

G685 EVOLUTION OF ECOSYSTEMS

INSTRUCTOR: Dr. Claudia C. Johnson, Geology 501, 855-0646, claudia@indiana.edu

COURSE DESCRIPTION: Advanced analysis of large-scale, cohesive environmental influences on ecosystem development and persistence through the rock record. Emphasis is on paleoecologic grouping at community and higher levels. Analytical methods include synthesis of published numerical, geochemical and sedimentological models.

COURSE MATERIALS: Readings from textbooks and scientific journals. For each item selected for reading and discussion we will address the following: why the paper was selected, what we should consider while reading the article, specific topics that are significant to guide the discussion, and a critical evaluation of the positive and negative points of the paper. Come prepared to every class session with written notes on each of these topics.

PHILOSOPHY AND OBJECTIVES OF THE COURSE: Group discussion and open-ended questions will be the norm as we synthesize our knowledge of specific ecosystems through the Phanerozoic. It is anticipated that these discussions will promote ideas for graduate and future research projects.

STUDENT LEARNING OUTCOMES

Through a series of written assignments, you will demonstrate that you gained a temporal or geologic view of Earth's specific ecosystems, and knowledge of ecosystem functions

In an oral and written report submitted at the end of the course, you will demonstrate your understanding of evolutionary and ecologic processes that operate at numerous scales in an ecosystem

Through the semester's readings and structured class discussions, you will integrate the physical, chemical and biological changes that are possible for ecosystems on our future Earth

You will gain experience in sharpening both your writing and speaking skills, and will present a professional oral and written report at the end of the semester that demonstrates your skills

FINAL PROJECT: ORAL PRESENTATION AND WRITTEN REPORT

Topic selection: The goal of the final project is to advance your dissertation research into the realm of ecosystem dynamics. Select an ecosystem that will place your data into a larger, more encompassing research analysis and synthesis. You may choose any ecosystem, any time period.

Oral presentations will come at the end of the semester, during the last class sessions. Each student will have one hour to present information, answer questions, and pose areas for future research investigations. The scientific content, including intellectual depth and breadth, and relation of the chosen topic to the semester's breadth of topics on ecosystems, as well as the quality of your responses to questions posed by class members and the instructor, are the criteria I will use for assigning grades. A suggested format for the final written report is an *Abstract; Introduction* that introduces the topic and hypothesis, provides sufficient scientific background, and informs reader of the importance of the project; a *Data/Methods* section; a *Discussion* section in which you assess the data and relate your work to that of related topics; a *Summary and Conclusions* section in which you summarize succinctly your contributions, and draw conclusions concerning the evolution of ecosystems; *References, and Figures*.

G685 Evolution of Ecosystems Syllabus

Overview of the course

Introductory questions and discussions on ecosystems
Presentation on ecosystem basics

Field observation of a modern lacustrine ecosystem
Griffy Lake field trip

Synthesis of a modern oceanic ecosystem – the coral reef ecosystem
Presentation on the geologic record of reef ecosystems

Field observation of a modern terrestrial ecosystem – stages in transition
Stillwater Marsh field trip

Ecosystem models–integration of several fields of research

Ecosystem methods – how modern and ancient ecosystem components are analyzed

Ecosystem functions - nutrient cycling through ecosystems: C, O, N, S, P, trace elements

Evolution of Ecosystems: Do ecosystems evolve?

Analysis of ecosystems in ancient greenhouse worlds

Analysis of ecosystem dynamics in ancient icehouse and transitional climate states

Recent publications in ecosystem research from *Science & Nature*

Student presentations