جامعة الموصل
الكلية : العلوم
القسم : الكيمياء

المرحلة : الرابع

First semester Syllabus

ت	اسم المادة	عدد الوحدات	مفردات المادة
	Quantum chemistry كيمياء الكم	**3**	General Introduction and outline + Classical
			Classical Mechanics includes: Conservative System, Hamilton and Lagrange functions. +
			Quantum Theory includes: Photoelectric
			Quantum Mechanics + Schrodinger Equation
			Postulates of Quantum Mechanics
			Normalization and Orthogonality,
			Applications of Schrodinger Equation to some systems, Particle in a box, Microwave
			Applications of Schrodinger Equation to some systems, IR spectroscopy, Hydrogen

ت	اسم المادة	عدد الوحدات	مفردات المادة
	Spectroscopy الطيف		Introduction to spectroscopy- .Spectral parameters and their units- .Interaction of light with matter- **MICROWAVE SPECTROSCOPY** . Introduction in molecular rotation- . Applications in energy and bond length calculi- . Isotopic substitution effect-

second semester syllybus

ت	اسم المادة	الوحدات	المفردات
	Spectroscopy الطيف	**3**	. Introduction- . Vibration- . Vibration of one particle - . Vibration of di atomic molecules - . Harmonies oscillation- . An Harmonies oscillation- . Energy of Harmonies oscillation- . Energy of an Harmonies oscillation - . Dissociation and Dissociation energy-

1- Optical Methods:

ت	اسم المادة	الوحدات	المفردات
	INSTRUMENTAL ANALYSIS التحليل الالي	**3**	a- Introduction of Optical Methods: Nature of energy , Reaction with material , Molecular spectra Flourescence , Phosphorescence , Raman spectra , Polarisation , Continuous and linear sources of radiation , Filters , Monochromators b- Ultraviolet and Infrared Absorption: Absorption ability , Beers –law deviation , Spectrophotometers , Qualitative and quantitative analysis , Application

c- Molecular Chemiluminescence (Fluorescence,Phosphorescence) Measurements and calculations, Fluorescence spectra , Excitation spectra ,Measurements of fluorescence , Spectrophotometer and fluorometer , Chemical quenching , Phosphoroscope , d- Infrared absorption : IR-spectra , Qualitative analysis , quantitative analysis by baseline method , Liquids and gases analysis , IR-absorpyion spectrophotometers , Calibration of IR-absorption spectraphotometer , e- Measurment by Polarization light: measurement , Nephelometry measurement , Scattering spectrophotometer , Light , Turbidimetric titration , Ramans scattering or nephelometry , Application of f- Atomic Absorption Analysis: atomization , Fuel and oxidents , Burners- Nebulizer system ,Flame and flameless atomization , Cold atomization , Calibration , Matrix effects , Chemical interference , Detection limit , Application. g- Atomic Emission Spectrophotometer : Principle , Methods of atomic excitation , ICP- atomic emission spectroscopy , Quantitative analysis , Interferences , Application . h- Thermal Analysis : Classification, Thermogravimetry (TGA) , Differential thermal analysis (DTA).			
. Instrumentation- -Micro wave applications			
١ – أسس التشخيص Identification Principles التنقية Purification Methods الثوابت الفيزياوية Determination of physical constants العناصر Elemental analysis انية Solubility فات لتصنيف مادة مجهولة Tests for unknown classification المخاليط Mixture separation المشتقات Choice of derivatives	مفردات منهج التشخيص العضوي ٣.٥		
IV- Protein and amino acids metabolism *V- Nucleotides metabolism* *VI- Replication and transcription of DNA.*	4	Biochemistry	
I-Introduction of metabolism *II- Carbohydrate metabolism* -Glycolysis pathway -Krebs cycle	4	Biochemistry	

VII- Protein synthesis		
VIII- The blood		
IX- The Urine		
X- Human Nutrition, digestion and absorption.		

