****

**Department of Geology……………………….**

**College of …Science…………………………….**

**University of …Salahaddin……………………….**

**Subject: …Geotectonics……………………………….**

**Course Book – 4th year (Year 4)**

**Lecturer's name Dr Imaddadin Omer Hassan**

**Academic Year: 2019/2020**

|  |  |  |
| --- | --- | --- |
| **1. Course name** | **Geotectonics** | |
| **2. Lecturer in charge** | **Dr.imaddadin omer hassan** | |
| **3. Department/ College** | **Geology / Science** | |
| **4. Contact** | **e-mail: imad\_geol@ yahoo.com**  **Tel: 0750 4450525** | |
| **5. Time (in hours) per week** | **Theory: 2**  **Practical: 3** | |
| **6. Office hours** | **30** | |
| **7. Course code** |  | |
| **8. Teacher's academic profile** | **B.Sc. (1974-1975)**  **M.Sc. (1988(**  **PhD. (1998)** | |
| **9. Keywords** | **Hydrogeology** | |
| **10. Course overview:**  Desired Course Outcomes:  1.The student should be able to define the main topics of geotectonis.  2.The student should be able to identify and understand the different terms and subjects of geotectonics.  3.The student should be able to have an idea about different subjects of geotectonics from creation of the universe to the different layers of the earth.  4.The student should understand and learn about the different portions of the earth(crust ,mantle,core).  5.The student should understand the boundaries of the tectonic plates and their movement.  6.The student should be able to understand the types and speeds of plate movement and the results of the plate motion ,continent spreading ,creation of new islands and volcanisms.  Different teaching methods and techniques should be used including power point(data show) , green board and magic pens for drawing illustrations and sketches, figures for better explanations of subjects, discussions…etc.  Seasonal Examination Theoretical hydrogeology Applied Hydrogeology  25 marks 15 marks  Final Examination 40 marks 20 marks  Total marks equal to (100 marks) | | |
| **11. Course objective:**  Geotectonic subject is very important for geology department graduates, as it explains how the universe , our galaxy, solar system ,and the earth created .The lectures starts with the sudden explosion in the point at which all matter and energy accumulated (The Big Bang Theory), then explain how the universe started to expand(which thought to be continuous till now).Then explain the different stages of universe , galaxies , solar system , and the earth developed , then concentrates on the earth tectonics .This subject is basic for geology graduates. | | |
| **12. Student's obligation**  The student’s obligation during the course is attendance in the class or lab for about three hours for studying the practical part of the course. Every lab there are many exercise to solve after a brief explaining for the theoretical part and then students must write a report with a discussion of what they did in the lab. There are marks on the attendance of the students and on the work of the students and on their reports. | | |
| **13. Forms of teaching**  1. Data show . 2.Green or black board. 3.White board and magic pens. | | |
| **14. Assessment scheme**  There will be one examination via the course, quizzes some times, in addition the student should be ready for negotiation .The attendance, classroom activities, and reports, discussions .  ؟‌ | | |
| **15. Student learning outcome:**  In this course student learn the important of Water and how to respect this resource that god gave us and how to protect it from reducing and pollution. Water is the elixir of life, without it life is possible, people depend on surface and ground water for several purposes such as drinking industrial, agriculture and irrigation, so it is necessary for student to understand the important of quantity and quality of water and to be responsible to save water and leave it clean.  There are many directories and water resources companies in public and private sectors where geology students can attend after they graduate such as Dam directory, Groundwater directory and water resources directory, so this branch is very important for the practical life after graduation where most places need a Hydrologist.. | | |
| **16. Course Reading List and References‌:**  References of the subject  1-Groundwater Hydrogeology , 1980, David K. Todd.  2-Applied Hydrogeology , 1994, C.W. Fetter.  3-Hydrogeology , 1966, Davis & De Wiest.  4-Hydrology for Engineers , Geologists ,1997 ,Sergio E. Serrano.  4-In addition to many other references. | | |
| **17. The Topics:** | | **Lecturer's name** |
