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**Department of Earth sciences and petroleum**

**College of Science**

**University of Salahaddin**

**Subject: Practical Geochemistry 2**

**Course Book – Year 4**

**Lecturer's name: Rezhin Kamal Mustafa (MSc)**

**Academic Year: 2022/2023**

**Course Book**

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| **1. Course name** | **Practical Geochemistry 2** |
| **2. Lecturer in charge** | **Rezhin Kamal Mustafa (MSc)** |
| **3. Department/ College** |  |
| **4. Contact** | **e-mail: rezhin.mustafa@su.edu.krd****Tel: 009647504256696** |
| **5. Time (in hours) per week**  | **For example, Theory: 2** **Practical: 2**  |
| **6. Office hours** | **3-4 hours** |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | I received B.Sc. degree in geology from Salahaddin University- Erbil-Iraq, in 2013 and M.Sc. degree in Geochemistry from the same university in 2019. I am a member of staff in Department of Earth sciences & petroleum, College of Science, University of Salahaddin. I am a member of Kurdistan Geologists syndicate since 2009. |
| **9. Keywords** | **Geochemistry, science** |
| **10. Course overview:** This course focuses on the chemistry of the natural world and the chemical evolution of the Earth. We will discuss practical and theoretical geochemistry, with an emphasis on how chemical principles are used to study Earth Sciences. The course is composed of a two modules: (a) geochemical fundamentals; (b) the origin and evolution of Earth and the solar system through nuclear and high temperature chemical processes. This course also focuses on the geochemistry of the igneous, sedimentary and metamorphic rocks. The last lectures deals with the geochemistry of the isotopes which become very important at the last years.  |
| **11. Course objective:**The studying of this course, the students will be able to understand the geochemical exploration of the elements. Also, how to collect the sample and worked on it in the laboratory.  The other part of the course will be deal with the isotopes (radioactive and stable). The students would be employed this subject in the estimation of the age of the formation of the studied rocks and prediction of the climate during the deposition and in some times the salinity of the water under which the minerals are deposited.  |
| **12. Student's obligation** The student’s obligation during the course is attendance in the class for two hours for studying the theoretical part of the course the he applied it in the laboratory (about three hours). There are many tests before the beginning of the labs.  |
| **13. Forms of teaching** Different forms of teaching will be used to reach the objectives of the course: power point presentations for the titles and definitions and summary of conclusions, all figures that related to the lectures. Furthermore, students will be asked to prepare research papers on selective topics, these topics need to be from printed media or internet. There will be classroom discussions at the last ten minutes of the lecture. To get the best of the course, it is suggested that you attend classes as much as possible, read the required lectures before the time of lecture, teacher's notes regularly as all of them are foundations for the course. Try as much as possible to participate in classroom discussions.  |
| **14. Assessment scheme**The students are required to do an exam after each five lectures. There is one theoretical exam at the mid, and one practical exam at the end of the semester, in addition to quiz exams during course. - The final mark of semester is **50%**, and divided to: **15%** for theoretical part, and **35%** for practical part; also, the practical mark is divided to two marks: exam and reports.- The final exam is from **50%** on theory Therefore, the total mark will be **100%**. |
| **15. Student learning outcome:** In the last years many oil companies come to Kurdistan Region for oil exploration and production, in a wide area along the region, so several geologists are followed these companies and others are work with the geological survey where the mineral resources are available in the region. Some of the students after graduation they employed in water resources companies in public and private sectors.  |
| **16. Course Reading List and References‌:**▪ Required books:1) White, W.M. 2005, Geochemistry, John Hopkins University Press, 701p.2) Brownlow, A.H., 1979, Geochemistry, Prentice-Hall, Inc., New Jersey, 498p. 3) Krauskopf, K., 1967, Introduction to geochemistry, McGraw-Hill, Inc., New York, 721p. Students are encouraged to search for the Journals and internet that may help them in this course, such as:1) Geochemica et Cosmochemica Acta*.*2) Chemical Geology 3) Geochemical exploration |
| **17. Practical Topics:** | **Lecturer's name** |
| *Lab 1:* Exploration Geochemistry.  *Lab 2:* Work in the laboratory.*Lab 3:* Quiz for lab 1 and 2; Precision and Accuracy. *Lab 4, 5& 6:* Geochemical Data Analysis.*Lab 7:* Quality of water.  | MSc Rezhin K. Mustafa (2 hrs)ex: 15/1/2023 |
| **19. Examinations:****Q1) Fill in the blank of the following sentences by the appropriate words: (20 Marks)**1. Exploration Geochemistry is divided to ................................. and …………………survey.
2. ……………… is an instrument used in soil sampling.
3. The occurrence of trace elements in solids, as a trace element …………………. on the surface of a colloidal particle of Fe-Mn Oxides, Clay mineral or Organic material.
4. The points which located under inflection point in the table are used to determine …………………....
5. Relative difference (R.D) for wateris the difference between sum of ……………. and ……….….. in (epm).
6. Planning of exploration……………………….…….............., ……….…………………..………. and …………………………………….

**Q2) The following table is data of geochemical analysis of Pb element from stream sediment sample of Dokan area using semi log paper to determine the Anomaly, Background & Threshold?****Note: Standard deviation (SD or σ) = 0.24, and Arithmetic mean (X)= 1.01 (40 Marks)**

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| --- | --- |
| Class Interval | Frequency |
| 1.1-1.2 | 1 |
| 1.2-1.3 | 16 |
| 1.3-1.4 | 33 |
| 1.4-1.5 | 50 |
| 1.5-1.6 | 49 |
| 1.6-1.7 | 36 |
| 1.7-1.8 | 9 |
| 1.8-1.9 | 6 |
| 1.9-2.0 | 5 |
| 2.0-2.1 | 4 |
| 2.1-2.2 | 10 |
| 2.2-2.3 | 8 |
| 2.3-2.4 | 5 |
| 2.4-2.5 | 4 |
| 2.5-2.6 | 2 |
| 2.6-2.7 | 0 |
| 2.7-2.8 | 1 |

**Q3) Find precision for these cations of some water samples taken from the river, if it is acceptable or not accepted. (20 Marks)**If Standard deviation (SD or σ) Arithmetic mean(X)

|  |  |  |
| --- | --- | --- |
| Elements (ppm) | SD (σ) | X |
| Ca  | 2.15 | 68.03 |
| Mg  | 0.51 | 9.03 |
| Na  | 0.5 | 6.5 |
| K  | 0.02 | 0.8 |

**Good Luck**Assist lect. Rezhin K. Mustafa |
| **20. Extra notes:** |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ** Assistant Prof. Dr. Hikmat S. Mustafa Al-Jaleel |