



VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY
JNANASAGARA CAMPUS, BALLARI-583105

Department of Studies in Biotechnology

III & IV Semester Syllabus

Bachelor of Science

Chairman
Chairman

With effect from 2021-22 and onwards.

BOS in Biotechnonology (PG)
Department of PG. Studies and
Research in Biotechnonology
Vijayanagara Sri Krishnadevaraya
University, BALLARI - 583105.

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Dr. Asha Jyothi. C, M.Sc., Ph.D
Assistant Professor
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Department of Biotechnology

Semester-III

DSC: 21BSC3C3BTL: Biomolecules

Course Title: Biomolecules	Course code: 21BSC3C3BTL
Total Contact Hours: 56 Hrs.	Course Credits: 04
Internal Assessment Marks: 40	Duration of SEE: 03 Hrs.
Semester End Examination Marks: 60	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Acquire knowledge about types of biomolecules, structure, and their functions
2. Will be able to demonstrate the skills to perform bioanalytical techniques
3. Apply comprehensive innovations and skills of biomolecules to biotechnology field

DSC: 21BSC3C3BTL: Biomolecules

Unit	Description	Hours
1	Carbohydrates: Introduction, sources, classification of carbohydrates. Structure, function and properties of carbohydrates. Monosaccharides – Isomerism and ring structure, Sugar derivatives – amino sugars and ascorbic acid. Oligosaccharides – Sucrose and Fructose, Polysaccharides – Classification as homo and heteropolysaccharides, Homopolysaccharides - storage polysaccharides (starch and glycogen- structure, reaction, properties), structural polysaccharides (cellulose and chitin-structure, properties), Heteropolysaccharides- glycoproteins and proteoglycans (Brief study). Metabolism: Glycolysis and gluconeogenesis, Kreb's cycle, oxidative phosphorylation.	11
2	Amino Acids, Peptides and Proteins: Introduction, classification and structure of amino acids. Concept of – Zwitterion, isoelectric point, pK values. Essential and nonessential amino acids. Peptide bond and peptide, classification of proteins based on structure and function, Structural organization of proteins [primary, secondary (α), tertiary and quaternary]. Fibrous and globular proteins, Denaturation and renaturation of proteins General aspects of amino acid, Metabolism: Transamination, deamination, decarboxylation and urea cycle.	11
3	A. Lipids: Classification and function of lipids, properties (saponification value, acid value, iodine number, rancidity), Hydrogenation of fats and oils Saturated and unsaturated fatty acids. General structure and biological functions of - phospholipids, sphingolipids, glycolipids, lipoproteins, prostaglandins, cholesterol, ergosterol. Metabolism: Beta oxidation of fatty acids. Biosynthesis of cholesterol.	11

	<p>B. Enzymes: Introduction, nomenclature and classification, enzyme kinetics, factors influencing enzyme activity, metalloenzymes, activation energy and transition state, enzyme activity, specific activity. Coenzymes and their functions (one reaction involving FMN, FAD, NAD). Enzyme inhibition- Irreversible and reversible (competitive, non-competitive and uncompetitive inhibition with an example each) Zymogens (trypsinogen, chymotrypsinogen and pepsinogen), Isozymes (LDH, Creatine kinase, Alkaline phosphatase and their clinical significance).</p>	
4	<p>A. Vitamins: Water- and fat-soluble vitamins, dietary source and biological role of vitamins Deficiency manifestation of vitamin A, B, C, D, E and K</p> <p>B. Nucleic acids: Structures of purines and pyrimidines, nucleosides, nucleotides in DNA Denovo and salvage pathway of purine and pyrimidine synthesis.</p> <p>C. Hormones: Classification of hormones based on chemical nature and mechanism of action. Chemical structure and functions of the following hormones: Glucagon, Cortisone, Epinephrine, Testosterone and Estradiol.</p>	11
5	<p>Bioanalytical tools:</p> <p>a) Chromatography: Principle, procedure and applications of - paper chromatography, thin layer chromatography, adsorption chromatography, ion exchange chromatography, gel filtration chromatography, affinity chromatography, gas liquid chromatography and high performance liquid chromatography.</p> <p>b) Electrophoresis: Principle, procedure and applications of electrophoresis (paper electrophoresis, gel electrophoresis -PAGE, SDS- PAGE & agarose electrophoresis) and isoelectric focusing.</p> <p>c) Spectroscopy: UV-Vis spectrophotometry; mass spectroscopy, atomic absorption spectroscopy.</p>	12
<p>References:</p> <ol style="list-style-type: none"> 1. Principles of Biochemistry by A.L.Lehninger, 2 Ed. (worth), 2015 2. Lehninger Principles of Biochemistry by Nelson, D and Cox, D. Macmillon Pub, 2017 3. Biochemistry by L.Stryer 5 Ed. (Freeman-Toppan), 2015 4. Text Book of Biochemistry by West et. al., (Mac Millan), 2012 5. Principles of Biochemistry by Smith et. al., (Mc Graw Hill), 1983 6. Harper's Biochemistry (Langeman), 2018 7. Biochemistry by D.Voet and J.G.Voet (John weily). 8. Enzymes by Palmer (East), 2008 9. Biochemistry by U. Satyanarayana (Books & Allied (P) Ltd), 2008 		

