

## EARTH SCIENCES 2265A: PALEOBIOLOGY AND PALEOECOLOGY

**Instructor:** Jisuo Jin, Professor (BGS Rm 0180; 519-661-4061; E-mail: [jjin@uwo.ca](mailto:jjin@uwo.ca))

**Course Description:** A survey of common fossils from bacteria, protists, calcareous algae, to invertebrate animals. Topics on each group of fossils include functional morphology, evolution, ancient living environments, contribution to sediment accumulation and reef-building, utility for dating and correlating rocks and for understanding long-term biodiversity change.

**Learning Outcomes:** Upon successful completion of this course, students will be able to:

- recognize the most common fossil groups in the geological record, predominantly megafossils that are visible in sedimentary strata of various geological periods based on laboratory assignments;
- describe the most common rock-forming, including reef-building fossil groups and their importance in ancient ecosystems;
- explain the functional morphology of fossil organisms and interpret their adaptations to living environments in the geological past;
- use paleoecological information to interpret depositional environments, such as marine vs. fresh-water conditions, water depth, turbulence level, oxygen content, and substrate types.

**Prerequisite or Corequisite:** ES 2200a/b or permission of department.

**Antirequisite:** Former ES 361a/b.

**University Policies:**

*Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.*

*If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see: <http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>*

*A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: [https://studentservices.uwo.ca/secure/medical\\_document.pdf](https://studentservices.uwo.ca/secure/medical_document.pdf)*

**Accessibility:** *Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.*

**Academic Offences:** *Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: <http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf>.*

**Lectures:** (Monday and Wednesday, 10:30–11:30AM, UCC-56)

Week 1: Introduction to the principles of paleontology, fossils and the geological time scale, paleoenvironments and paleobiogeography, processes of fossilization, and classification of organisms.

Week 2: Bacteria. Origin and evolution of primitive life forms and their relationships to the early lithosphere, hydrosphere, and atmosphere. Bacteria contribution to ecosystems and deposits associated with black smokers, hot springs, microbial deposits.

Week 3: Protists. Calcareous and siliceous forms (such as coccoliths, foraminifers, diatoms, radiolarians) and their importance to the carbon dioxide and silica balance in the ecosystems.

Week 4–11: Major invertebrate fossil groups: zoological baupläne, functional morphology, evolution, and ecology/paleoecology.

Week 12–13: Paleontological applications: biostratigraphy, paleoenvironmental reconstruction, paleobiogeographic reconstruction, major trends of biotic radiation and mass extinctions.

**Laboratory:** Thursday, B&GS-1069, Session 1, 2:30–5:30PM; Session 2, 6:00–9:00PM.

- Three-hour labs on these aspects of fossils: taphonomy, paleoecology, classification, functional morphology, and microscopic structures relevant to sedimentary petrology.

Lab 1. Fossilization

Lab 2. Bacteria and protists

Lab 3. The reef-builders: sponges, corals, and byozoans

Lab 4. The shelly benthos: brachiopods and molluscs

Lab 5. Arthropoda (trilobites and “sea scorpions”)

Lab 6. The Deuterostomate invertebrates: echinoderms and hemichordates

- Students must complete all lab assignments in order to get a final grade for the course.
- For each lab, a part of the assignment is due by the end of the 3-hour session, and the remainder is due one week (7 days) after the lab session.
- A 10% deduction of marks will be assessed per one day of late submission.

<b>Course Evaluation:</b> Mid-term exam (October 19, 10:30-11:20AM):	20%
Final exam (University scheduled):	40%
Classroom quizzes (random)	10%
Lab assignments (see under Laboratory)	30%

### **Recommended Texts and Other Course Material**

- 1) Clarkson, E.N.K. 1998. Invertebrate Palaeontology and Evolution (4<sup>th</sup> edition). Blackwell Science.

2) Jin, J. 2010. Earth Sciences 2265 Paleobiology and Paleoecology, Laboratory Manual. 110 pp. (Available in PDF electronic version on OWL)

3) Jin, J. Powerpoint lectures. (Available in PDF electronic version on OWL)

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