genes, site directed mutagenesis, Tag sequences (His tag)

Unit III GENE TRANSFER TECHNOLOGY

Types of Gene transfer methods – Electroporation, Microinjection, Biolistic method, transformation using PEG & Calcium, Viral transfection, Protoplast fusion, Ti plasmid mediated gene-transformation

Unit IV ANALYTICAL TECHNIQUES

Qualitative and Quantitative analysis of DNA, RNA and Protein, Spectroscopy and Spectrophotometric analysis, Electrophoretic assay and Blotting techniques, DNA finger printing and RAPD

Unit V APPLICATIONS OF GENETICALLY MODIFIED ORGANISMS

Production of Transgenic plants, animals and microorganisms, Blood products, Food products, Merits and Demerits of GMOs.

Text Books:

1. Biotechnology by U.Sathyanarayana, Allied Book publications, 2nd edition (2006) (For Unit 1, 2 & 3)
2. Animal Biotechnology by V.Kumaresan, Saras Publications, (2009) (For Unit 4 & 5)

Books for Reference:

1. Molecular Biotechnology, Bernard R. Glick and Jack J. Pasternack. II edition ASM press.
2. Recombinant DNA by Waston et al., (1992) Scientific American Books.
3. Principles of Gene manipulation by R.N. Old and S.B. Primrose (1994) Blackwell scientific publications.
4. Concepts in Biotechnology, Eds D. Balasubramanian et al., (1996) University press.
5. Internet search should be made for journals for the latest information.
6. Biotechnology by R.C.Dubey, S.Chand Publications (2009)
7. Biotechnology by S.S.Purohit, Saraswati Publishers (2005)



**III YEAR – VI SEMESTER
COURSE CODE: 7BBCE2B**

ELECTIVE COURSE - II (B) - DRUG BIOCHEMISTRY

Unit I

Introduction and receptor concept; Introduction to drugs, Classification of drugs, Passage of drugs across biological membrane; Absorption and distribution of drugs; Binding of drugs to plasma proteins.

Drug receptor interaction, Binding forces in drug receptor interaction, types of receptors, receptor theories, isolation of receptors, consequences of drug receptor interaction.

Unit II

Drug metabolism and elimination; Drug metabolism, methods of studying drug metabolism- microsomal drug metabolism, metabolism via hydroxylation, conjugation, deamination, N- oxidation, azo & nitro reduction, non-microsomal oxidation, oxidative deamination, purine oxidation, dehalogenation, hydrolysis, action of choline esterase. Elimination of drugs from the body with reference to renal system.

Unit III

Chemotherapy; mode of action of sulfonamides, anti-metabolites of folate, purines and pyrimidines. Anti- bacterials- mode of action and resistance to penicillin, streptomycin, tetracycline and chloramphenicol. Anti viral, anti malarial and anti-TB drugs.

Unit IV

Drugs acting on CNS and Cardio-vascular system. CNS structure and mode of action of barbiturates, salicylates, MAO inhibitors and drugs for Parkinson's disease.

Unit V

Immunity to bacteria and viruses. Skin test; Mantoux and penicillin test. Resistant to tumors; NK cells; Tumour immune therapy; lymphoid tumours. Vaccination; passive and active immunization; Recombinant vaccines; DNA vaccines. Benefits and adverse effects of vaccination. CD4 cell count in HIV infection.

Books for Reference:

1. Immunology- An introduction, Tizard R Jan, 1995.
2. Immunology- Roitt Ivann, Jonathan Brastoff and David Male. 1993.
3. Text book of microbiology- Ananthanarayanan R and Yayaramman Paniker, 1996.
4. Immunology- Janis Kuby, 3rd edition.
5. Text book of pharmaceutical chemistry – Mohammed Ali CBS Publishers and Distributors, New Delhi, 1995
6. Pharmacology, An introduction to Drugs, Prentice Hall Inc, Eaglewood Cliffs, New Jersey, 1994.
7. Pharmaceutical chemistry- G.R. Chatwal, Vol II, 1st edition, Himalaya Publishing House, Bombay, 1991.



**III YEAR – VI SEMESTER
COURSE CODE: 7BBCE3A**

ELECTIVE COURSE - III (A) – BIOSTATISTICS & BIOINFORMATICS

Unit I COLLECTION AND ORGANIZATION OF DATA

Collection of primary data and secondary data. Methods of data collection.
Sampling and sampling designs – meaning and definition of random and non-random sampling.

Editing of data, Definition for editing, objectives of editing, problems of accuracy, problems of approximation and errors.

Unit II REPRESENTATION OF DATA

Classification of Data, Meaning and Definition, objectives of classification of data.

- a) Ungrouped data – continuous – discrete variation.
- b) Univariate frequency distribution, continuous frequency distribution, discrete frequency distribution.
- c) Cumulative frequency distribution

Tabulation of data: Meaning and definition (a) parts of a table (b) Advantages. Diagrammatic and graphic representation of data.

Unit III

Explanation, Types of dispersion: 1. Range 2. Mean deviation 3. Standard deviation and variance, Problems related to the above mentioned dispersion taking ungrouped data. Explanation and definition for symmetry, explanation for skewness, kurtosis of different types of moments. Tests of skewness, Measures of skewness, measures of Kurtosis (Problems not necessary).

Unit IV

a) Basics of Computer

- ❖ Course introduction, MS Windows basics, Unix basics
- ❖ PC X windows (NCD PCXWARE)
- ❖ File management
- ❖ E-mail (PINE, EUDORA, METSCAPE MAIL)
- ❖ File transfer (ftp, wsftp)

b) Review of key molecular genetic internet site and searching for similar sequences and multiple sequence alignment

- ❖ Internet world wide web resources (a list and description is provided in some useful sites on the internet)
- ❖ Similarity searching BLAST/FASTA
- ❖ Retrieving and installing a program (Tree Tool)
- ❖ Multiple sequence alignment (CLUSTLAW and bee)

Unit V

a) The virtual library

- ❖ Searching MEDLINE on the pubmed system from the center for biotechnology information.
- ❖ Searching the Science Citation Index and current contents connect from the institute for scientific information.
- ❖ Using bibliographic databases and tables of content services to stay current of the biomedical literature.
- ❖ Accessing full – text journals on the internet and printing articles.

b) Databases and search tools

- ❖ NCBI: <http://www.ncbi.nlm.nih.gov/>
- ❖ EMBL SERVER: <http://www.ebi.ac.uk/services.html>
- ❖ Genom Navigator: S. cerevisiae Genome index
- ❖ <http://www.mpimg-berlin-dahlem.mpg.de/andy/GN/S.cerevisiae>

Books for Reference:

1. Statistical Methods – S.P. Gupta
2. Biostatistics – A foundation analysis in health Science – Daniel
3. Form and Style in thesis writing health science – Cambhell
4. Thesis and Assignment Writing health science – Anderson
5. Research Methodology health science – R.C. Kothari
6. Genomic Perl – From Bioinformatics Basics to working code – Rex A. Dwyer
7. Fundamentals of Biostatistics – Rosner
8. Bioinformatics Sequence and Genome analysis – David W. Mount
9. Bioinformatics Methods and Protocols – Stephen Misener
10. Bioinformatics (2nd edition) – Baxe vanis



**III YEAR – VI SEMESTER
COURSE CODE: 7BBCEPR**

ELECTIVE COURSE - III (B) – MINI PROJECT

** Interested candidates will be allowed to do mini project at reputed colleges / Universities / Industries for a period of 20 – 30 days instead of elective course. The Viva-voce examination will be conducted by Internal staff only