-Glyoxylate cycle - Phosphogluconate pathway . ***III- Lipid metabolism*** -Lipid catabolism and anabolism pathway - Triglyceride catabolism -Cholesterol catabolism and bile acid synthesis. - Ester cholesterol.		

1. Condensation polymerization , addition and substitution polycodens- ation , mechanisms of polycodensation , kinetics of polycodensation gel points , molecular weight determination . 2. Industrial applications : polyesters , polyamides , polycarbonates , Polyureas , polyurethanes . : Reactions and transformations of polymers .٤ degradation , branching ، crosslinking , isomerisation , side group reactions complex . formation , ion-exchangers , polymeric reagents Molecular forces in polymers : primary and secondary .٥ ، forces cohesive energy density (CED) , methods of CED ، determination solubility parameter , effect of molecular forces on . polymer chain ، Molecular weight of polymers : polymer fractionation .٦ -polydisper	**3**	**Polymer chemistry** **البوليمرات**

I-Introduction of metabolism **II- Carbohydrate metabolism** **III- Lipid metabolism**		**Biochemistry**

relationship between petrol petrochemistry and polymers . 2. Chemical structure of polymers , primary , secondary and supermole - cular structures , polymer classification and nomenclature .		**Polymer chemistry**

، sity , methods of M.wt determination : viscometry – membrane ، osmometry , light-scattering , ultracentrifugation ، diffusion . end-group analysis , M.wt distribution curves		

IV- Protein and amino acids metabolism **V- Nucleotides metabolism** **VI- Replication and transcription of DNA.** **VII- Protein synthesis:** **VIII- The blood** **IX- The Urine** **X- Human Nutrition, digestion and absorption.**		**Biochemistry**

١ – علم الأطياف Spectroscopy ٢ – طيف الأشعة فوق البنفسجية Ultraviolet spectroscopy ٣ ـ طيف الأشعة تحت الحمراء Infrared spectroscopy ٤ – طيف الرنين النووي المغناطيسي Nuclear Magnetic resonance spectroscopy	**3.5**	**dentification of organic commpound** **تشخيص**

١. المواد الخام الأساسية المستخدمة من قبل الصناعة الكيميائية. Raw materials used in chemical industry	**Petrochemicals**

, polymerization methods : homogeneous methods (bulk and solution) and heterogenous methods (suspension , emulsion , interfacial , gas-phase) 4. Addition polymerization , basic concepts , monomer structures and initiation ability . initiation , mechanism and kinetics of F . R anionic polymerization , Natta catalysts , mechanism and kinetics of polymerization . copolymerization , monomer – reactivity ratios . teflon , polystyrene , polypropylene , polyvinyl chloride , polyvinyl acetate , polyacrylo – nitrile , polymethyl methacrylate , poly methyl acrylate , polyacryl – amide , polyisoprene (natural and synthetic) , polychloroprene , S B R , N B R and A B S rubbers , butyl rubber , special rubbers ,	**3**	**البوليمرات**

كيمياء النفط	3	١. أصل النفط .Origin ٢. وجوده في الأرض وطرق أنتاجه . Occurrence and production methods ٣. طرق تصنيفه.Classification of petroleum ٤. طرق تقييم النفط والمشتقات النفطية. Evaluation methods ٥. التركيب الكيميائي للنفط. Chemical composition of petroleum ٦. كيمياء عمليات التكرير والمشتقات النفطية الأساسية.Basic refining processes	البتروكيماويات	3	٢. البتروكيميائيات الأساسية المشتقة من عمليات الغاز المصنع. Basic petrochemicals from synthesis gas ٣. عملية أنتاج الألكينات والألكاينات ومشتقاتها البتروكيميائية الأساسية. Production of basic alkenes and alkynes ٤. عمليات الأكسدة البتروكيميائية ومشتقاتها الأساسية . Oxidation process in petrochemical industry ٥. عمليات إنتاج المواد الأرومية ومشتقاتها البتروكيمياوية الأساسية. Production of aromatics