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**Department of Chemistry/college of education**

**Salahaddin University**

**Subject: Practical biochemistry**

**Course Book – 3rd level chemistry**

**Lecturer's name: Hemn Jameel Majeed**

**Academic Year: 2023/2024**

**Course Book**

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| **1. Course name** | **Practical biochemistry**  |
| **2. Lecturer in charge** | **Hemn Jameel Majeed** |
| **3. Department/ College** | **chemistry/ education** |
| **4. Contact** | **e-mail:** **hemn.majeed@su.edu.krd** **hemn981@gmail.com****Mobile Phone: 009647504565522** |
| **5. Time (in hours) per week**  |  **Practical: 6x2 = 12**  |
| **6. Office hours** | **by an appointment**  |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | **Education:****Lecturer: May. 2020****Assistant lecture:** Oct. 2017**MSc. In Tissue Engineering/biochemistry,** 12/2012-06/2015 University of Salahaddin-Erbil & Radboud University Medical Center/Nijmegen –Netherlands.**Thesis**: Comparison Among Type I Collagen Extracted from Bovine, Goat and Sheep Achilles Tendon.**Supervisor**: Prof. Dr. Kawis Aziz Faraj**Assist. Chemistry**: 24/10/2009 – 09/12/2012**BSc. In chemistry,** July 2004**Teaching Experience:****MSc. Assistant lecturer:** University of Salahaddin college of education/Chemistry DepartmentBiochemistry lab., 2015 – presentLaboratory instructor for undergraduate chemistry department.* Basic principle in analytical chemistry 2nd year of Chemistry Department/ college of Science-Erbil International University. 2021 – 2022.
* Basic principle in Instrumental Analysis 4th year of Chemistry Department/ college of Science-Erbil International University. 2021 – 2022.
* Basic principle in biochemistry for 1st level of pharmacy department- Aynda private institute. 2018 – 2019.
* Basic principle in biochemistry for 1st level of nursing department- Gasha private institute. 2018 – 2019.
* Basic principle in biochemistry for 1st level of pharmacy department- Gasha private institute. 2017 – 2018.
* Basic principle in biochemistry for 2nd level of pathological analysis department- College of science/Knowledge Univ. 2016 – 2018.
* Basic principle in biochemistry for 3rd year of chemistry department. 2015 – Present.
* Basic principle in organic chemistry for 2nd year college of Agriculture/soil and water department. 2015 - 2016
* Basic principle in analytical chemistry 1st year of college of agriculture / food technology department. 2015 – 2016.
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| **9. Keywords** |  |
| **10. Course overview:** This course is designed as an introduction to biochemistry. Biochemistry is the branch of chemistry concerned with the chemical reactions that occur inside living organisms. This practical module considers identification and determination of biomolecules (carbohydrates, Lipids and proteins). Several tests for carbohydrate are discussed and explained for distinguishing carbohydrates from other type of molecules. Some experiments are designed for distinguished among monosaccharides, disaccharides and polysaccharides. The solubility of lipids is discussed with the factors which are affected on the solubility of this compound. Free fatty acid and glycerol are detected by some tests. The structure of proteins and amino acid are described and some tests are designed for identifying the proteins. Preparation of protein is explained. Training in the laboratory technique of biochemistry has a function beyond the obvious one of providing practical training essential to the potential biochemist. In affording an opportunity for the student to become up to date with a number of agent biology compounds, to observe their special properties and characteristic behaviours, and to have some experience with the methods of handling them. For those who become particularly interested and who develop suitable proficiency there is a wide field even in an elementary course for special experimentation.**Preparation for laboratory work:**In order to work efficiently it is quite essential to study the experiments in advance and to lay definite plans for the utilization of the time available. Certain operations, such as the heating of a reaction mixture, often require definite, stated periods of time and it is obviously necessary to arrange for this. It often happens that there are periods in an experiment during which the operator's full attention is not required, and the intelligent worker makes good use of these periods by working on other experiments, cleaning apparatus, obtaining supplies for future operations or otherwise busying himself.  |