| Geotectonic subject presented to the students in (15 weeks)as following:  **1st week**  Definition of tectonics and geotectonics , the early earth The Creation, Nuclear Fusion , Origin of the Solar System , Differentiation , Age determination , Origin of the Earth's Moon.  **2nd week**  The Earth's interior ,The core , inner core , outer core, The mantle, Discontinuities in the mantle , Moho-discontinuity , The seismic Moho , The petrologic Moho , The low-velocity zone (LVZ), The 410 km discontinuity , 670 km discontinuity , D (Deep) -layer, Beno Gutenberg discontinuity.  **3rd week** Layers of Earth’s Interior , The Crust , Continental crust , Drilling through the crust , Oceanic crust , Development of the continental crust , Shields , Platforms , Glint line, Aulacogen .  **4th week**  Precambrian time , Archean sediment , Archean tectonics , Greenstone belts , Proterozoic Eon , Banded iron Formations.  **5th week**  Continental Drift, The Theory of Continental Drift ,Wegener Hypothesis , What evidence did Wegener have to support his hypothesis , Magnetic Field: Direction and Inclination.  **6th week**  Curie point, Palaeomagnetism , Apparent polar wandering , The sea floor spreading , Magnetic Reversals, Hess hypothesis (1962) .  **7th week**  Plate tectonics , The theory of plate tectonics , The Major Plates of Earth’s Lithosphere , Plate boundaries , Lithosphere , Asthenosphere.  **8th week**  Subduction , Subduction zone , Benioffzone , Oceanic trenches , Mid-Oceanic Ridge , Axial trough , Origin of Mid-Oceanic Ridge, Magma chamber, Rift valley , Fracture zones , Transform fault , Continental volcanic arc, Volcanic island arc.  **9th week**  Plate boundaries, Divergent boundaries (spreading centres) , Oceanic / continental, Oceanic / oceanic , Convergent boundaries , Continental / continental , Transform boundaries .  **10 th week**  Continental margins, Passive continental margins , Continental shelf , Continental slope , Continental rise , Active continental margins,Accretionarv prism, Destruction of oceanic lithosphere.  **11th week**  Continental rifting , Plate velocity , Absolute plate velocity , Plate attributes .  **12th week**  Mechanisms of plate motion , Ridge-push force , Slab-pull force, Mantle convection , Mantle plume and hot spot ,Modern models of mantle convection, Seamounts , Guyots , Oceanic plateaus , Aseismic ridge (no earthquake activity) , Before Pangaea .  **13th week**  Isostasy , The principle of isostasy , Isostatic adjustment , Marine terraces , Negative isostatic anomaly ,Positive isostatic anomaly, Subsidence.  **14th week**  Volcanoes , types of volcanoes , Earth quakes , reasons of earth quakes.  **15th week**  Seasonal Examination. | | Lecturer's name  ex: (2 hrs)  ex: 14/10/2015 |
| **18. Practical Topics (If there is any)** | |  |
| Week 1: Exercises for point measurement of precipitation by using histograms (bar-graphs) and continuous curves. Estimation of missing precipitation data by using normal ratio method.  Week 2: Determining the effective depth precipitation for a basin by using the arithmetic mean, Isohyetal and Thiessen methods.  Week 3:Determining the monthly potential evapotraspiration by using data of temperature and sunshine by using Thornthwait, Blany Cridle and Kharofa method. Then determining the water surplus and water deficit.  Week 4: Exercises to determine infiltration rates and infiltration capacity by using Davis equation with illustrating the relation between infiltration rates and time on normal graph paper.  Week 5: Determining the total discharge for a cross sectional area of a steam by using data of velocity and depth for several stations and by using Mean and Mid section methods.  Week 6: Exercises to separate base flow for a stream discharge hydrograph by using Straight line method, Fixed base length method, Variable slope method and Kunkles method.  Week7: Monthly Examination.  Week 8: Relation between water level in streams and ground water level in three types of streams: Influent, Effluent and Equifluent streams by constructing ground water level maps and drawing cross sections for the streams.  Week 9: Exercises to study the three types of Aquifers: confined, Unconfined and Perched aquifer by drawing stratigraphic cross section for subsurface data of several wells oriented in same direction.  Week 10: Exercises to determine the aquifer characteristics (discharge , transsmisivity ,hydraulic conductivity).  Week 11: Determining aquifer characteristics by using three point problem .  Week 12:Exercises to prepare a flow net by using equipotential lines and flow lines and determining aquifer discharge by using flow net.  Week13: Well Hydraulics Pumping tests. Three methods (Theis, Jacob and Chow method) are used to determine transsmissivity and storage coefficient for an aquifer by using data of drawdown from an observation well.  Week14: Presentation of chemical analysis results for groundwater by using several diagrams.  Week15: Review for all labs.  Week16: Monthly Examination.    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | Lecturer's nameDr imaddadin omer hassan |
| **19. Examinations:**  ***The examination will contain different types :***  1-Explanations.  2-True or false.  3-Drawings and sketches and its labling .  4-Multiple choice.  5-Interpretation ,giving the reasons. | | |
| **20. Extra notes:**  None. | | |
| **21. Peer review پێداچوونه‌وه‌ی هاوه‌ڵ**  .‌‌ | | |

**Course Book**