

Course Description Template for the subject | **Biochemistry**

University/College Name	Al-Ayen University, Iraq / College of Medicine
Subject Name	Biochemistry
Academic Stage	second Stage
Available Attendance Modes	Lecture and Discussion
Subject System	Yearly
Number of Hours per Week	
Academic Year for Preparing this Description"	2023-2022

Week no.	Lecture title	Objective
1	Digestion and Absorption	To give the students insight into appreciating how understanding of digestion and absorption of the main dietary categories (carbohydrate, lipid, and protein) in the human body and the key metabolic processes occurring in the human body, could contribute to the understanding and explanation of pathological phenomena. understand Signal molecules produced at specific sites, Peptide hormones regulating digestion, Peptide hormones regulating appetite, Adipose tissue derived hormones, Growth factors
2	Carbohydrates metabolism Glycolysis, The tricarboxylic acid cycle, metabolism of monosaccharide and disaccharide	understand how carbohydrate metabolism normally responds in the fed state, the fasting state, and during exercise, Cori's cycle Glucose alanine cycle,
3	Pentose phosphate pathway Glycogen metabolism	Understand Pentose phosphate pathway, structure and function of glycogen, Glycogenesis and Glycogenolysis and
4	Hyperglycemia and diabetes mellitus Hypoglycaemia	-understand how carbohydrate metabolism is altered by diabetes and the metabolic response to trauma and surgery, -understand the relationship between obesity, exercise, insulin resistance, and diabetes. Diabetic ketoacidosis -understand Metabolic pathways during tissue hypoxia understand Hypoglycaemia, its causes; and the Investigation of hypoglycaemia

5	Lipids metabolism Fatty acids and triacylglycerol metabolism	Understand fatty acids-oxidation & energetics, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids., regulation of lipid metabolism, essential fatty acids.
6	Complex lipid metabolism Triglycerides & phospholipids	Describe the metabolism of Triglycerides & phospholipids
7	Cholesterol & prostaglandin	Understand the metabolism of Cholesterol & prostaglandin
8	Disorders of lipid metabolism (Atherosclerosis and coronary artery disease.)	Describe how lipids are transported in both the endogenous and the exogenous pathways composition and functions of the different classes of lipoproteins . Know the features of the different classes of Disorders of lipid metabolism , Understand Atherosclerosis and coronary artery disease, Risk factors for coronary artery disease , Preventions of atherosclerosis , Hypolipoproteinemias
9	Amino acids, proteins metabolism Biosynthesis of amino acids,	Understand the general scheme through which amino acids are metabolized. Know the reaction catalyzed by transaminases. Understand the role played by transaminases in linking amino acid metabolism to carbohydrate metabolism. Know the general principle that underlies the way in which the carbon skeleton is degraded. Know how waste nitrogen is transported from extra-hepatic tissues to the liver.

10	Amino acids, proteins metabolism catabolism of amino acids and conversion of amino acids to specialized products	Understand generally how urea is synthesized and why it is synthesized. Understand how the various treatments for urea cycle enzymopathies work. Understand the mechanism of ammonia toxicity. Know generally the pathway for heme biosynthesis and in particular what porphyrins are. Know the chemical properties of free porphyrins and how they give rise to the symptoms of porphyrias.
11	Biological oxidation	To enable the student to point out the bioenergetics of energy consuming and releasing of the concerned metabolic pathways under different physiological circumstances. The respiratory chain, its role in energy capture & control, Energetics of oxidative phosphorylation, mechanism of oxidative phosphorylation
12	Diagnostic Enzymology	Assessment of cell damage and proliferation , Factors affecting results of plasma enzyme assay, Normal plasma enzyme activities , Plasma enzyme patterns in disease
13	Vitamins fat soluble	Understand the metabolism of fat-soluble vitamins are: A (retinol), D (calciferol), E (a-tocopherol), K (2-methyl-1,4-naphthoquinone)
14	Vitamins water soluble	Understand the metabolism of water-soluble vitamins are: the B complex: (thiamine (B ₁), riboflavin (B ₂), nicotinamide (niacin), pyridoxine (B ₆), folate (pteroylglutamate), the vitamin B ₁₂ complex (cobalamins), biotin and pantothenate, ascorbate (vitamin C).

