**Kurdistan Regional Government**

**Ministry of Higher Education and Scientific Affairs**

**University of Duhok**

**Directorate of Quality Assurance**

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**College of Dentistry- Department of Biochemistry**

**Course book for first year students**

**Academic year 2015- 2016**

**Course Book**

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| **Course title**  |  **Biochemistry**  |
| **lecturer in charge**  |  Adala Mustafa sami |
| **College / Dept**  |  | College of dentistry/Biochemistry |
| **Contact details** | Tel: 00967504977412 | Email: adalamusatafa@yahoo.com |
| **Coordinator’s name** | Dr. Sherwan F Salih  |
| **Contact details** |  |  |
|  **‌Course overview:** This course covers topics such as bonding and structures, acids and bases, organic molecules and functional groups, alkanes, stereochemistry, organic reactions, oxidation and reduction; solutions, colloids; emulsions; and other various topics. This course also give fundamental concepts relating to carbon compounds with emphasis on structural theory and the nature of chemical bonding, physical, and chemical properties of the principal classes of carbon compounds. The course talk about the biochemical structures, properties and functions of proteins, enzymes, carbohydrates, lipids, and nucleic acid.  |
| **Course Objectives:**1. The overall goal of the laboratory course is to provide students or helping them to understand some of the principles, laws, and theories of chemistry.
2. Understand the chemistry connection among carbohydrates, proteins, lipids, nucleic acids, enzymes…etc, and the human health
3. Know the medical uses of the common chemical compound as antiseptics, anesthetics, drugs… etc.
4. In addition every student should increase their competence in the use of basic laboratory equipment properly, safely, and efficiently.
5. Understand that success in the course depends, in part, upon the commitment of each student to work cooperatively with their laboratory team.
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| **Course Reading List and References‌**1- The chemical basis of life.2- Fundamental of Organic Chemistry. 3- Chemistry for the health sciences. 4- Robert K. Murray. Harper's illustrated biochemistry 5- David L. Nelson. Lehninger principles of biochemistry  |

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| **Subjects: Biochemistry** |
| **lecturer’s name:**  Adala M Sami |
| **Contacts:** | Tel/00967504977412 |  Email: adalamustafa@yahoo.com  |
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| curriculum vitae of lecturerAssistant lecturer at Biochemistry Dept /college of medicine, University of Duhok. Since 2004.2004-2006: teaching basic biochemistry course for 1st class medical and nursing students.2008-2010: teaching basic biochemistry 1st class medical, dentistry and pharmacy students. 2012- 2013: Member of examination committee of under and postgraduate studies of the Dept. teaching basic biochemistry 1st class medical, dentistry and pharmacy students. 2015-2016: teaching basic biochemistry for 1st class, dentistry and Health science students.   |
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| **Student's obligation**The final assessment of the students indicated good attendance and they follow the department regulations with regard to completion of all tests in the laboratory, theoretical and practical examinations |
| **Forms of teaching**Data show, PowerPoint and whiteboard |
|  **Assessment scheme**Assessment scheme of our department depend on attendance of students to lecture room, monthly quizzes, coarse exams, reports and midyear and final year exams. |
| **Student learning outcome:**The specific Learning Outcomes include evaluation for students on their technical competence in the laboratory with respect to properly handling apparatus and chemicals. In addition to technical proficiency, reports of laboratory results and analyses will be presented in a modified scientific format. The effectiveness of presentation and the linguistic quality of the report will be evaluated.The mission is to offer students of medicine and medical sciences a good standard of skill and and understand the basic principles of laboratory utilization in the diagnosis and management of disease.The objectives are to enables students of medicine and medical sciences maintaining a high standard of patient care through the diagnosis and monitoring services of clinical biochemistry laboratory and to provide medical biochemistry, as well as the research scientists in this field. |
| **Scientific contents of the subject:****Part One Theory**

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| **Subject** | **No of hrs** |
| **1- General chemistry** | **8** |
| Some important definitions; atoms, elements, compounds, mixtures, alloys, energy, kinetic energy, potential energy, chemical reaction, chemical equilibrium, exothermic and endothermic reactions, metabolism | 1 |
| The pH concept, Buffers and buffer systems of physiologic importance | 2 |
| Solutions and different methods of expressing concentration | 2 |
| Suspensions and emulsions | 1 |
| Colloid chemistry and biological colloid systems | 2 |
| **2- Organic Chemistry** | **14** |
| A short introduction to the nature of the carbon atom and the properties of organic compounds | 1 |
| Hydrocarbons, alkanes, alkenes, and alkynes (aliphatic) | 2 |
| Isomerism, stereoisomerism (optical and geometrical isomerism) and their relationship to medical activity | 2 |
| Alkyl halides | 1 |
| Aromatic hydrocarbons | 1 |
| Alcohols (dihydroxy, trihydroxy, and polyhydroxy alcohols) | 2 |
| Ethers | 1 |
| Carboxylic acids and their derivatives (amides, esters ...etc.) | 2 |
| Amino acids and amino derivatives  | 1 |
| Thio and sulfur compounds (sulfa drugs) | 1 |

