

<b>COURSE TITLE</b>	<b>APPLIED BIOCHEMISTRY &amp; APPLIED NUTRITION AND DIETETICS</b>
<b>COURSE CODE</b>	<b>20BN0201</b>
<b>COURSE CREDITS</b>	<b>5</b>

**Objective:**

- 1 Describe the metabolism of carbohydrates and its alterations, Explain the metabolism of lipids and its alterations, Explain the metabolism of proteins and amino acids and its alterations
- 2 Explain clinical enzymology in various disease conditions, Explain acid base balance, imbalance and its clinical significance, Describe the metabolism of hemoglobin and its clinical significance.
- 3 To understand the role of enzymes in clinical biochemistry and explain the significance of enzymology in diagnosing and managing disease conditions., Explain different function tests and interpret the findings. Illustrate the immunochemistry
- 4 Identify the importance of nutrition in health and wellness. Apply nutrient and dietary modifications in caring patients.
- 5 Explain the principles and practices of Nutrition and Dietetics. Identify nutritional needs of different age groups and plan a balanced diet for them.
- 6 Identify the dietary principles for different diseases. Plan therapeutic diet for patients suffering from various disease conditions. Prepare meals using different methods and cookery rules.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Describe the metabolism of carbohydrates and its alterations, Explain the metabolism of lipids and its alterations, Explain the metabolism of amino acids and proteins, Identify alterations in disease conditions
- 2 Explain clinical enzymology in various disease conditions, Explain acid base balance, imbalance and its clinical significance, Describe the metabolism of hemoglobin and its clinical significance,
- 3 Explain different function tests and interpret the findings, Illustrate the immunochemistry
- 4 Define nutrition and its relationship to Health, Describe the classification, functions, sources and recommended daily allowances (RDA) of carbohydrates, Explain BMR and factors affecting BMR, Describe the classification, Functions, sources and RDA of proteins.
- 5 Describe the classification, Functions, sources and RDA of fats, Describe the classification, functions, sources and RDA of vitamins, Describe the classification, functions, sources and RDA of minerals, Describe and plan balanced diet for different age groups, pregnancy, and lactation.
- 6 Classify and describe the common nutritional deficiency disorders and identify nurses' role in assessment, management and prevention, Principles of diets in various diseases, Describe the rules and preservation of nutrients, Explain the methods of nutritional assessment and nutrition education, Describe nutritional problems in India and nutritional programs, Discuss the importance of food hygiene and food safety, Explain the Acts related to food safety

**Pre-requisite of course:** To have the foundational knowledge necessary for understanding biochemical processes relevant to nursing practice. Basic understanding of Biology and Chemistry is a fundamental pre-requisite to grasp the principles of Nutrition and Dietetics and effectively apply them in Nursing practice.

### Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	1	75	15	10	0	0

Contents : Unit	Topics	Contact Hours
1	<b>Carbohydrates</b> Digestion, absorption and metabolism of carbohydrates and related disorders, Regulation of blood glucose, Diabetes Mellitus – type 1 and type 2, symptoms, complications & management in brief, Investigations of Diabetes Mellitus o OGTT – Indications, Procedure, Interpretation and types of GTT curve o Mini GTT, extended GTT, GCT, IV GTT o HbA1c (Only definition), Hypoglycemia – Definition & causes	8
2	<b>Lipids</b> Fatty acids – Definition, classification, Definition & Clinical significance of MUFA & PUFA, Essential fatty acids, Trans fatty acids, Digestion, absorption & metabolism of lipids & related disorders, Compounds formed from cholesterol, Ketone bodies (name, types & significance only), Lipoproteins – types & functions (metabolism not required), Lipid profile, Atherosclerosis (in brief)	8
3	<b>Proteins</b> Classification of amino acids based on nutrition, metabolic rate with examples, Digestion, absorption & metabolism of protein & related disorders, Biologically important compounds synthesized from various amino acids (only names), In born errors of amino acid metabolism – only aromatic amino acids (in brief), Plasma protein – types, function & normal values, Causes of proteinuria, hypoproteinemia, hyper-gamma globinemia, Principle of electrophoresis, normal & abnormal electrophoretic patterns (in brief)	9
4	<b>Clinical Enzymology</b> Isoenzymes – Definition & properties, Enzymes of diagnostic importance in o Liver Diseases – ALT, AST, ALP, GGT o Myocardial infarction – CK, cardiac troponins, AST, LDH o Muscle diseases – CK, Aldolase o Bone diseases – ALP o Prostate cancer – PSA, ACP	4
5	<b>Acid base maintenance</b> pH – definition, normal value, Regulation of blood pH – blood buffer, respiratory & renal, ABG – normal values, Acid base disorders – types, definition & causes	3

