

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

BIOCHEMISTRY - Minor W.e.f. 2023-24 AY onwards COURSE STRUCTURE

Year	Semester	Course	Title	No. Hrs./ Week	No. of Credits
	II	1	Biomolecules - (T)	3	3
			Biomolecules - (P)	2	1
II	III	2	Analytical techniques- (T)	3	3
			Analytical techniques- (P)	2	1
	IV	3	Bioenergetics and Metabolism of Carbohydrates and Lipids- (T)	3	3
			Bioenergetics and Metabolism of Carbohydrates and Lipids- (P)	2	1
	IV	4	Enzymology- (T)	3	3
			Enzymology- (P)	2	1
III	V	5	Nutritional Biochemistry - (T)	3	3
			Nutritional Biochemistry - (P)	2	1
		6	Clinical Biochemistry- (T)	3	3
			Clinical Biochemistry- (P)	2	1

V- SEMESTER (2025-26)

Course No-12: NUTRITIONAL BIOCHEMISTRY

Course Objectives:

1. To compile various nutrition and balanced diets, various dietary requirements of nutrients.
2. To acquire knowledge about protein calorie malnutrition
3. To revise the facts about Fat- and Water-soluble vitamins and their importance.
4. To acquire the knowledge about food contaminants and antinutrients.
5. To extract facts about Obesity and various lifestyle associated diseases

UNIT- I

Animal and vegetative foods – chemical composition. Nutrients – Essential Nutrients and their classification. Digestibility, absorption and biochemical functions of macro nutrients, Carbohydrates – dietary requirements. Proteins – Nitrogen balance studies, Determination of Biological values of proteins, Specific Dynamic Action, Lipids – Dietary needs of lipids, essential fatty acids. Calorific values of foods, Basal metabolic rate and its determination, factors influencing BMR.

UNIT-II

Clinical nutrition – role of diet and nutrition in prevention of atherosclerosis and obesity, role of leptin in regulation of body mass. Starvation – Protein sparing treatment during fasting, Protein calorie malnutrition – Kwashiorkor and Marasmus, Nutritional requirements for pregnant and lactating women and aged people.

Unit-III

Biological effects of non-nutrients, dietary fibre, physiological actions. Antinutrients – Protease inhibitors, hemagglutinins, hepatotoxin, goitrogens, cyanogenic glucosides. Toxins from mushrooms. Biological effects of food contaminants – Hexachlorobenzene, arsenic, DDT, cadmium, mercury, lead, aflatoxins, food additives - saccharin and sodium nitrite. Animal foods and sea foods. Food allergy – role of allergens, diagnosis and management of food allergy.

UNIT-IV

Vitamins – Fat soluble vitamins (A, D, E, and K) and Water soluble vitamins (B complex and C) (Sources, biological functions and RDA), Disorders of vitamins A, D, E, K, Vitamin C and B-complex vitamins: Thiamin, Riboflavin, Niacin, Pantothenic acid, Lipoic acid, Pyridoxine, Biotin, folic acid and vitamin B12. Minerals- iron, calcium, iodine, selenium (Sources, biological functions and RDA). Deficiency disorders of minerals Nutritional requirements in infancy, childhood, pregnancy and lactation and old age.

UNIT- V

Obesity – Causes, Anthropometric measurements and Diet management. Dietary management in – Infection, Fever, Constipation, Diabetes mellitus, Peptic Ulcer, PCOS, Hypertension, Cardiovascular diseases, Pancreatitis, Cirrhosis and Cancer.

COURSE OUTCOME:

- 1) Students can analyse the role of various nutrients, their dietary allowances and relate in day-to-day life.
- 2) Student can revise the knowledge about the water- and fat-soluble vitamins and its significance and its functions
- 3) Student can outline the knowledge about Protein calorie malnutrition
- 4) Student can explain the biological effects of food contaminants
- 5) Student can outline the knowledge on Obesity and obtaining better results

Course No-12: NUTRITIONAL BIOCHEMISTRY

PRACTICAL SYLLABUS

- 1) Determination of total Ascorbic acid by DNPH method
- 2) Determination of calcium in the food
- 3) Isolation of casein from milk
- 4) Determination of cholesterol of edible oil
- 5) Determination of moisture content of foods/food grains/ powders
- 6) Determination of fructose from honey/fruit pulp
- 7) Determination of iodine value of edible oil by titrimetry
- 8) Determination of acid value by titrimetry

COURSE OUTCOME

1. Student can determine the calcium content in the food, cholesterol from edible oil.
2. Student can determine iodine value and acid value by titrimetric methods.

