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**Department of Earth sciences and petroleum**

**College of Science**

**University of Salahaddin**

**Subject: Petroleum geology**

**Course Book – *For example* (Year 1, 2, 3, or 4)**

**Lecturer's name PhD**

**Academic Year: *For example* 2022/2023**

**Course Book**

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| **1. Course name** | **Petroleum Geology** | |
| **2. Lecturer in charge** | **PhD** | |
| **3. Department/ College** | **Earth sciences & petroleum** | |
| **4. Contact** | **e-mail: wrya.jabbar@su.edu.krd**  **Tel: (optional):07504543753** | |
| **5. Time (in hours) per week** | **For example Theory: 2**  **Practical: 2** | |
| **6. Office hours** | **Availability of the lecturer to the student during the week** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | Wria jihad jabbar was undergraduated student at college of science during the years (2003-2007) and was awarded the M.Sc. degree in Petroleum Geology at Salahaddin University in 2010, now I have Ph.D. degree in petrophysical properties and organic geochemistry; | |
| **9. Keywords** | **Source rock & reservoir rock properties** | |
| **10. Course overview:**  In this course, fourth grade students will learn most about how oil is formed in the beginning and how organic matter is converted through pressure and temperature to hydrocarbons and become liquids and gases, then migrate to the rocks that are like warehouses including the presence of cap rocks  In the rest of the course, the properties of reservoir rock such as porosity, permeability, saturation, capillary pressure, wettability etc. will be discussed. All the topics discussed here will enable students to become self-reliant in major oil companies after graduating from this department and build a strong background from the beginning of the formation of oil deposits to the time of drilling wells that are extracted  This course is very important for fourth grade students to learn before going to the foreign market and work because here in addition to the benefits and importance that we have mentioned you will learn something else useful, which is to know the amount of oil reserves | | |
| **11. Course objective:**  We teach students how to start their own businesses in oil companies and increase their job opportunities. We give them summer training and scientific trips to see more about the equipment used during oil extraction Use the ruins that are useful to them in companies | | |
| **12. Student's obligation**  This is in addition to giving them seminars on oil-related topics, doing small experiments daily, giving them homework, and explaining theory lessons in an easy way | | |
| **13. Forms of teaching**  Each whiteboard is used with data show to explain the topics to students | | |
| **14. Assessment scheme**  A few minutes before the end of the lesson, we give students an exercise to analyze. In addition to sending them several homework assignments each week, we organize several seminars in the classroom ‌ | | |
| **15. Student learning outcome:**  We will introduce them to all the topics related to the creation of oil transportation and how to extract oil that will benefit them in today's labor market | | |
| **16. Course Reading List and References‌:**  ▪ Magazines and review (internet): | | |
| **17. The Topics:** | | **Lecturer's name** |
| **Week-1 // (Introduction of Petroleum)**  **Petroleum geology** is the study of origin, occurrence, movement, accumulation, and exploration of hydrocarbon fuels  **WHAT IS PETROLEUM?**  Petro=Rock Oleum=oil  Petroleum= Rock oil  Petroleum is a complex mixture of hydrocarbon (H, C) compound with minor amount of Nitrogen, Oxygen, and Sulfur as impurities.  Petroleum is a general term for all naturally occurring hydrocarbons present in Liquid Gaseous, Solids, Semisolid forms  **Week-2 // (Source rock/Migration and accumulation)**  **((SOURCE ROCK))**  Petroleum *source rocks* are water-deposited sedimentary rocks that Contain sufficient amounts of organic matter to generate and expel commercial quantities of oil and/or gas when heated.  **Source rock terms**   • A source may be termed **potential source rock**- if it hasn’t been sufficiently cooked (immature)  • **Effective source rock** which contains organic matter and is presently generating and/or expelling hydrocarbons to form commercial accumulations.   * **Active source rock** if it’s is currently generating (early, mid or late mature); * **Inactive source rock** (stopped generating) spent oil if it is over mature, uplifted or lacks OM to continue generating   **Week-3 // (Reservoir rock/Porosity)**  Porosity: Ability of rock to carry HC or it is a place that the HC can accumulate or Porosity characteristics the capability of a reservoir to store fluid due to presence of voids  **Week-4 // (Reservoir rock/Permeability)**  **Permeability**  Permeability defines the capability of the rock to allow fluid to flow under a pressure gradient and is characterized by the connectivity of pore spaces. Hence, any reliable method for determining the Permeability of a core sample would generally involve fluid flowing at a known rate through porous material under measured differential pressure.  **Week-5 // (Reservoir rock/Saturation)**  Saturation is defined as the ratio of volume of fluid phase (gas, oil or water) in a given core sample to the pore volume of sample. Fluid saturation is usually expressed as a fraction of pore space or in percentages. For example, a reservoir having an oil saturation of 70% implies that 70% of the pore space in the rock is occupied by liquid petroleum.  **Week-6 // (Midterm exam)**  **Week-7 // (Reservoir rock/wettability)**  Is the tendency of one fluid to spread on or adhere to a solid surface in the presence of other immiscible fluids?  The ability of a liquid to spread over a rocky surface when two unmixed liquids are present.  **Week-8// Seminar (each student will prepare a brief seminar about petroleum topic)**  **Week-9 // (Reservoir rock/Surface tension)**  **Surface and interfacial tension**  The apparent film which separates two immiscible fluids, such as air and water is caused by unequal attractive forces of molecules at the interface.  Surface tension is the tension between liquid and gas (between gas and water, gas and oil) while interfacial tension is a tension between 2 immiscible liquids (between oil and water).  **Week-10-11 // (Reservoir rock/Capillary pressure)**  Is the major factor that controlling the fluid distribution in a reservoir rock when two immiscible fluids in contact with each other in capillary like tubes  Capillary tubes of low diameter automatically raise fluids to the surface  The higher the diameter, the lower the liquid surface  **Week-12 // (Second exam)**  **Week-13-14 // (Phase Diagram)**  To fully understand the significance of the pressure-temperature diagrams (PVT), it is necessary to identify and define the following key points on these diagrams:  **Week-15// Review**  **Week-16 // (Reservoir Drive Mechanisms)**  The reservoir drive mechanism refers to the method by which the reservoir provides the energy for fluid production. There are a number of drive mechanisms and a reservoir may be under the influence of one or more of these mechanisms simultaneously. | | Lecturer's name  ex: (2 hrs)  ex: 14/9/2022 |
| **18. Practical Topics (If there is any)** | |  |
| The practical in this lecture is divided into two main parts, the first one is related to theoretical lessons such as: rock eval pyrolysis, types of source rock, how oil is migrate, type of trap, in addition to finding porosity and permeability in a core sample, how core samples have been saturated, and how the oil water and gas distributed in a pores, what is relationship between water saturation and capillary pressure, etc… whereas in the second part the students will learn more about petrel software program which is a huge program in modern oil companies in this part we have more than ten topics | | Lecturer's name  ex: (2 hrs)  ex: 14/9/2022 |
| **19. Examinations:**  ***1. Compositional:*** In this type of exam the questions usually starts with Explain how, What are the reasons for…?, Why…?, How….?  With their typical answers  Examples should be provided  ***2.******True or false type of exams:***  In this type of exam a short sentence about a specific subject will be provided, and then students will comment on the trueness or falseness of this particular sentence. Examples should be provided  ***3. Multiple choices:***  In this type of exam there will be a number of phrases next or below a statement, students will match the correct phrase. Examples should be provided. | | |
| **20. Extra notes:**  There should be no more than 6 articles that we saw more than 20 topics | | |
| **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.‌‌ | | |