



**BAGALKOT UNIVERSITY
JAMKHANDI**

**PROGRAM /COURSE STRUCTURE AND SYLLABUS
For**

**Bachelor of Science with BIOTECHNOLOGY
I and II Semester**

**w.e.f.
Academic Year 2024-25 and onwards**

PROGRAM STRUCTURE

Syllabus and Credits Structure under Choice Based Credit System [CBCS] General Degree for the Three Years B.Sc. with Biotechnology Undergraduate Programme with effect from 2024-25.

First Semester B.Sc. with Biotechnology Scheme

SEMESTER-I											
Category	Course code	Title of the Paper	Marks			Teaching hours/ week			Credits	Duration of Exam (Hrs)	Teaching Department
			IA	SEE	Total	L	T	P			
L1	-----	Language 1	20	80	100	4	-	-	3	3	-
L2	-----	Language 2	20	80	100	4	-	-	3	3	-
Major	2A1BIOM01T	Cell biology and Genetics	20	80	100	4	-	-	3	3	Biotechnology
	2A1BIOM01L	Cell biology and Genetics Lab	10	40	50	-	-	4	2	3	Biotechnology
Major	-----	Major Subject 2	20	80	100	4	-	-	3	3	---
	-----	Practical	10	40	50	-	-	4	2	3	---
Major	-----	Major Subject 3	20	80	100	4	-	-	3	3	---
	-----	Practical	10	40	50	-	-	4	2	3	---
Common	2S1XXXC01T	Constitutional Values	10	40	50	2	-	-	2	2	Constitutional Values: Political Science
	2S1XXXC02T	Environmental studies									Environmental Studies: Chemistry/ Geography / Botany
Total Marks					700	Semester Credits			23		

Second Semester B.Sc. Biotechnology Scheme

SEMESTER-II											
Category	Course code	Title of the Paper	Marks			Teaching hours/week			Credits	Duration of exams (Hrs)	Teaching Department
			IA	SEE	Total	L	T	P			
L3	-----	Language 3	20	80	100	4	-	-	3	3	-
L4	-----	Language 4	20	80	100	4	-	-	3	3	-
Major	2A2BIOM02T	Biochemistry and Genetics	20	80	100	4	-	-	3	3	Biotechnology
	2A2BIOM02L	Biochemistry and Genetics Lab	10	40	50	-	-	4	2	3	Biotechnology
Major	-----	Major Subject 2	20	80	100	4	-	-	3	3	---
	-----	Practical	10	40	50	-	-	4	2	3	---
Major	-----	Major Subject 3	20	80	100	4	-	-	3	3	---
	-----	Practical	10	40	50	-	-	4	2	3	---
Common	2S1XXXC01T	Constitutional Values	10	40	50	2	-	-	2	2	Constitutional Values:
	2S1XXXC02T	Environmental Studies									Political Science Environmental Studies: Chemistry/Geography / Botany
Total Marks					700	Semester Credits			23		

Year	I	Course Code: 2A1BIOM01T			Credits	03
Sem.	1	Paper Title: Cell Biology and Genetics			Hours	52
Internal Assessment Marks: 20		External Assessment Marks: 80		Duration of Exam: 03hrs.		
Unit No.	Course content				Hours	
Unit I	<p>General Introduction and cell as a basic unit of life: Introduction to Biotechnology, Scope and branches of Biotechnology. Historical perspectives, the cell theory, Ultra structure of animal and plant cells and their organelles: Cell wall, Plasmamembrane, Mitochondria, Chloroplast, Ribosome, Golgi complex, Endoplasmic Reticulum, Nucleus, Lysosome, Peroxisomes, Vacuoles, Cytosol and Cytoskeleton structures, Cell –Cell Interaction</p> <p>Chromosomes and Cell division: Discovery, morphology and structural organization: Number, size and types, Chromosomal Morphology, fine structure and models, heterochromatin and Euchromatin, Giant chromosomes. Cell Division: Cell cycle, Mitosis and Meiosis and its applications.</p>				13 Hours	
Unit II	<p>Transport across Cell Membrane: Active and passive transport.</p> <p>Cancer Biology: Causes, symptoms, types of cancer and its prevention</p> <p>Gametogenesis: Spermatogenesis and Oogenesis.</p> <p>Cell motility: Amoeboid, ciliary and flagellar movements</p> <p>Cell senescence and programmed cell death</p>				13 Hours	
Unit III	<p>Introduction to genetics: History and scope and branches of Genetics. Mendelism: Mendel's work, Laws of heredity, back cross, Test-cross, Incomplete Dominance and simple problems</p> <p>Supplementary factors: Comb pattern in Fowls, Complementary factors: Flower color in sweet pea</p> <p>Multiple factors: Skin color in human beings</p> <p>multiple allelism: Blood group in human beings.</p> <p>Epistasis: Plumage color in Poultry</p> <p>Sex determination in Plants and Animals: Concept of allosomes and autosomes, XX-XY, XX-XO, ZW-ZZ, ZO-ZZ Types</p>				13 Hours	
Unit IV	<p>Linkage and crossing over: Coupling and repulsion hypothesis, Linkage in maize and Drosophila, Mechanism of crossing over and its importance, chromosomal mapping-Linkage map in maize.</p> <p>Chromosomal Variation: Structural and numerical aberrations, chromosomal evolution in wheat and cotton</p> <p>Mutations: Types- Spontaneous and Induced; Mutagens –Physical and chemical mutagens, Induced Mutations in Plants, Animals and Microbes</p> <p>foreconomic benefit. Cytoplasmic inheritance: Plastid inheritance in Mirabilis, Petite character in yeast and Kappa particles in Paramecium.</p> <p>Population Genetics: Hardy Weinberg law and its role in evaluation and speciation. Human Genetics: Karyotype in man, Inherited disorders – Allosomal (Klinefelter's and Turner's syndrome), Autosomal (Downs and Cri-du-chat syndrome)</p>				13 Hours	

