Course Description Template for the subject | Medicinal chemistry

University/College Name	**Al-Ayen University, Iraq / College of Medicine**
Subject Name	**Medicinal chemistry**
Academic Stage	**First Stage**
Available Attendance Modes	**Lecture and Discussion**
Subject System	**Yearly**
Academic Year for Preparing this Description"	**2023-2022**

Amino acidsand proteins	Type of Amino acids	Classify each of the 20 commonamino acids found in proteins according to side chain type (aliphatic, aromatic, sulfur containing, aliphatic hydroxyl, basic, acidic, amide, hydrophilic(polar), hydrophobic (nonpolar). (These categories overlap extensively, e.g., glutamate is acidic and it's verypolar.)
	Draw the structure of a typical amino acid	indicating the following features: α-carbon, α-carboxyl group, α-amino group, sidechain ("R group"),
	behavior of amino acids at acidic and basic medium	Ionic forms that predominate at acidic (say, pH 1), neutral (pH 7), and basic (pH 13) pH values.
	The ionization reactions of ionizable groups	Learn the structure of each of these 20 amino acids, with its full name and 3-letter abbreviation. DO THIS NOW – DON'T PUT IT OFF. You won't have to draw detailed structures of arginine, histidine, or tryptophan, but you should be able to recognize them, and draw the simpler structures,.
	Protien and four structures	Explain the 4 levels of protein structure: primary,secondary, tertiary, and quaternary

	the α- amino and α- carboxyl groups in peptides and proteins; pKa values	Be very familiar with the approximate ("typical") pKavalues of the 7 ionizable R groups (side chains) and also the α- amino and α-carboxyl groups in peptides and proteins; note that numerical values of these "generic " pKa values for the ionizable functional groups in peptides and proteins will be on the cover sheet of Exam 1, but the pKa values are of little use if you don't know the chemical nature of the groups (see below). You do NOT needto know the pKa values for theionizable groups on the free amino acids. Write out the ionization (protonation /deprotonation) reactions for the 9 ionizable functional groups (7 side chains plus terminal α-amino and α- carboxyl groups), with appropriate structures; understand the charge properties of each form (conjugate acid and conjugate base) of each group.
Enzyme	Enzymes : Define theterms	To introduce some of the most relevant and commonly used chemical concepts, processes and naming systems. Define the following terms: a. Enzymes b. Isoenzyme c. Catalyst d. Substrate e. Product i. Activator f. Activation energy j. Active site g. Cofactor k. Inhibitor h. Coenzyme
Enzymes	Classification of enzymes The facters enzyme dependency	Discuss the following as theyrelate to enzymes: a.Chemical composition b.Biochemical function c.Importance in health and disease (biological function)
		Describe the types of enzyme specificity for substrates. Define the following terms used in describing the Michaelis-Menton curve: a. Km b. Vmax c. Zero order d. First order Differentiate zero order from first order kinetics in terms of: a.Dependency on enzyme concentration b.Dependency on substrate concentration c.Optimum phase to calculate concentration of enzymes. Analyze the following on a Michaelis-Menton curve: a. Km b. Vmax c. ½ Vmax d. Zero order e. First order

