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**Postgraduate Course Book**

**Department:**

**College:** College of Education

**University:** Salahaddin University-Erbl

**Subject:** Advanced Analytical Chemistry

**Course Book Level**:( M. Sc Students); First semester

**Lecturer's name:** Prof. Dr. Nabil A. Fakhre

**Academic Year:** 2023-2024

**Course Book**

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| **1. Course name** | **Advanced Analytical Chemistry** |
| **2. Lecturer in charge** | **Prof. Dr. Nabil A. Fakhre** |
| **3. Department/ College** | **Chemistry/ Education** |
| **4. Contact** | **e-mail:** **nabil.fakhre@su.edu.krd****Tel: (optional) 009647504661563** |
| **5. Time (in hours) per week**  | **Theory: 3 hrs** |
| **6. Office hours** | **2 hrs** |
| **7. Course code** |  |
| **8. Teacher's academic profile** | **https://academics.su.edu.krd/nabil.fakhre** |
| **9. Keywords** | **Environmental, Analytical, Chemistry, FIA, Spectrophotometry** |
| **10. Course overview:** Analytical chemistry is the study of the separation, identification, and quantification of the chemical components of natural and artificial materials. Qualitative analysis gives an indication of the identity of the chemical species in the sample and quantitative analysis determines the amount of one or more of these components. The separation of components is often performed prior to analysis. Analytical methods can be separated into classical and instrumental.[2] Classical methods (also known as wet chemistry methods) use separations such as precipitation, extraction, and distillation and qualitative analysis by color, odor, or melting point. Classical quantitative analysis is achieved by measurement of weight or volume. Instrumental methods use an apparatus to measure physical quantities of the analyte such as light absorption, fluorescence, or conductivity. The separation of materials is accomplished using chromatography, electrophoresis or field flow fractionation methods. |
| **11. Course objective:** Analytical chemistry is also focused on improvements in experimental design, chemometrics, and the creation of new measurement tools to provide better chemical information. Analytical chemistry has applications in forensics, bioanalysis, clinical analysis, environmental analysis, and materials analysis. |
| **12. Student's obligation**The student should participate in the lectures and prepare reports supported with update papers. |
| **13. Forms of teaching**Different forms of teaching will be used to reach the objectives of the annual program: power point presentations for the head titles, definitions, applications, examples, discussions and conclusions. |
| **14. Assessment scheme**1- A written exam at the mid of the course and another one at the end of the course.2- A report.‌ |
| **15. Student learning outcome:**The subject leads to have a good back ground in the analytical chemistry and how the student deals with the problems and how to find the suitable solutions depending on update papers. |
| **16. Course Reading List and References:****( Last Edition)** 1. Dougles A. Skoog and Donald M. West, "Fundamentals of analytical chemistry", Holt Rinehart Winston.2. John H. Kenndy, “ Analytical chemistry, principles”, Harcourt Brace Jovanovich Publishers3. John H. Kenndy, “Analytical chemistry, practice”, Harcourt Brace Jovanovich Publishers.4. Daniel C. Harris, “ Quantitative chemical analysis”, Freeman.5. Gary D. Christain, “Analytical chemistry”, John Wiley and Sons. 6. Douglas A. Skoog, F. James Holler, and Stanley R. Crouch, Principles of instrumental analysis, 6th ed. Thomson Books.7. Journals, Analytical Chemistry, Analyst, Anal. Letters, Talanta, Anal, Chimica Acta, ...etc |
|  **17. Topics Program** | **Lecture’s** **Name**  |
| **Week 1:**  Introduction to analytical chemistry. | Prof. Dr.Nabil A. Fakhre |
| **Week 2:** Introduction to analytical chemistry. |   |
| **Week 3:** The General Analytical Problem  |  |
| **Week 4:** Errors in Chemical Analysis |  |
| **Week 5:** Molecular Spectroscopy |  |
| **Week 6:** Electromagnetic Waves & the Electromagnetic Spectrum |  |
| **Week 7:** Visible and UV regions.  |  |
| **Week 8:** Applications of UV/ Visible spectrophotometric methods |  |
| **Week 9:** Examples of the applications of UV/ Visible spectrophotometric methods.  |  |
| **Week 10:** Exam. |  |
| **Week 11:** Nephelometry and turbidimetry. |  |
| **Week 12:** Applications. |  |
| **Week 13:** IR spectrophotometry. |  |
| **Week 14:** Applications. |  |
| **18. Grading procedure**25% Midterm Exam10% preparing report10% Quiz5% ActivitiesTotal=50Final Examination over 50% |  |
| **19. Examinations:****1. Compositional:** **-** How can you believe in your found value when an analytical method is applied?**2.** **True or false type of exams:**The same law can be used for the quantitative analysis in the uv/ visible, NIR, IR,Turbidimetric and Nephelometric methods.  **3. Multiple choices:**The analysis of multi- component systems can be applied by:1- Derivative spectroscopy2- NMR spectroscopy3- IR spectroscopy |  |
| **20. Extra notes:**The student should be to use updated papers to solve the problems and the answer of the questions. |
| 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.‌‌  |

\* Must have permission of the Scientific and Higher Education Committee