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**Department of Chemistry**

**College of Science**

**University of Salahaddin**

**Subject: Practical Biochemistry**

**Course Book – Third Stage. Chemistry Department**

**Lecturer's name MSc. Lana Othman Mahmood**

**Academic Year: 2022-2023**

**Course Book**

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| **1. Course name** | **Practical Biochemistry** |
| **2. Lecturer in charge** | **Lana Othman Mahmood** |
| **3. Department/ College** | **Chemistry department / Science College** |
| **4. Contact** | **e-mail: lana.mahmood@su.edu.krd**  |
| **5. Time (in hours) per week**  | **Practical: 3h**  |
| **6. Office hours** | **Sun. 8:30 – 5:00 Practical Biochemistry Lab****Mon. 8:30 – 5:00 Practical Biochemistry Lab** |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | **I am Lana Othman Mahmood. I have got MSc. in Biochemistry in 2015 at Chemistry Department in College of Science-Salahaddin University. In addition, I got Bachelor degree in 2010 at the Chemistry department at Salahaddin university. I participated in different training courses such as, English course and Teaching method courses, also, I Published one paper:****Evaluation of Plasma Homocysteine, Oxidative Stress and Some Biochemical Parameters in Patient with Coronary Atherosclerosis in Erbil Governorate.** |
| **9. Keywords** |  **Biochemistry. enzyme and disease, Carbohydrate** |
| **10. Course overview:** ▪ The general aim of this course is to equip students with knowledge and skills to develop and understand principle of biochemistry and the methods which use in practical biochemistry.- It is important to learn what is the practical biochemistry and its relation to their live.-they will understanding the principle of carbohydrate, lipids , proteins, enzymes, Vitamins and many other techniques in practical biochemistry like electrophoresis, separation methods of protein, denaturation of protein and they will take Sufficient knowledge and understanding working in bio lab or clinical biochemistry lab in future in hospital or private biochemical lab. |
| **11. Course objective:**After this course and Upon completing this course, students should understand the basic concepts and practices of contemporary experimental biochemistry. A successful student will learn how to keep a laboratory notebook and prepare laboratory reports in the style of a biochemical journal, and have practical experience in the fundamental biochemical techniques that would be expected of a student applying to quantities and qualitative experiments in carbohydrates, lipid, protein and enzymes. And some techniques form the foundation for many of the experiments of a contemporary biochemical research laboratory. |
| **12. Student's obligation**- Lack of attendance and tardiness to class are unacceptable practices for laboratory courses. Obviously unforeseen events can lead to absenteeism and/or tardiness, but those instances are expected to be rare. So, please report to class on time! Due to limitations in support personnel and materials/supplies, opportunities to make up missed laboratory experiments will not be feasible. If a student is absent for any reason, he/she should email Dr. Peek and the teaching assistant as soon as possible. Late assignments will only be accepted at the discretion of the instructor. Typically prompt written documentation will be required to justify the acceptance of late assignments as a result of absenteeism. - Weekly report:- The purpose of the laboratory report is to communicate experimental work in writing. The educational goal is to help students learn and practice expressing their ideas and describing their work in a professional manner. - Homework assignments will be given to students.-PROJECT PRESENTATION some time will done- LABORATORY NOTEBOOK MAINTENANCE  All experimental data, except instrument output, should be recorded in indelible ink in a bound laboratory notebook with pre-printed sequential page numbers. θ Students should sign the notebook on the last page of that day’s experiment. θ Do not leave blank pages in a laboratory notebook. θ A lab notebook should include protocols, identification of samples, observations, and data. θ Record data and observations as you obtain or make them. Do not write on scraps of paper with the intention of transferring information to the lab notebook later. θ Do not worry if your notebook is a little messy. θ The recording and organization of a permanent record of laboratory observations is as important a technique to master as any of the experimental methods you learn. The research notebook is a day-by-day record of the progress of experimental work. It should reflect the integrity and honesty of the experimenter as well as the clarity of his or her thought. -Examination:- there will be two exam in two course and at end it will be final exam  |
| **13. Forms of teaching**Learning resources in this course include white board, lecture notes, PowerPoint presentations. |
| **14. Assessment scheme**The overall grading is 15% and distribute as in this scheme for this course is as follows: 1% Laboratory Reports3% Laboratory Performance and Notebook Maintenance 1% Homework and quiz5% tow Mid exam and 15% Final Examinations‌ |
| **15. Student learning outcome:**Upon completing this course, students should understand the basic concepts and practices of contemporary experimental biochemistry. A successful student will learn how to keep a laboratory notebook and prepare laboratory reports in the style of a biochemical journal, and have practical experience in the fundamental biochemical techniques. Also they will learn how to do clinical test because it is important to their future work in hospital and bio lab.  |
| **16. Course Reading List and References‌:**▪ Key references: Practical biochemistry, analytical biochemistry, enzymes. Clinical biochemistry ▪ Useful references: Analysis of Lipids practic detail : analyticaltechniquesinbiochemistbyrajankatoch▪ Magazines and review (internet): highwire press web siteThe journal of biological chemistryEnzyme journals |
| **17. The Topics:** | **Lecturer's name** |
| They are divided to the blocks { B 1 } : Carbohydrates1- Libratory roles and safety………………………………..…..…………..1st week2- Molisch,s test………………………………….………………………….…. 2nd week3- Reactions of reducing sugars including………………………….....3rd week.4- Test for individual carbohydrates including................................................................................... 4th week 5-The hydrolysis of polysaccharides…………………………………….. 5th week6- identification of an unknown carbohydrate…………………..… 6th weekIt is examination about the carbohydrates by using the scheme{ B2 } Chemical And physical properties of amino acids and proteins Qualitative tests1- The solubility of amino acids………………………………………….….7th week 2- Ninhydrin reaction3- Xanthoproteic reaction………………………………………..………….. 8th week4-The Biuret test for peptide bonds 5- Denaturation and Precipitation of portions including5:1- by heat and Heavy metal ……………………………………………...9th week5:2- by Precipitation of protein by ammonium sulfate ……….10th week5:3- Denaturation of protein by organic solvents……………….. 11th week---------------------------------------------------------------------------------------- -{B 3 } : LIPIDS AND MEMBRANES Qualitative tests for Lipids……………………………………..….……...12th week 1-The solubility of lipids2-Grease test3-Tests for unsaturated fatty acids4-Tests for triacyl glycerol……………………………….…………………..13th week 5- Tests for cholesterol 1.Lieberman test 2. Salkowaski test  Quantitative Analysis of Lipids 1- The determination of the peroxide value of a fat …..……….14th week 1. Determine the rancidity in the fat  2. Determine the peroxide value in fat2- The determination of the acid value of a fat……………………..15th week Exam in the B1,B2,B3………..………………………………….…………...16th week -----------------------------------------------------------------------------------------------{ B4 } : ENZYMES1- Enzymes classification ……………………………..………………….….17th week1. Catalase by using H2O2 which is act as substrate …..18th week2. Peroxidase by using 4 amino antipyrine reagent ……..19th week3. Polyphenol oxidase by using catechole ………………….20th week2- factors affecting the rate of the enzyme activity 1:Temperature ……………………………...………………………………. 21th week 2: pH ………………………………………………………………………………..22th week 2: Substrate concentration…………………………….…………………23th week3- Determination of ascorbic acid …...............................……..24th week4- Dialysis and separation of large molecule ……………………. 25th week5- electrophoresis ……………………………………………………………..26th week -----------------------------------------------------------------------------------------Clinical Chemistry Assay-{ B5 }1. Blood chemistry sampling …………………………………... 27th week 2-urinary analysis ……………………………………………………. 28th week Determination the element in the urine by the physical, chemical and microscopic analysis. 2. Determination of the blood sugar….....................……………29th week.-{B6 }: liver function test including…….....................................30th week 1.T.protein 2. Bilirubin test Lipid profile test .................................................................... 31th week  Total CholesterolPractical examination in general tests…………………………….…..32th week  | M. Lana Othman Mahmoodex: (3hrs) |
| **18. Practical Topics (If there is any)** |  |
| In this section The lecturer shall write titles of all practical topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture  | Lecturer's nameex: (3-4 hrs) |
| **19. Examinations:*****1. Compositional:*** In this type of exam the questions usually starts with Explain how, What are the reasons for…?, Why…?, How….?***Q1) - Explain the following: (2 marks)***  1. Explain dialysis and its benefits.

