



مركز الاعتماد
وإضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

Course Name:
Invertebrate Paleontology

1	Course title	Invertebrate Paleontology
2	Course number	0305301
3	Credit hours (theory, practical)	3 Credit hours
	Contact hours (theory, practical)	
4	Prerequisites/corequisites	General Geology (0305101)
5	Program title	Environmental and Applied geology
6	Program code	
7	Awarding institution	
8	Faculty	Faculty of Science
9	Department	Geology
10	Level of course	Bachelor
11	Year of study and semester (s)	2017/2018, First semester
12	Final Qualification	
13	Other department (s) involved in teaching the course	
14	Language of Instruction	English
15	Date of production/revision	

16. Course Coordinator:

<p>Dr. Ikhlas Alhejoj Office hour: Tuesday and Thursday, 10:00 am -12:00 pm Monday and Wednesday, 11:00 am -1:00 pm and by appointment Phone numbers: 962 6 53 555 000, ext. 22264 email address: i.alhejoj@ju.edu.jo</p>
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17. Other instructors:

<p><i>Office numbers, office hours, phone numbers, and email addresses should be listed.</i></p>
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18. Course Description:

Systematic of important groups of invertebrate fossils. Introduction to biostratigraphy, paleoecology, and the study of mass extinctions and faunal radiations. Mechanisms and patterns of evolution. Groups covered include: Porifera, Cnidaria, Brachiopoda, Mollusca, Trilobita, Echinodermata, plant fossils, and some microfossil groups (Foraminifera, Radiolaria, Ostracoda). In addition this course covers many subjects including the paleontology, taphonomy, ichnology, and pseudofossils.

19. Course aims and outcomes:**A- Aims:**

This course provides a survey of the major fossil-forming groups of invertebrate animals. You will be able to identify fossil specimens from the major invertebrate groups, and to use these specimens and identifications to facilitate interpretation of the age and environment in which the organisms originally lived. The student will learn how fossils may be used to reconstruct ancient organism communities, environments and evolutionary history. Also learn about the origin and early evolution of life, and subsequent large-scale diversity patterns over geologic time. Most importantly, you should have an understanding of the principles of paleontology, and how fossils are used to recreate past environments and determine the history of life on Earth.

B- Intended Learning Outcomes (ILOs):

By the end of the course, every student should be able to:

- Understand fossils, paleontology, taphonomy, ichnology, and pseudofossils.
- Identify major groups of invertebrate fossils (Mollusca: Pelecypoda, Gastropoda, Cephalopoda; Echinodermata; Crinoid; Brachiopoda; Coelenterata; Arthropoda; Graptolithina; Porifera ;Bryozoa; microfossils: Foraminifera, Radiolaria, Ostracoda ; plant fossils) and use the identified fossils to refine interpretations of the age and environment in which the organisms originally lived.
- Know the basic morphological and taxonomic features of major of invertebrate fossil groups and their life style.
- Describe the uses of trace fossils and be able to identify a variety of trace fossils.
- Explain the usage, value and advantages of index fossil groups within biostratigraphy, paleoenvironmental, and paleoclimate reconstructions.
- Describe/Identify fossil groups and their importance in describing Earth history
- Broadly classify fossils into the Eon/Era during which they lived
- Show an understanding of the mechanisms of evolution and extinction.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Introduction	1	Dr. Ikhlas Alhejoj	History of paleontology and Origin of life, STROMATOLITE fossils. NO LABS		Benton & Harper, (1997). Prothero & Dott (2004).

Fossils and Taphonomy	2	Dr. Ikhlas Alhejoj	Fossils and fossil preservation types (Taphonomy), Ichnology Classification of major invertebrate phyla and classes, LAB 1: (Fossils& Fossilization) The lab component will emphasize taphonomy (how organisms are transformed into fossils) and ethology (as shown by their trace fossils).		Chapters 1-3, Clarkson (1998) . - Chapter 20, Nichols (2009) . Foote & Miller(2008)
Phylum Porifera	3	Dr. Ikhlas Alhejoj	Phylum Porifera (Sponges) and Cnidaria (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends). LAB 2: Study and description of sponge and coral fossil specimens		Chapters 4-5, Clarkson (1998)
Phylum Bryozoa	4	Dr. Ikhlas Alhejoj	Phylum Bryozoa: Morphology of two genera: 1- <i>Bowerbankia</i> , 2- <i>Smittina</i> ; (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends). LAB 3: Study and description of bryozoan fossil specimens		Chapter 6, Clarkson (1998)
Phylum Brachiopoda	5	Dr. Ikhlas Alhejoj	Phylum Brachiopoda(taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends). LAB 4: Study and description of brachiopod fossil specimens	Lecture Exam	Chapter 7, Clarkson, (1998)
Phylum Mollusca	6	Dr. Ikhlas Alhejoj	Phylum Mollusca (gastropods, cephalopods and bivalves) (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends). LAB 5: Part I, Gastropods and Cephalopods LAB 6: Part II, Bivalves		Chapter 8, Clarkson, (1998). Benton & Harper (2009)
Phylum Echinodermata	7	Dr. Ikhlas Alhejoj	Phylum Echinodermata(taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments),		Chapter 9, Clarkson, (1998)

