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**Department of Earth Sciences and petroleum**

**College of Science**

**University of Salahaddin/Erbil**

**Subject: Invertebrate Palaeontology**

**Course Book –Year. 2**

**Lecturer's name: Majeed Toma Hanna (Ph.D.)**

**Academic Year: 2022 - 2023**

**Course Book**

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| **1. Course name** | Invertebrate Palaeontology |
| **2. Lecturer in charge** | Dr. Majeed Toma Hanna |
| **3. Department/ College** | Earth Sciences and Petroleum/Science |
| **4. Contact** | e-mail: majeed.hanna@su.edu.krdTel: (optional) |
| **5. Time (in hours) per week**  | Theory: 2 Practical: 2  |
| **6. Office hours** | 2 |
| **7. Course code** |  |
| **8. Teacher's academic profile**  | First assignment in University of Salahaddin/Erbil in 1993 as assistant lecturer.Attainment of Ph.D. degree and lecturer title in 2008. |
| **9. Keywords** |  |
| **10. Course overview:** Palaeontology means in Greek the science that studies the ancient life, through the remains or traces of prehistoric organisms often preserved within sedimentary rocks. Palaeontology is important because life on the earth has not always been as its now. By studying the fossils in progressively older rocks, the Palaeontologist attempts to establish an account of how all the animals and plants, which make up the modern biosphere evolved from their earliest beginnings.The field of palaeontology is quite diverse and comprises several sub disciplines, each of which has relevance to different branches of geology and biology.Fossils are important to geologists for three reasons: they provide age determination of rocks in which they occur, they provide establishment of environment of formation of the sediments of the past in which they occur and hence the key to palaeoecological and palaeogeographical reconstructions, and they provide the raw data for determining the evolution of past organisms. |
| **11. Course objective:**The course aims to give a preliminary and concise knowledge on the invertebrate palaeontology to the undergraduate students as a base for the following courses of biostratigraphy, palaeoecology, sedimentology and geology of Iraq.Upon completing this course students will be able to use the fossil record for determination the relative age of fossil bearing rocks, and to make inferences about palaeoenvironments. Therefore, it will be required that students demonstrate a general understanding of the various groups of fossil organisms and their stratigraphical occurrence. Specifically, students should:1. Demonstrate ability to identify fossils of major taxomonic groups.
2. Demonstrate knowledge of morphology of major fossil groups.
3. Demonstrate knowledge of the age and stratigraphical significance of major fossil groups.
4. Be able to collect and interpret palaeontological data from the field.
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| **12. Student's obligation**In this section the lecturer shall write the role of students and their obligations throughout the academic year, for example the attendance and completion of all tests, exams, assignments, reports , essays…etc لێره‌ مامۆستا به‌رپرسیارێتی قوتابی خوێندکار ڕوونده‌کاته‌وه‌ سه‌باره‌ت به‌ کۆرسه‌که‌ بۆ نموونه‌ ئاماده‌بوونی قوتابیان له‌ وانه‌کاندا، له‌ تاقیکردنه‌وه‌کاندا، راپۆرت و ووتار نووسین... هتد.  |
| **13. Forms of teaching**The following are used in teaching the subject:* Power point program with data show.
* White Board.
* Hard copy in pdf form of a lecture, prepared previously.
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| **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؟‌ |
| **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 words  |
| **16. Course Reading List and References‌:****REQUIRED TEXTBOOKS**Clarkson, E.N.K. 1996. Invertebrate Palaeontology and Evolution. 3rd Edition. Chapman and Hall, London, 434p.Black, R.M. 1995. The Elements of palaeontology. 2nd Edition. Cambridge University Press, 404p.Moore, R.C. (ed.) 1953. Treatise on invertebrate Palaeontology. Kansas University Press. A series of volumes each dealing with a major invertebrate group on a detailed and systematic basis. Murray, J.W. (ed.) 1985. Atlas of Invertebrate Macrofossils. Longman Group Ltd, Harlow. 241p.**ADDITIONAL READINGS**Nield, E.W. and Tucker, V.C.T. 1985.Palaeontology-An Introduction. Pergamon Press Ltd, England. 172p.Prothero, D.R. 2004. Bringing Fossils to Life: An Introduction to Palaeobiology. 2nd Edition. McGrow-Hill, 503p. |