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| **3- Introduction to biochemistry** | **1** |
| Definitions and aims of biochemistry, composition of biochemicals | 1 |
| **6- Carbohydrates** | **8** |
| Definitions, biochemical importance, Classification and subclassification, origins | 1 |
| Monosaccharides: stereochemistry, cyclic structure, Mutarotation and reactions | 2 |
| Sugar derivatives of biochemical importance | 1 |
| Disaccharides: reducing properties, fermentation, disorders | 2 |
| Polysaccharides and Mucopolysaccharides | 1 |
| Carbohydrates of cell membranes | 1 |
| **7- Lipids** | **8** |
| Definition, biochemical importance, classification of lipids-fatty acids | 1 |
| Isomerism, essential fatty acids, alcohols, cholesterol, other sterols of biomedical importance | 1 |
| Simple lipids, identification of fats and oil, compound lipids | 1 |
| Phospholipids, glycolipids, gangliosides | 1 |
| Prostaglandins: chemistry and functions | 1 |
| Plasma lipoproteins: composition, functions and clinical importance | 1 |
| Biological membranes  | 2 |
| **8- Proteins and Amino acids** | **6** |
| Biochemical importance, amino acids: classification, structure, function, and properties | 2 |
| Proteins: properties, biological importance, peptides | 1 |
| Structure of proteins, denaturation, purification-chromatography | 2 |
| Plasma proteins: chemistry and functions | 1 |
| **10- Enzymes** | **8** |
| Definition and classification | 1 |
| Factors affecting enzymatic reactions | 1 |
| Enzyme specificity, enzyme kinetics and mechanisms of action | 2 |
| Regulation of metabolic pathways | 1 |
| Enzyme inhibition | 1 |
| Enzymes in clinical diagnosis (plasma enzymes) | 2 |
| **9- Nucleic acids (DNA and RNAs)** | **4** |
| Nucleoproteins, sugars, pyrimidine and purine bases | 1 |
| Nucleosides, nucleotides, nucleotides of biochemical importance | 1 |
| Structure of DNA, Watson and Crik's model, RNAs | 2 |

 **Practical Syllabus**

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| **Practical session** | **hrs/week** |
| An introduction to chemical calculations and handling laboratory tools, equipment, chemicals and the risks of chemicals | 2 |
| Experiment: Standardisation of HCl with Na2CO3 | 2 |
| Experiment: Determination of the concentration of acetic acid in vinegar | 2 |
| Experiment: Titration of standard HCl with a mixture of NaOH and Na2CO3 | 2 |
| Experiment: Determination of total hardness of water | 2 |
| Experiment: Determination of chloride by MOHR method | 2 |
| Experiment: Measuring pH of saliva by pH meter  | 2 |
| Experiment: Preparation of aspirin (acetyl salicylic acid) | 2 |
| Experiment: Crystallisation of the crude aspirin in a mixture of 1:1 acetic acid and water | 2 |
| Experiment: Detection of Amino acids and proteins | 2 |
| Experiment of lipids | 2 |
| Experiment of nucleic acids | 2 |
| Experiment of Normal urine | 2 |
| Experiment of Abnormal urine  | 2 |
| Experiment of chromatography  | 2 |

**Examinations**1- **Distinguish between the following:** -A pure substance & Mixture 2- **Give a chemical equation representing: -** Oxidation of secondary alcohol3- **Chose the correct answer:** * For accurate work for titration the difference between the readings should not exceed:
1. 1ml b- 1L c- 0.1ml
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**Student’s Feedback for the topic**

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| **Title of Subject:** |
| **Course:****Date:** **Year:****lecturer:** |
| **Department:** | **School** | **University:** |
| **No.** | **Evaluation Questions** | **Level (1-5)** | **More Remarks – Objective ones** |
| 1 | The objectives and key messages of the subject were clear? |  |  |
| 2 | The contents of the subject were useful and relevant to the main goal of the course? |  |  |
| 3 | The materials were prepared carefully as needed |  |  |
| 4 | The lecturer while lecturing tried to analyze the principles, contents and the important points of the subject simply and properly? |  |  |
| 5 | The lecturer came into the classroom on time and was committed to the duration of the lecture? |  |  |
| 6 | The lecturer’s behaved calmly and respectfully during the lecture? |  |  |
| 7 | The slides used in the lecture were clear and attractive? |  |  |
| 8 | The lecturer gave the students chance to ask questions and tried to answer them fully?  |  |  |
| 9 | The reading sources are new and compatible with the subject. |  |  |
| 10 | Total of the levels |  |  |

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| **Evaluation Measuring Tool** |
| **1-2 Not Good** | **2-3 Average** | **3-4 Good** | **4-5 Very Good** |
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