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**College of Agricultural Engineering Sciences**

**University of Salahaddin**

**Subject: Analytical Chemistry**

**Course Book – (First Class)**

**Lecturer's name : Nawroz Omer**

**Academic Year: 2022/2023**

**\*Course Book**

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| **1. Course name** | **Autumn semester** |
| **2. Lecturer in charge** | **Nawroz Omer**  |
| **3. Department/ College** | **G3** |
| **4. Contact** | **e-mail:Bashdar.sadee@su.edu.krd****Tel: (optional)** |
| **5. Time (in hours) per week**  | **Theory: 2** **Practical: 3** |
| **6. Office hours** | **5 days a week**  |
| **7. Course code** | **--** |
| **8. Teacher's academic profile**  | **e.g Webpage, Blog, Moodle…** **or few paragraphs about not less than 100 words** |
| **9. Keywords** | **Concentration, pH, molarity, titration and gravimetric**  |
| **10. Course overview:**In this section the lecturer shall write an overview about the subject he/she is giving. The course overview must cover:Analytical Chemistry is one of the main brunches of chemistry. A set of powerful ideas and methods will be described to students in order to understand the relationship between analytical chemistry and other branches of agriculture such as Food Science, soil and water Science, crop science and Horticulture. This course helps student how to make different solution theoretically and practically. Students will be introduced to different theory and concepts in Analytical Chemistry such as classification of analytical chemistry, studying different useful classical approaches for analysing different samples such as volumetric and gravimetric analysis as well as an induction of instrumental analysis. ▪The importance of studying the subject▪ Understanding of the fundamental concepts of the course▪Principles and theories of the course▪ A sound knowledge of the major areas of the subject▪Sufficient knowledge and understanding to secure employmentThis should not be less than 200 words |
| **11. Course objective:**Theoretical: Many different definitions exist for chemical analysis, but it may be reasonably stated as the application of a process or series of processes in order to identify and/or quantify a substance, the components of a solution or mixture, or the determination of the structures of chemical compounds.This means that the scope of analytical chemistry is very broad and embraces a wide range of manual, chemical and instrumental techniques and procedures. The objective and purpose of the analysis has to be sensibly assessed before selecting an appropriate procedure. The aim of this subject is to provide a simple understanding of the principles of analytical chemistry and to show how these principles are applied in chemistry and related disciplines.Practical 1.to guide students how to treat with chemical materials & apparatuses 2. to teach students how to solve the problems in the lab . 3. to learn how to write a lab report. 4. how to obtain good results from the experiments. 5. obey any safety instructions given either verbally or in the described method.* + **Dress appropriately (wearing lab coat)**
	+ **Don't taste or sniff chemicals**
	+ **Don't dispose any chemicals into the draining place instead put in the provided bins in the labs.**
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| **12. Student's obligation**Students must follow the instructions illustrated by the department. The students must attend all classes otherwise the lecturer should report the administration at the department. Student’s obligations throughout the academic year include for example the attendance and completion exams, assignments, reports quiz…etcThe role of students in the class will be monitored in terms of quietness and their activities, and also the attendance in the class .  |
| **13. Forms of teaching**لێره‌ مامۆستا ڕێگه‌ی وانه‌‌ ووتنه‌وه‌ ده‌نووسێت، بۆ نموونه‌:‌ داتاشۆ و پاوه‌رپۆینت، ‌سه‌ر ته‌خته‌ڕه‌ش، ته‌خته‌ی سپی، سمارتبۆردیان‌ مه‌لزه‌مه‌... هتدDifferent teaching approaches will be used in the class in order to deliver the main topics of the subject. Prior the class the hard copy of the lecture will be handed out to the students in order to make notes by them. Different forms of teaching will be used to the reach the objectives of the subject such as using data show to deliver the presentation and other classical tools for more clarification.  |