			geological history and evolutionary trends). LAB 7: Study and description of echinoid fossil specimens		
Trilobites/Graptolites	8	Dr. Ikhlas Alhejoj	Graptolites and Arthropoda (Trilobites), (taxonomy and higher level classification, morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends). LAB 8: Study and description of Graptolites & Trilobite fossil specimens		-Chapter 10, , Clarkson, (1998). -Chapter 11, Clarkson, (1998). Benton & Harper (2009)
Micropaleontology	9	Dr. Ikhlas Alhejoj	Micropaleontology (bacteria, foraminifera, diatoms, Radiolaria, Ostracods and Conodonts) (taxonomy and higher level classification, morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends). LAB 9: Micropaleontology		Chapters 14-17, and 20&21, Armstrong & Brasier. (2005).
Kingdom: Plantae,	10	Dr. Ikhlas Alhejoj	Kingdom: Plantae, Preservation; (taxonomy and higher level classification, morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends), LAB 10	Lab Exam	Benton & Harper (2009)
Invertebrates fossils in Jordan	11	Dr. Ikhlas Alhejoj	Invertebrates fossils in Jordan Field trip: fieldwork on fossils	Field trip report	Bandel, Salameh (2013)

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

- Lectures by teacher, Use of slides, PowerPoint.
- Class project Presentation by students.
- Problem solving or case studies.
- Use of chalkboard by instructor as aid in teaching.
- Discussion Groups by students.
- Field trips: students reports by individuals and student group reports.
- Use of diagrams, graphs, and charts by instructor in teaching.
- Text book assignment.
- Laboratory exercise and student construction of diagrams, chart, maps.
- Labs use different samples and models of invertebrate fossils.

- You are encouraged to work in small groups in the labs, but each student must turn an individual and unique assignment.

Three hours lab each week is required. This course will attempt to integrate lectures, labs, and fieldwork on Invertebrate fossils. The lecture component of the course will emphasize the significant contributions of paleontology, as well as providing information necessary to understand the lab component. Lectures use Power point but you are responsible to take your own notes. I strongly recommend that you take notes in class. The lab component of the course emphasizes the morphology of the common groups of invertebrate fossils and fossil identification. The field component will use the fossil assemblages of the Amman area to illustrate the ecology of fossils.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Written exams, assignment, Problem solving, written reports, oral exam (seminar presentation).

23. Course Policies:

A- Attendance policies:

Class attendance is highly recommended. Each student will be expected to attend all classes (lecture or lab). You will be permitted ONE EXCUSED absence from a lab. If you miss a lecture or lab, you are still responsible for any assignments that were assigned at that time. Absences from lectures or labs must provide a written excuse. I reserve the right to drop any student from the class who has unexcused absences based on University attendance policy.

B- Absences from exams and handing in assignments on time:

Attendance is required for both lecture and lab exams. There will be no make-ups for unexcused absences.

Absences from exams will not be excused except for those causes approved by University policy. Only those students excused for these causes will be eligible for a make-up exam.

- Students are strongly encouraged to attend all lectures and laboratory exercises. Lab exercises can be completed only during lab periods and materials may not be available outside these hours. Again, Students who miss an exam must provide a written excuse in order to receive a makeup assignment.

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior:

I realize it is very tempting and easy to plagiarize assignments. However, I expect that all assignments will be in your own words and when you paraphrase an article, that article will be cited. As easy as it is to plagiarize it is just as easy to catch. Any instances of Plagiarism or cheating will result in a 0 on the assignment or exam and will be reported to the dean's office.

If a student (or students) disrupts the class or disturbs the learning of the other students, he/she will be issued a warning. If the behavior continues, the instructor has the right to talk and write officially to the dean's office.

E- Grading policy: I will use a variety of methods to assess your performance in this course. Graded work will include lecture and lab exams, and Field trip report . Formula for grading will be as follows:

Midterm Exam 30%	
Lab exams 20%	Field trip report 10%
Final Exam 40%	

24. Required equipment:

Lab materials that may be required for some labs are medium pencils, a few coloured pencils, drawing paper .

2. References:**A- Required books:**

- Foote, M. and A. Miller. 2008. Principles of Paleontology. 3rd ed. Freeman, NYC
- Benton & Harper, 2009. Introduction to Paleobiology and the Fossil Record. Wiley-Blackwell, 592 pages. ISBN: 978-1-4051-4157-4
- Donald R. Prothero & Robert H. Dott, Jr., 7th ed., 2004, The Evolution of the Earth: MacGraw-Hill, New York.
- Clarkson, E.N.K., 1998. Invertebrate Palaeontology and Evolution. 4th ed. Blackwell, NYC.
- Nichols, G. 2009. Sedimentology and Stratigraphy. 2nd ed. Wiley-Blackwell.
- Bandel, K., Salameh, E., 2013, Geologic Development of Jordan - Evolution of its Rocks and Life. The University of Jordan Press, 276 p.
- Armstrong, H.A. and Brasier, M.D.2005. Microfossils, 2nd edition, Blackwell Publishing, Oxford, 296 pp. Copestake, P. 1993.
- Briggs, D. E. G., and Crowther, P. R. (eds.), 2001, Palaeobiology II: A Synthesis. Blackwell Scientific

B- Recommended books, materials, and media:

- Prothero, D. R., 2004, Bringing fossils to life: An introduction to paleobiology 2nd Edition. WCB/McGraw-Hill, Boston.
- Raup. D. M., 1991, Extinction: Bad genes or bad luck? W. W. Norton & Co., N. Y.
- Levin, H. J., 1999. Ancient Invertebrates and Their Living Relatives. Prentice Hall. Low level.

Recommended materials:- Fossil samples and models , microscope with digital camera.

2. Additional information:

Name of Course Coordinator: Dr. Ikhlas Alhejoj Signature: ----- Date: 30 May 31, 2015

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- -Signature: -----

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Assistant Dean for Quality Assurance
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