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
6	<b>Heme catabolism</b> Heme degradation pathway, Jaundice – type, causes, urine & blood investigations (van den berg test)	2
7	<b>Organ function tests (biochemical parameters &amp; normal values only)</b> Renal, liver, thyroid	3
8	<b>Immunochemistry</b> Structure & functions of immunoglobulin, Investigations & interpretation – ELISA	3
9	<b>Introduction to Nutrition- Concepts, nutrients and food</b> Definition of Nutrition & Health, Malnutrition – Under Nutrition & Over Nutrition, Role of Nutrition in maintaining health, Factors affecting food and nutrition, Classification of nutrients, Macro & Micronutrients, Organic & Inorganic, Energy Yielding & Non-Energy Yielding, Classification – Food groups, Origin	2
10	<b>Carbohydrates and energy</b> Composition – Starches, sugar and cellulose, Recommended Daily Allowance (RDA), Dietary sources, Functions, Unit of energy – Kcal, Basal Metabolic Rate (BMR), Factors affecting BMR	3
11	<b>Proteins</b> Composition, Eight essential amino acids, Functions, Dietary sources, Protein requirements – RDA	3
12	<b>Fats</b> Classification – Saturated & unsaturated, Calorie value, Functions, Dietary sources of fats and fatty acids, Fat requirements – RDA	3
13	<b>Vitamins</b> Classification – fat soluble & water soluble, Fat soluble – Vitamins A, D, E, and K, Water soluble – Thiamine (vitamin B1), Riboflavin (vitamin B2), Nicotinic acid, Pyridoxine (vitamin B6), Pantothenic acid, Folic acid, Vitamin B12, Ascorbic acid (vitamin C), Functions, Dietary Sources & Requirements – RDA of every vitamin	3
14	<b>Minerals</b> Classification – Major minerals (Calcium, phosphorus, sodium, potassium and magnesium) and Trace elements, Functions, Dietary Sources, Requirements – RDA	3
15	<b>Balanced diet and Nutrition across life cycle</b> Definition of balanced diet, principles, steps, Food guides – Basic Four Food Groups, RDA – Definition, limitations, uses, Food Exchange System, Calculation of nutritive value of foods, Dietary fibre, Meal planning/Menu planning – Definition, principles, steps, Infant and Young Child Feeding (IYCF) guidelines – breast feeding, infant foods, Diet plan for different age groups –Children, adolescents and elderly, Diet in pregnancy – nutritional requirements and balanced diet plan, Anemia in pregnancy – diagnosis, diet for anemic pregnant women, iron & folic acid supplementation and counseling, Nutrition in lactation – nutritional requirements, diet for lactating mothers, complementary feeding/weaning	7

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
16	<b>Nutritional deficiency disorders</b> Protein energy malnutrition – magnitude of the problem, causes, classification, signs & symptoms, Severe acute malnutrition (SAM), management & prevention and nurses’ role, Childhood obesity – signs & symptoms, assessment, management & prevention and nurses’ role, Vitamin deficiency disorders – vitamin A, B, C & D deficiency disorders –causes, signs & symptoms, management & prevention and nurses’ role, Mineral deficiency diseases – iron, iodine and calcium deficiencies –causes, signs & symptoms, management & prevention and nurses’ role	6
17	<b>Therapeutic diets</b> Definition, Objectives, Principles, Modifications – Consistency, Nutrients, Feeding techniques., Diet in Diseases – Obesity, Diabetes Mellitus, CVD, Underweight, Renal diseases, Hepatic disorders Constipation, Diarrhea, Pre and Post-operative period	4
18	<b>Cookery rules and preservation of nutrients</b> Cooking – Methods, Advantages and Disadvantages, Preservation of nutrients, Measures to prevent loss of nutrients during preparation, Safe food handling and Storage of foods, Food preservation, Food additives and food adulteration, Prevention of Food Adulteration Act (PFA), Food standards	3
19	<b>Nutrition assessment and nutrition education</b> Objectives of nutritional assessment, Methods of assessment – clinical examination, anthropometry, laboratory & biochemical assessment, assessment of dietary intake including Food frequency questionnaire (FFQ) method, Nutrition education – purposes, principles and methods	4
20	<b>National Nutritional Programs and role of nurse</b> Nutritional problems in India, National nutritional policy, National nutritional programs – Vitamin A Supplementation, Anemia Mukh Bharat Program, Integrated Child Development Services (ICDS), Mid-day Meal Scheme (MDMS), National Iodine Deficiency Disorders Control Program (NIDDCP), Weekly Iron Folic Acid Supplementation (WIFS) and others as introduced, Role of nurse in every program	3
21	<b>Food safety</b> Definition, Food safety considerations & measures, Food safety regulatory measures in India – Relevant Acts, Five keys to safer food, Food storage, food handling and cooking, General principles of food storage of food items (ex. milk, meat), Role of food handlers in food borne diseases, Essential steps in safe cooking practices	2
<b>Total Hours</b>		<b>86</b>

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	<b>Balanced diet and Nutrition across life cycle</b> Preparation of balanced diet for different categories, Low cost nutritious dishes	8
2	<b>Therapeutic diets</b> Lab session on preparation of therapeutic diets	7
<b>Total Hours</b>		<b>15</b>

### Textbook :

- 1 Nutrition and Biochemistry for Nurses, 2nd edition, Anthikad, Jacob, Jaypee Brothers Medical Publishers (P) Ltd., 2014
- 2 Textbook of Applied Biochemistry for BSc Nursing Students, Amandeep Kaur, vision health sciences publisher, 2021

### References:

- 1 Anatomy, Physiology and Biochemistry Made Esasy for Nurses, Anatomy, Physiology and Biochemistry Made Esasy for Nurses, Vij, Anjula, Jaypee Brothers Medical Publishers (P) Ltd., 2015

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	30.00	25.00	15.00	10.00	0.00

### Instructional Method:

- 1 Classroom teaching

### Supplementary Resources:

- 1 NA