| **14. Assessment scheme**Breakdown of overall assessment and examinationلێره‌ مامۆستا جۆری هه‌ڵسه‌نگاندن (تاقیکردنه‌وه‌کان یان ئه‌زموونه‌کان) ده‌نووسێت بۆ نموونه‌ تاقیکردنه‌وه‌ی مانگانه‌، کویزه‌کان، بیرکردنه‌وه‌ی ڕه‌خنه‌گرانه (پریزه‌نته‌یشن)، ڕاپۆرت نووسین، ووتار نووسین‌ یان ئاماده‌نه‌بوونی خوێندکار له‌ پۆلدا...هتد. ئامانه‌ چه‌ند نمره‌ی له‌سه‌رده‌بێت و مامۆستا چۆن نمره‌کان دابه‌شده‌کات؟First Exam after five lecturesSecond Exam after ten lectures. Mark Distribution:Monthly Exam 40% (Theoretical 25% + Practical 15%)Final Exam 60% (Theoretical 40% + Practical 20%)Final Mark 100%‌ |
| **15. Student learning outcome:**پڕکردنه‌وه‌ی ئه‌م خانه‌یه‌ زۆر گرنگه‌، مامۆستا ده‌رئه‌نجامه‌کانی فێربوون ده‌نووسێت. بۆ نموونه‌:ڕوونی ئامانجه‌ سه‌ره‌کیه‌کانی کۆرسه‌که‌ (بابه‌ته‌که‌) بۆ خوێندکار‌گونجاندنی ناوه‌ڕۆکی کۆرسه‌که‌ به‌ پێویستی ده‌ره‌وه‌ و بازاڕی کارقوتابی چی نوێ فێرده‌بێت له‌ ڕێگه‌ی پێدانی ئه‌م کۆرسه‌وه‌؟This should not be less than 100 wordsAt the end of the course the students will learn how to make different solutions and different chemicals which is very important to them as it helps them in their research and other stages of their study. They will be toughed the impacts of these chemicals on the daily basis life as well as the impact of the toxicity of these chemicals. This course helps them to use different chemical and instrumental methods to determine the levels of different chemicals in different samples. Students will learn how to use this information in the next stage of their study.  |
| **16. Course Reading List and References‌:**1. ▪ **Fundamentals of Analytical Chemistry by: Skoog& West**
2. **Quantitative Chemical Analysis by: Daniel C. Harris**
3. **Analytical Chemistry principles by: Kenned**
4. **Modern Method of Chemical Analysis by: Robert L. Pecsok**
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| **17. The Topics:** | **Lecturer's name** |
| Week 1: Introduction to analytical chemistryDefinition of analytical chemistry, qualitative analysis, quantitative analysis, importance of analytical chemistry, steps in chemical analysisWeek 2: solutions and electrolytesWeak and strong electrolytes, non electrolyte, weak and strong acids, weak and strong bases, salts, auto ionization of waterWeek 3: expression of concentrationMolarity, formality, normality, equivalent weights, calculation of preparation of solutionsWeek4: expression of concentrationPercentage concentration, dilution of solution, part per millions,calculation of examples, interconversion of concentration units.Week5:acid-base equilibriumpH of solutions, calculation of weak acids and weak bases pH, pH of salt solutionsWeek 6: buffer solutionsdefinition of buffer solution, how buffers work,Henderson-Hasselbach equation ,calculation of pHof buffer solutionsWeek 7: The pH of salt solutionWeek 8: Introduction to volumetric analysisDefinition of principal terms, kinds of reactions, acid-base titration, indicators, indicator rangeWeek 9: acid –base titration curveTitration curve, calculation of pH of strong acid and strong base titration.Week 10: precipitation titrationPrecipitation process, solubility, titration curve of precipitationWeek 11: end point detection of precipitation titrationMohr titration, Volhard titration, Fajan titrationWeek 12: An introduction of Gravimetric Analysis | Lecturer's nameDr Bashdar Abuzed Each teaching week is 2 hrs  |
| **18. Practical Topics (If there is any)** |  |
| 1- Purification of solid compound by sublimation2- Determination of water hydration in CuSO4.5H2O3- Preparation of solutions4- Preparation and standardization of 0.1 N HCl5- Determination of acetic acid in vinegar6-Determination of chloride by the mohr method7-Determination concentration of carbonate and bicarbonate ions in a mixture8-Iodo metric titration9-Determination of calcium and magnesium ions in water | Miss Saewan Ahmed3 hours per week |
| **19. Examinations:****1.***Define Analytical Chemistry and Analyte**Answer* **Analytical chemistry** is a measurement science consisting of a set of powerful ideas and methods that are useful in all fields of science engineering, and medicine**Analytes** are the components of a sample to be determined. 2. Classify **Analytical chemistry****Qualitative analysis** establishes the chemical identity of the species in the sample or reveals the identity of the elements and compounds in a sample. **Quantitative analysis** determine the relative amounts of these species, or analytes **Or** indicates the amount of each substance in a sample. |
| **20. Extra notes:**Here the lecturer shall write any note or comment that is not covered in this template and he/she wishes to enrich the course book with his/her valuable remarks. |
| **21. Peer reviewپێداچوونه‌وه‌ی 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.‌‌  |