Year	Course Code: 2A1BIOM01L		Credits	02
Sem.	Course Title: Cell Biology and Genetics Lab		Hours	50
Internal Assessment Marks: 10		External Assessment Marks: 40	Duration of Exam: 03hrs.	
Unit No.	Course content			Hours 50
	<p>Study of fixatives and stains: Preparation of Formaldehyde 2. (4-10%), Alcohol (70- 100%), Bouin's fixative, Carnoy's solution, 3. Borax carmine (alcoholic), Eosin (alcoholic), Heamatoxylin, 4. Acetocarmine, Aceto-orcein, Schiff's reagent (Feulgen method), Giemsa Stain. 5. Squash preparation: Onion root tip to study stages of mitosis. 6. Squash preparation: Grasshopper testis / onion flower bud/ Tradiscantia to study stages of meiosis. 7. Squash preparation of salivary gland chromosomes: 8. Drosophila /Chironomous larva. 9.Karyotyping analysis. 10.Micrometry. 11.Buccal epithelial smear and Barr body. 12.Extraction of cellular materials in saline buffers, solvents and precipitation. 13.Demonstration of Laws of inheritance by using color beads a. Law of segregation b. Law of independent assortment c. Solve genetic problems 14. Each student is required to submit 2 permanent slides of Mitosis and Meiosis: at least one from each</p>			
Recommended Learning Resources				
<p>CELL BIOLOGY: 1. Alberts, B.Bray, D.Lewis, J. Roff, M.Roberts, K, and Watson, J D 1994: 3rd edition,molecularbiology of "The Cell".Bolsover, S.R Hysams, J.E Jones, S. Shepherd,E.A and White, ,H.A.1997:Form genes to cells wileys-less .Inc New York. 2. Cambell, N .A .Mitchell, L .G. and Reece, J.B. 1996: General Biology. BenjaminCunning. 3. Cooper, GM. 1997 The Cell: A molecular approach, ASM press, USA. 4. De- Robertis , E.D.P. and Robertis , E.M.S. 1996 : Cell and Molecular Biology , HoltSaunders International 5. Garrett, R.H. and Gresham, C.M. 1995: Molecular aspects of cell biology , International edition , Saunders college publishing 6. P.K.Gupta Cell and molecular. Biology: 7. Gilbert and Raunio 1997 : Embryology – constructing the organism 8. Holly Ahern 1992 : Introduction to Experimental Cell biology , W.M.C.Brown publishers 9. Inder Singh, 1997: Text book of human Histology , Jaypee brothers Medical publishers , New Delhi. 10. Karp, G. 2000 Cell and Molecular Biology : Concepts and Experiments, John Willey and sons Inc. New York. 11. Lodish .H.Berk. A. Zipursky , S.L. Matsiduvarya . P. Baltimore, D. 12. Darnell, J. 2000: Molecular cell Biology, Freeman W.H. and co. New York.</p>				