15	Hormones General principles of endocrine diagnosis Hypothalamus and pituitary gland	Describe the functions of hormones Antidiuretic hormone, Oxytocin, Hypothalamic releasing factors Growth hormone Adrenocorticotrophic hormone Thyroid stimulating hormone Gonadotropins Disorders of anterior pituitary hormone secretion Disorders of posterior pituitary hormone secretion Hypopituitarism
16	steroid hormones & adrenal cortex	Synthesis of steroid hormone , ketosteroids Biological effects of glucocorticoids Assessment of glucocorticoid secretion, Adrenal hyper and hypofunction, Ovarian hormones, Testicular hormones Chemistry and biosynthesis of steroids , Physiology , The hypothalamic–pituitary– adrenal axis , Factors affecting plasma cortisol concentrations , Disorders of the adrenal cortex , Adrenocortical hyperfunction , Primary adrenocortical hypofunction (Addison’s disease) , Investigation of suspected adrenal hypofunction Corticosteroid therapy , Congenital adrenal hyperplasia , Primary hyperaldosteronism (Conn’s syndrome)
18	thyroid function	Physiology , Disorders of the thyroid gland , Strategy for thyroid function testing and interpretation
19	Cell membrane and cells communications	to define cell membrane and its role in the Extracellular & Intracellular Communication Discuss how membrane lipids are responsible for Fluidity , Selective permeability , Asymmetry , and Self-sealing capability Discuss the transport across membrane Illustrate Types of transport systems Describe Specific deficiencies or alterations of certain membrane components lead to a variety of diseases
20	Purines and pyrimidine metabolism biosynthesis and degradation of purine and pyrimidine	Understand the important point in the synthesis and degradation of purine and pyrimidine, Uric acid and gout
21	Nucleic acids metabolism DNA replication, & DNA repair mechanism, transcription, translation process	describe the role of nucleic acids in the heredity and the development of the organism , Upon completion of this lecture, the student will have the ability to DNA directs the development of the organism through Replication (Cell division). DNA Organization, Replication, & Repair
22	RNA Synthesis, Processing, & Modification Genetic Code and Protein synthesis	Expression of genetic information and protein synthesis (through RNAs).
23	Nucleic acids metabolism Genetic Code and Protein inhibition Biotechnology and human disease (PCR)	Understand the Genetic Code Regulation of Gene Expression , Molecular Genetics, Recombinant DNA, & Genomic Technology knowledge in the development of methods for the diagnosis of genetic diseases, and initial successes in the treatment of patients by gene therapy
24	Renal function	Understand the renal glomerular function , Renal tubular function , Water reabsorption: urinary concentration and dilution , Biochemistry of renal disorders, Syndromes reflecting predominant tubular damage , renal tubular acidosis, Nephrotic syndrome, Nephritic syndrome , Diagnosis of renal dysfunction , Urinary sodium and osmolality , Biochemical principles of the treatment of renal , dysfunction , Renal calculi
25	Liver function	Understand the functions of the liver , Biochemical tests for liver disease , Diseases of the liver Jaundice , Bile and gallstones , Investigation of suspected liver disease

26	Minerals metabolism (Macro elements)	Describe the functions and metabolism of Calcium, availability and functions Factors regulating blood calcium level Calcium, clinical applications Phosphorus Magnesium .potassium, sodium Sulfur
27	Minerals metabolism(Micro elements)	Understand the functions and body homeostasis of Iron absorption, transport, deficiency, Copper, Zinc, Fluoride ,Selenium Manganese, Molybdenum, Cobalt, NickelChromium, Lithium
28	Acid - base balance	Buffers, Acid base balance in the body, Bicarbonate buffer system, Respiratory regulation of pH, Renal regulation of pH, Relation of pH and potassium Respiratory acidosis, Metabolic acidosis Respiratory alkalosis, Metabolic alkalosis, Hydrogen
29	Cancer chemistry,	Describe the Mutagens and carcinogens , Oncogenic viruses, Oncogenes and oncosuppressor genes Oncofetal antigens, Tumor markers, Anticancer drugs, Tumorimmunology ,probability
30	Pregnancy and infertility	Pregnancy and lactation , Infertility , Some drug effects on the hypothalamic-pituitary- gonadal axis