REFERENCE BOOKS:

- 1) Smith EL (1983) Principles of biochemistry: mammalian biochemistry: McGraw- Hill Companies.
- 2) Chatterjee CC (1951) Human physiology: Medical Allied Agency.
- 3) Murray R, Granner D, Mayes P, Rodwell V (2003)
- 4) Harper's illustrated biochemistry (LANGE basic science): McGraw-Hill Medical.
- 5) Guyton Aurcher C, Hall John E (2006) Text book of Medical Physiology. Elsevier India Ltd. New Delhi.
- 6) Dixon M, Webb E (1979) Enzyme inhibition and activation. Enzymes 3: 126-136.
- 7) Rao C (1973) University General Chemistry: An Introduction to Chemical Science: MacMillan.
- 8) Price NC, Frey PA (2001) Fundamentals of enzymology. Biochemistry and Molecular Biology Edu.
- 9) Palmer T, Bonner PL (2007) Enzymes: biochemistry, biotechnology, clinical chemistry: Elsevier.

V - SEMESTER
Course No-13: CLINICAL BIOCHEMISTRY

COURSE OBJECTIVES

1. To understand the basic concepts of laboratory techniques.
2. To understand the basic concepts of organ functions.
3. To gain knowledge about various investigations and their interpretations.

UNIT-I

Clinical Biochemistry Laboratory and Investigation of Homeostasis. The use of biochemical tests- Specimen collection and types, Automation and Computerization Water and electrolyte homeostasis - renin angiotensin – aldosterone system Pathological variations of water and electrolytes- diagnosis and Interpretations

UNIT-II

Abnormal Hemoglobin and Inherited Disorders. Inborn errors of Metabolism: Patterns of inheritance - alkaptonuria, phenyl ketonuria, albinism, glycogen storage diseases and inherited disorders associated with urea cycle. Abnormal hemoglobin and hemoglobinopathies- Sickle cell anemia and thalassemias, porphyrias and porphyrinurias

UNIT-III

Investigation of Renal and Gastric Functions. Renal functions tests: Preliminary investigations, tests based on GFR, RPF and tubular function. Diseases related to kidney - nephritis, nephrosis, uremia, renal failure, renal calculi, renal tubular acidosis, diabetes insipidus.

Gastric function tests: Examination of resting content, Fractional gastric analysis, stimulation tests, Tubeless gastric analysis. Malabsorption syndrome, acidity, ulcers - gastric, pancreatitis, gastric and pancreatic 'function tests.

UNIT-IV

Liver Function Tests and Lipid Disorder. Liver function tests: Tests based on abnormalities of bile pigment metabolism, detoxification and excretory functions. Diagnosis of different types of jaundice. Pancreatic function tests. Diseases relating to liver - jaundice, cirrhosis, hepatitis, Lipid: Lipoproteinemias and atherosclerosis coronary heart diseases and hypertension.

UNIT- V

Blood Glucose Regulation and Enzymes of Diagnostic Importance

Carbohydrates: Blood glucose level - regulation and its clinical significance, Diabetes mellitus, Glycosuria and GTT. Enzymes and Isoenzymes of clinical importance - general principles of assay - Clinical significance of enzymes and isoenzymes (LDH, CK, phosphatase, 5' nucleosidase, amylase, lipase, acetyl cholinesterase, transaminase and gamma glutamyl transferase).

COURSE OUTCOMES

1. Student can obtain basic knowledge about specimen collections, pathological variations of water, electrolytes
2. Student can interpret the results to diagnose the abnormal functions of organs.
3. Correlate the tests used for renal and gastric functions and their interpretations
4. Impart the diagnostic tests for liver function and lipoprotein metabolic disorders
5. Evaluate the alterations in blood glucose regulation and enzymes of clinical importance

Course No-13: CLINICAL BIOCHEMISTRY

PRACTICAL SYLLABUS

1. Blood analysis: Iron and Hemoglobin, Glucose, GTT.
2. Serum and Urine analysis: Creatine, chloride, phosphorus, calcium.
3. Lipid profiles (Serum) – Total cholesterol, triglycerides, HDL, LDL
4. Liver function tests – Total Bilirubin, total protein, albumin, globulin, AST
5. Kidney function tests Urea, creatinine, uric acid.

COURSE OUTCOMES

After completing this course, the student will:

1. Analyze blood sample for Iron, Hemoglobin, glucose and GTT.
2. Analyze serum for creatinine, lipid profile
3. Do liver function tests and kidney function tests

REFERENCE BOOKS

1. Gowenlock, A.H. and Donald, J (2002). Varley's practical clinical Biochemistry, sixth edition, CBS publications and Distributors, New Delhi.
2. Sembulingam, K and Sembulingam, P (2010). Essentials of Medical Physiology, fifth edition. Jaypee Brothers (p) ltd, New Delhi.
3. Burtis and Ashwood (2007) Tietz Fundamentals of Clinical chemistry, 6th edition, WB Saunders Company, Oxford Science Publications USA.
4. Chatterjee and Shinde (2012). Text book of medical biochemistry, 8th edition.
5. Devlin, T.M (2010). Text Book of Biochemistry with clinical correlations, 7th edition.