A)- In biochemistry, dialysis is the process of separating molecules in solution by the difference in their rates of diffusion through a semipermeable membrane, such as dialysis tubing..The benefits are to separation large molecules like protein or polysaccharides for purification.. Or desalting in protein purification steps. And Dialysis may be used for those with an acute disturbance in kidney function.Description: http://www.siumed.edu/~bbartholomew/images/chapter6/F06-11.jpg***2.******True or false type of exams:******Answer the following questions with T or F******Note: the incorrect answer cancelled the one correct answer (4 marks)***Q1. Regarding the carbohydrates1. They are polyhydroxy of aldehyde or ketones
2. Di sacharides can not be hydrolyzed
3. Biuret,s test is general test used for detection that
4. Iodine test give( +) result with the glucose

*The key**a.T**b.F**c.F**d.F*Q-) Place (+ve or –ve) for following chemical tests:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Barfoed** | **Benedict** | **Seliwanoff’s** | **Bial** |
| Galactose | + | + | - | - |
| Sucrose | - | - | + | - |
| Lactose | - | + | - | - |
| Fructose | + | + | + | - |
| Ribose | + | + | - | + |

***3- Complet following reactions:***Gly+Asp = Gly-aspProtein + Pb+2 = ppt. of protein4- ***Compare between the following*** Q- Slating in and salting outA-   |
| **20. Extra notes:**The Academic Honor System of Iraqi is based on the premise that each student has the responsibility (1) to uphold the highest standards of academic integrity in the student's own work, (2) to refuse to tolerate violations of academic integrity in the University community, and (3) to foster a high sense of integrity and social responsibility on the part of the University community. *This means that you will not give or receive information during an examination, nor will you consult unauthorized sources of information during an examination*. Students should review the Academic Honor System outlined in the (الوقائع العراقية) Student Handbook. Violations of the Honor Code will not be tolerated and will result in zero points being awarded for the course work in question. |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.*(A peer is person who has enough knowledge about the subject you are teaching, he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).*ئه‌م کۆرسبووکه‌ ده‌بێت له‌لایه‌ن هاوه‌ڵێکی ئه‌کادیمیه‌وه‌ سه‌یر بکرێت و ناوه‌ڕۆکی بابه‌ته‌کانی کۆرسه‌که‌ په‌سه‌ند بکات و جه‌ند ووشه‌یه‌ک بنووسێت له‌سه‌ر شیاوی ناوه‌ڕۆکی کۆرسه‌که و واژووی له‌سه‌ر بکات.هاوه‌ڵ ئه‌و که‌سه‌یه‌ که‌ زانیاری هه‌بێت له‌سه‌ر کۆرسه‌که‌ و ده‌بیت پله‌ی زانستی له‌ مامۆستا که‌متر نه‌بێت.‌‌  |