| **12. Student's obligation**The student should attend two hours practices. In each season there is a writing examination in addition to represent at least six report on a different subject during academic year. The students should attend all the lectures, shouldn't be absent in final exam and should pass the final exam. In addition, to that there is different tests in practical. |
| **13. Forms of teaching**Digital copy of each lecture will be given to all students weekly to obtain their hard copy before the lecture day. All the covered topics will be presented as power point presentations. And extra explanation by using white board.  |
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| **14. Assessment scheme**1. Two writing examination in each season. 2- Six reports in different subjects during academic years.‌ |
| **15. Student learning outcome:**1- Teaching the student the basic theory and principle of biochemistry.2- Teaching the student the objective of their chemical experiments, properly carry out the experiments, and appropriately record and analyze the results. 3- It is expected after completion of this course the student will be able to understand and discuss many areas of biochemistry specially carbohydrates, Lipids and protein. And be able to gain more understanding with independent study. 4- Developing a sufficient background for those students who wish to study more advanced biochemistry topics and continue their future studies in this field.  |
| **16. Course Reading List and References‌:**1- Lehninger’s Principles of Biochemistry, Nelson D.L., and Cox M.M., CBS Publishers and distributors, 4 th editon, 2005.2- Biochemistry, Victor l. Davidson, Donald B.Sittman, Lippincott Williams & Wilkins, 4th edition, 1999.3- Garrett R.H., and Grisham C.M., Biochemistry, 3 rd edition, Thomson Brooks/Cole, 2005.4- Naik P., Biochemistry, Jaypee brothers Medical Publishers (P) Ltd, New Delhi, 2007.**5- free books:**http://www.readingfanatic.com/index.jhtml?partner=^AIC^xdm106&gclid=CJbxjpa0oMECFQQIwwodZKgAwQ.  |
| **17. The Topics:** | **Lecturer's name** |
|   | Lecturer's name(2 hrs)  |
| **18. Practical Topics (If there is any)** | Hemn J. Majeed  |
| **Week 1:** General information about biochemistry**.****Week 2:** identification of carbohydrates.**Week 3:** hydrolysis of Di and polysaccharides**.****Week 4:** identification of Lipids**.****Week 5:** tests of Lipids.**Week 6:** proteins and amino acids.**Week 7:** classification of amino acids.**Week 8:** tests of proteins and amino acid**.****Week 9:** Accuracy and precision.**Week 10**: Spectrophotometry and UV/VIS Spectroscopy**Week 11**: Colorimetric determination of blood sugar level**Week**  **12:** Estimation total cholesterol in serum by Liebermann-Burchard method**Week**  **13:** Determination total protein and Albumin-globulin ratio**Week**  **14:** Determination of calcium in serum**Week**  **15:** Determination of Vitamin C by Spectrophotometry in fruit and Vegetable**Week**  **16:** Serum creatinine and creatinine clearance**Week**  **17:** Creatinine clearance**Week**  **18:** Clinical Enzymologists: (Creatine Kinase (CK))**Week**  **19:** Lactate dehydrogenase (LDH)**Week**  **20:** Glutamate–Oxaloacetate Transaminase (GOT) | Each lecture is (2hrs) |
| **19. Examinations:**In regard to this subject the type of exam will be as follows: - 1. **Multiple choice questions.**
2. The suitable test for differentiation between mono and disaccharides:
3. **Bails test**  b. Molisch test c. Benedict test d. Barfoed's test

**The answer**: - (d)1. **Fill the following Blanks**
2. Macromolecular polymers of monosaccharides unit linked by glycosidic bond called …………………, **Polysaccharide**.
3. Lipids, are soluble in ……………… and insoluble in ……………….

**non-polar organic solvent, water**1. ……………. Test, is a general test used to distinguish carbohydrates from other compounds.

**Molisch test** 1. Glyoxylic acid test is specific test for those amino acids that have …………….. groups, so this test can say specific for detecting ……………….

**Indole group, tryptophan**  1. **Describe at least one tests to distinguish between compounds:**
* Protein and lysine
* Tyrosine and cystine

The answer 1. **Biuret Test:**

This test is a general test for identification of protein, which is positive for all compounds containing two or more peptide bonds. **+Ve with protein** **-Ve with lysine.** **2. Xanthoprotic test*** **This test gives positive result with aromatic amino acids containing phenyl groups in their structures like phenyl alanine, tyrosine and tryptophan.**

**+Ve with Tyrosine** **-Ve with cystine.**  |
| **20. Extra notes:** |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ**  |