Date

Course Coordinator

Subject Committee Chairperson

Department of Biotechnology

Semester-III

DSC: 21BSC3C3BTP: Biomolecules Lab

Course Title: Biomolecules Lab	Course code: 21BSC3C3BTP
Total Contact Hours:	Course Credits: 02
Internal Assessment Marks: 25	Duration of SEE: 03 Hrs.
Semester End Examination Marks: 25	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Analyze and identify the protein and carbohydrate concentrations by using qualitative and quantitative methods
2. Choose appropriate analytical techniques to study biomolecules at research labs and industries
3. To understand the strengths, limitations and creative use of techniques for problem solving

DSC: 21BSC3C3BTP: Biomolecules Lab

List of Experiments

1. Introduction to basic instruments (Principle, standard operating procedure) with demonstration.
2. Definitions and calculations: Molarity, Molality, Normality, Mass percent % (w/w), Percent by volume (% v/v), parts per million (ppm), parts per billion (ppb), Dilution of concentrated solutions. Standard solutions, stock solution, solution of acids. Reagent bottle label reading and precautions.
3. Preparation of standard buffers by Hendersen-Hasselbach equation – Acetate, phosphate, Tris and determination of pH of solution using pH meter.
4. Estimation of maltose by DNS method
5. Determination of α -amylase activity by DNS method
6. Estimation of proteins by Bradford method
7. Estimation of amino acid by Ninhydrin method
8. Extraction of protein from soaked/sprouted green gram by salting out method
9. Separation of plant pigments by circular paper chromatography
10. Separation of amino acids by thin layer chromatography
11. Native PAGE
12. Determination of iodine number of lipids

References:

1. An Introduction to Practical Biochemistry, 3rd Edition, (2001), David Plummer; Tata McGraw Hill Edu.Pvt.Ltd. New Delhi, India
2. Biochemical Methods, 1st Edition, (1995), S.Sadashivam, A.Manickam; New Age International Publishers, India
3. Introductory Practical biochemistry, S. K. Sawhney&Randhir Singh (eds) Narosa Publishing. House, New Delhi, ISBN 81-7319-302-9
4. Experimental Biochemistry: A Student Companion, BeeduSasidharRao& Vijay Despande(ed).I.K International Pvt. LTD, NewDelhi. ISBN 81-88237-41-8
5. Standard Methods of Biochemical Analysis, S. K. Thimmaiah (ed), Kalyani Publishers, Ludhiana ISBN 81-7663-067

Date

Course Coordinator

Subject Committee Chairperson

Department of Biotechnology

Semester-III

OEC: 21BSC3O3BT1: Nutrition and Health

Course Title: Nutrition and Health	Course code: 21BSC3O3BT1
Total Contact Hours: 56 Hrs.	Course Credits: 03
Internal Assessment Marks: 40	Duration of SEE: 03 Hrs.
Semester End Examination Marks: 60	

Course Outcomes (COs):

At the end of the course, students will be able to:

1. Study the concepts of food, nutrition, diet and health
2. To apply the best practices of food intake and dietary requirements
3. Acquire knowledge about various sources of nutrients and good cooking practices

OEC: 21BSC3O3BT1: Nutrition and Health

Unit	Description	Hours
1	Introduction: Concepts of nutrition and health. Definition of Food, Diet and nutrition, Food groups. Food pyramids. Functions of food. Balanced diet. Meal planning. Eat right concept. Functional foods, Prebiotics, Probiotics, and antioxidants	11
2	Nutrients: Macro and Micronutrients - Sources, functions and deficiency. Carbohydrates, Proteins, Fats – Sources and calories. Minerals –Calcium, Iron, Iodine.	11
3	Vitamins: Fat soluble vitamins –A, D, E & K. Water soluble vitamins – vitamin C Thiamine, Riboflavin, Niacin. Water–Functions and water balance. Fibre – Functions and sources. Recommended Dietary Allowance, Body Mass Index and Basal Metabolic Rate.	11
4	Nutrition and Health: Methods of cooking affecting nutritional value. Advantages and disadvantages. Boiling, steaming, pressure cooking. Oil/Fat – Shallow frying, deep frying. Baking. Nutrition through lifecycle. Nutritional requirement, dietary guidelines: Adulthood, Pregnancy, Lactation, Infancy-Complementary feeding, Pre-school, Adolescence, geriatric. Nutrition related metabolic disorders- diabetes and cardiovascular disease.	12
5	Functional food: Overview; definition, classification of functional food, functional food science, food technology and its impact on functional food development, key issues in Indian functional food industry and nutraceutical. Relation of functional foods and nutraceutical (FFN) to foods and drugs.	11
References		
<ol style="list-style-type: none"> 1. Sri Lakshmi B, (2007), Dietetics. New Age International publishers. New Delhi 2. Sri Lakshmi B, (2002), Nutrition Science. New Age International publishers. New Delhi. 		

3. Swaminathan M. (2002), Advanced text book on food and Nutrition. Volume I. Bappco
4. Gopalan.C., RamaSastry B.V., and S.C.Balasubramanian (2009), Nutritive value of Indian Foods.NIN.ICMR.Hyderabad.
5. Mudambi S R and Rajagopal M V, (2008), Fundamentals of Foods, Nutrition & diet therapy by New Age International Publishers, New Delhi

Date

Course Coordinator

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