	The mechanism of the binding site of the inhibitor	Analyze how the following factors affect the rate of enzyme-catalyzed reactions: pH, Temperature , Substrate concentration , Time, Activators , Inhibitors Compare competitive, noncompetitive and uncompetitive inhibition with respect to: Reversible and irreversible effects--
	Reactions of enzymes	Differentiate an endpoint reaction from a kinetic reaction. Define the International Unit (IU) of enzyme activity. Discuss the type of reaction catalyzed by each of the sixclasses of enzymes.
Nuclic acids		Upon completion of this lecture, the student will have the ability to Aims: Describe the chemical structure of nucleic acids Describe the chemical structure of nitrogenous bases Discuss the differences between nucleosides and nucleotides Describe DNA molecular structure and it biological functions Describe RNA molecular structure, The major forms of RNA included messenger RNA (mRNA), ribosomal RNA (rRNA), and transfer RNA (tRNA). and thier biological functions.
Organic chemistry	(30 hours)	
Organic chemistry	Introduction	To introduce some of the most relevant and commonly Used chemical concepts, processes and naming systems,
		To provide students th Imprtance of Organic chemistry of life
Hydrocarbons.a liphatic and aromatic	Classification of hydrocarbones	To learn students That Organic compounds contain the same founctional group undergo similar chemical reactions.
	the simple organic compounds used in our society.	Hydrocarbones supplies much of the energy and many of the simple organic compounds used in our society.
	Reactions of hydrocarbons	Study some its reactions
	Prepration of aromatic compounds as drugs	Study most aromatic compounds to synthesis drugs
Alcohols , Phenols , Ethers	Nameclature of alcohols, phenols, and ethers	To learn the Nameclature of alcohols, phenols, and ethers according to the IUPAC system.DRAW the structure corresponding to a given name.
	Type of alcohols	CLASSIFY alcohols as primary, secondary, or tertiary based ontheir structure.
	the physical properties of alcohols, Phenols and ethers.	EXPLAIN the role of dipoles andhydrogen bonding in determining the physical properties of alcohols, Phenols and ethers.

	oxidation of a primary and secondary alcohol.	Study the structure of the major product of each of the following types of reactions of al cohols:
	oxidation of a Phenols, ethers	To learn how the fenols and ethers reactions with oxidize reagents
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Aldehydes and ketones	Nameclature of Aldehydes and ketones	To study the general chemistry of Aldehydes and ketones with
	particular attention	
	Reactions Aldehydes and ketones	To study their two majer reactions : addition to the carbonyl group and condensation reactions .
Organic acids ofmedical importance,anhydrides.esters .amids	Nomenclature	The student will study the major type of reactions that organic acid ,their Derivatives undergo in living systems is substitution reaction
	Reactions Organic acids	The student will study the major type of Reactions of esters and amids undergo in living systems is substitution reaction
	Important of Organic acids in living systems	we will examine four of these substitution reactions that important in living systems
	substitution reactions of several derivatives	we will examine the structure and substitution reactions of several derivatives of phosphoric acid that important in living systems.
Aliphatic amines and alkaloids		1.Provide both IUPAC and common names for amines. 2.Differentiate primary, secondary, and tertiary amines.
	Nomenclature and properties of Aliphatic amines and alkaloids	to provide an active learning experience. They are usually designed to meet additional goals that fall under four general headings: l familiarizing students with technical issues; l familiarizing students with experimental design
	Important of Aliphatic amines and Alkaloids a living system	providing students with first- hand experience with a living system

Thio and sulpha compounds		To introduce some of the most relevant and commonly Used chemical concepts, processes and naming systems.
	addition and condensation reactions	To study the general chemistry of thiol and sulpha with particular attention to their majer reactions : addition and condensation reactions . Many examples of these reactions are found in both of the labrotary and living systems
Stereochemistry (Isomerism)	the princlples and nomenclature of stereogenic	To provide an introduction to the shapes of organic molecules and the basic princlples and nomenclature of stereogenic elements in organic molecules.
	assign (R)- and (S)-description	• destinguish chiral molecules from achiral ones. • assign (R)- and (S)- descriptiors to stereogenic centres in chiral molecules. • appreciate the difference between enantiomers and diastereomers.
	The importance of stereochemistry in drug	The importance of stereochemistry in drug action is gaining greater attention in medical practice, and a basic knowledge of the subject will be necessary for clinicians to make informed decisions regarding the use of single- enantiomer drugs. For some therapeutics, single- enantiomer formulations can provide greater selectivities for their biological targets,
	improved therapeutic indices and pharmacokineticsv	improved therapeutic indices, and/or better pharmacokinetics than a mixture of enantiomers. the nomenclature for describing stereochemistry and enantiomers, emphasizes the potential biological and pharmacologic differences between the 2 enantiomers ofa drug, and highlights the clinical experience with single enantiomers of the selective serotonin reuptake inhibitors fluoxetine and citalopram.