| **17. The Topics (Theoretical and practical):** | **Lecturer's name** |
| **Week.1:** Introduction- Palaeontology; Fossils; The origin of life; Precambrian fossils; Preservation of fossils, Conditions favourable for preservation, Types of preservation- Unaltered remains.**Practical:** Study and description of fossils specimens represent various types of preservation.**Week.2:** Altered remains, Traces of soft parts, Traces of animal activities, Coprolites, Pseudofossils; Uses of fossils; Habitats and habits of animals; Classification of organisms.**Practical:** Study and description of fossils specimens represent various types of preservation.**Week.3:** Phylum Porifera (Sponges) - Nature and shape of the animal, The body wall, Grades of organisation; Classification: Subphylum Gelatinosa: Class Demospongea: Spicular demosponges, Sclerosponges, Chaetetids. **Practical:** Study and description of sponge fossils specimens.**Week.4:** Stromatoporoids, Sphinctozoans; Class Calcarea; Subphylum Nuda: Class Hexactinellida; Incertae sedis Archaeocyatha; Geological importance of sponges.**Practical:** Study and description of stromatoporoid and archaeocyathid fossils specimens.**Week.5:** Phylum Cnidaria- Living organism, The skeleton, Classification- Class Hydrozoa, Class Scyphozoa, Class Anthozoa- Subclass Ceriantipatharia, Subclass Octocorallia, Subclass Zoantharia, Order Rugosa-Form of corallum, Types of septa, Axial structures.**Practical:** Study and description of rugosan coral fossils specimens.**Week.6:** Order Rugosa- Tabulae and dissepiments, Calice, Corallum increase and budding, Rejuvenescence, Classification, Ecology of rugosan corals; Order Tabulata- Form of corallum.**Practical:** Study and description of rugosan coral fossils specimens.**Week.7:** 1st Theoretical and Practical Exam.**Week.8:** Order: Tabulata-Skeletal elements, Axial budding and growth, Classification, Ecology; Order Scleractinia- Type and habit, Septa and associated structures, Asexual reproduction and colony formation, Classification, Ecology; Geological uses of corals.**Practical:** Study and description of tabulate and scleractinian coral fossils specimens.**Week.9:** Phylum: Bryozoa- Recent bryozoa: Morphology of two genera: 1- *Bowerbankia*, 2- *Smittina*; Fossil bryozoa:1- *Dekayella* (Order: Trepostomata), 2- *Fenestella* (Order: Cryptostomata); The functional morphology of bryozoans’ colonies (Fenestellid colonies); Classification.**Practical:** Study and description of bryozoan fossils specimens.**Week.10:** Phylum Brachiopoda- Morphology, Subphylum: Rhynchonelliformea-Morphology of three genera: 1- *Magellania*, 2- *Visbyella*. **Practical:** Study and description of brachiopod fossils specimens. **Week.11:** 3- *Eoplectodonta*;Major features of brachiopod- Form of shells, Microstructure of shells, Punctation in brachiopod shells, Hinge and articulation; **Practical:** Study and description of brachiopod fossils specimens.**Week.12:** Muscle attachments; Lophophore; Subphylum: Linguliformea-Shell structure in *Lingula*; Ecology of brachiopoda.**Practical:** Study and description of brachiopod fossils specimens.**Week.13:** Phylum Mollusca- Fundamental organisation; Classification; Shell morphology and growth: 1- Coiled shell morphology, 2- Septation of the shell; Class Bivalvia: 1- Shell morphology and orientation, 2- Internal anatomy. **Practical:** Study and description of bivalve fossils specimens.**Week.14:** Features of bivalves: 1- Shell structure and mineralogy, 2- Dentition, 3- Ligaments and muscles, 4- Other shell structures, 5- Gill morphology; Mode of life; Classification.**Practical:** Study and description of bivalve fossils specimens.**Week.15:** 2nd Theoretical and Practical Exam.  | Lecturer's nameex: (2 hrs)ex: 14/10/2015 |
| **18. Practical Topics (If there is any)** |  |
| In this section The lecturer shall write titles of all practical topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic, date and time of the lecture  | Lecturer's nameex: (3-4 hrs)ex: 14/10/2015 |
| **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 answersExamples 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:**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 review:** Professor Dr. Faraj H. Tobyia.‌‌  |