Year	I	Course Code: 2A2BIOM02T		Credits	03
Sem.	II	Course Title: Biochemistry and Biostatistics		Hours	52
Internal Assessment Marks: 20		External Assessment Marks: 80		Duration of Exam: 03hrs.	
Unit No.	Course content			Hours	
Unit I	<p>Carbohydrates: Structure, Properties, Classification and functions</p> <p>Lipids: Structure, Properties, Classification and Functions</p> <p>Amino acids and Proteins: Structure, Properties, Classification and functions of amino acids and proteins. Structural organizations of proteins (primary, secondary, tertiary and quaternary structures) reverse turns and Ramachandran plot</p>			13 Hours	
Unit II	<p>Enzymes: Nomenclature, classification, properties, factors influencing enzyme catalyzed reactions, enzyme inhibition (reversible and irreversible), outline of purification, industrial application of enzymes. Vitamins& Hormones: Dietary source and functions of Water soluble and Fatsoluble vitamins. Chemistry and functions of pituitary and gonadal hormones</p>			13 Hours	
Unit III	<p>Bioenergetics: Concept of free energy transformations, Redox potentials, Regulations of Glycolysis, Krebs's cycle and Electron Transport System.</p> <p>Principles and applications of Solutions, pH and buffers: Theory of water ionization and its purity (kW), pKa & pKb acids and bases, Derivation of Henderson- Hasselbalch equation and its significance. Buffers: Criteria for selection of buffers, types of buffers, Buffers in Biological systems and their mechanism of action</p>			13 Hours	
Unit IV	<p>Analytical techniques: Principles and applications of Chromatography (Paper, thinlayer, column and GLC), Centrifugation (RPM and G, Ultracentrifugation), Spectroscopy (UV-Visible), Isotopes and Radioactivity: Radioactivity, decay laws, Isotopes in Biological studies.</p> <p>Biostatistics: Data & its types, Tabulation and classification of data, Frequency distribution and Graphical representation of data, Measures of central tendencies: Mean, Median, Mode and their properties, Measures of Dispersion: Mean deviation, Variance, Standard deviation and coefficient of Variation, Different models of data presentation with special reference to biological samples, Chi square test, student T test, introduction to SPSS analysis with examples etc.</p>			13 Hours	

Year	I	Course Code: 2A2BIOM02L		Credits	02
Sem.	1	Course Title: Biochemistry and Biostatistics Lab		Hours	50
Internal Assessment Marks: 10		External Assessment Marks: 40		Duration of Exam: 03hrs.	
Unit No.	Course content				Hours 50
	<ol style="list-style-type: none"> 1. Preparation of percent molarity, molality and normality of solution, Measurement of pH and buffer. 2. Qualitative analysis of Carbohydrates, Amino acids, Proteins and Lipids. 3. Paper Chromatography of amino acids and sugars. 4. Qualitative analysis of body fluids such as blood and urine. 5. Assay of amylase activity. 6. Colorimetric estimation of protein by Biuret method. 7. Colorimetric estimation of blood sugar. 8. Estimation of amino acids. 9. Estimation of creatinine in urine sample. 10. Testing of acid phosphates (Potato) and alkaline phosphates (milk) activity. 11. Demonstration of catalase activity. 				

Recommended Learning Resources

1. Biomolecules and analytical techniques Boyer Rodney, 1999 “Concepts of biochemistry”, Pacific Grove, Brooks/cole publishing company.
2. Deb, A.C. “Fundamental of Biochemistry”, New Central Book Agency, Calcutta.
3. Jain, J.L. “Fundamentals of Biochemistry”.S. Chand and Company.
Keshav Trehan; “Biochemistry”, wiley Eastern publication.
4. Lehninger, et.al., 1997: Principal of Biochemistry CBS publishers.Mathews and Van Horde:
5. Moron, L.A. sceimgeour, K.G. Hostan, H.R. Ochs, R.S. and Rawn, J.D. 2000: Biochemistry, 3rd edition
6. Biomolecule: Mohan P. Arora Biophysics: Mohan P. Arora
7. Biochemistry: A. C. Deb
8. Biophysics: Pattabh & Gautham Text book of Biochemistry (1997), Devlin, Thomas, M.
9. Biochemistry (1993) Zubay, G.
10. Biochemistry Fundamentals, Voet et al.
11. Biochemistry, Friedfider, D.
12. Practical Biochemistry, Plummer.
13. Physical Biochemistry: Application to Biochemistry and Molecular Biology – Freilder.
14. Principle of Instrumental Analysis – Skoog & West
15. Bliss, C.J.K. (1967) Statistics in Biology Vol 1. I Mc Graw hill. New York
16. Campbell R.C. (1974) Statistics for Biologists, Cambridge Univ, Press, Cambridge
17. Daniel (1999) Biostatistics (3rd Edition) Panima Publishing, Comotation
18. Sward law, A.C. (1985) Practical statistics for Exponents Biologists, Jhon Wiley and Sons, In
19. Khan (1999) Fundamentals of Biostatistics, Publishing Corporation