

Syllabus

Course Website: <http://biologylabs.utah.edu/farmer/Computational%20Paleophysiology.html>

Number of course: BIOL/GEO 5665/6665 (graduate level)

Title, credit hours: Computational Paleophysiology, 3 (1 lab, 2 lecture).

Department offering course: Department of Biology

Meeting location: Marriott Library room 1009

Meeting time: TBA.

Recommended: CHEM 1210; MATH 1210; PHYS 2210; BIOL 3310, 3320

Faculty name, office number, location, office hours, phone number, e-mail address: Associate Prof. Farmer; 107 S. Biology; Office hours: TBA; phone: 581- 4236; cg.frmr@gmail.com

This course meets the bachelor's degree quantitative intensive (QI) requirement.

This course addresses the following Essential Learning Outcomes: Quantitative Literacy, Written Communication, Critical Thinking.

Course description: This course examines the methods scientists use to 'put flesh on the bones' of extinct animals. It is designed to give students the quantitative tools needed to build computational models that reconstruct the biology of extinct organisms as well as to teach them how to frame hypotheses, select appropriate methods for investigating hypotheses, analyze data, use logic and evidence to reach conclusions, write a scientific paper, and communicate findings as an oral presentation. The class emphasizes project-based learning. Instructor's permission is required. The course application is available online at:
<http://biologylabs.utah.edu/farmer/application%20form.html>.

For questions contact the instructor at cg.frmr at gmail.com.

Course objectives: Students are introduced to a number of different methodologies used to deduce the physiology, behavior, and environmental context of extinct organisms. This course emphasizes participation in the scientific process, the use of evidence and logic to reach wise conclusions, development of communication and collaboration skills, as well as development of modeling, simulation, and computational skills. After completing the course students will be able to use these methods to 'breathe life' into extinct organisms, and to communicate the results of their research as a scientific manuscript and as an oral presentations. Students will be able to conduct peer assessment, which will foster autonomous learning.

Content overview: Understanding the biology of extinct organisms requires integration of information from disparate scientific disciplines, primarily the fossil record, paleogeography, geochemistry, isotope chemistry, and biological neontological studies encompassing developmental biology, biomechanics, ecology, and botany. An increasingly important line of investigation in this field is the use of models that range from geochemical models of the Earth's atmospheric composition to biomechanical models of gait, posture, bite forces, heat loss, sound production, metabolism, *etc.* Computational paleophysiology is an interdisciplinary course that integrates knowledge and methodologies from the fields of computational biology, paleontology, and geology. The fieldwork focuses on hands on learning, problem solving, and data collection and analysis. The course consists of approximately 30 hours of lectures and 40 hours of fieldwork. These time budgets do not include transit time to or from the field site.

Teaching & learning methods: This course emphasizes experiential and project-based learning and requires the development and use of problem solving skills. It employs a variety of modalities (visual, auditory, tactile) to facilitate learning, including lecture and discussion, problem sets, readings, a research project, writings, oral presentations, and fieldwork. The research project is broken down into several components, each of which is graded. Each student generates a problem statement and a hypothesis, as well as a list of potential methodologies that could be employed to test the hypothesis. Problems sets are given that are tailored to the research projects. The aims of the problem sets are to (1) teach and foster problem-solving skills and analytical thinking (2) illustrate the fact that large and complex problems are often solved by breaking the problem into several smaller and more tractable

components. After completing the problem sets the students synthesize their findings from these sets, integrate the information with data from additional sources (readings, fieldwork), and communicate the results of their research to the class as an oral presentation. Additionally, two papers are required: a summary of the discussions and findings of the fieldwork (a field notebook); a final paper of the project that is written as a scientific paper. The ability for autonomous and lifelong learning is fostered through peer assessments.

Evaluation methods and criteria: A combination of instructor and peer assessments is used. A grading rubric is given at the time of the assignment so that students are aware of how to judge the performance of their peers and themselves. The relative importance for different components of the course is as follows:

Homework: 100

Paper: 200

Oral presentation: 85

Field notebook, field worksheets, quizzes:

100 Participation: 15

Total: 500 points

Graduate students will/must carry out a research project and produce a manuscript at a graduate level.

Grade Scale: 100-93 A; 92-90 A-; 89-87 B+; 86-83 B; 82-80 B-; 79-77 C+; 76-73 C; 72-70 B-; 69-67 D+; 66-63 D; 62-60 D-; 0-59 E

Field Trip Policy: There is a required field trip for this course that will involve fossil collecting during daylight hours. Students may not drive their own vehicles and guests (family members or friends) are not allowed on the trip. The field trip is subject to the vagaries of weather and other uncontrollable factors.

Faculty and student responsibilities:

“All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. Students have specific rights in the classroom as detailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee.” “Faculty must strive in the classroom to maintain a climate conducive to thinking and learning.” PPM 6-316. Students have a right to support and assistance from the University in maintaining a climate conducive to thinking and learning.” PPM 8-400.

Statement on Addressing Sexual Misconduct:

“Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a Civil Rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran’s status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, [801- 581-8365](tel:801-581-8365), or the Office of the Dean of Students, 270 Union Building, [801-581-7066](tel:801-581-7066). For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, [801-581-7776](tel:801-581-7776). To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).”

ADA statement:

“The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Union Building, 581-5020 (V/TDD). CDS will work with you and the instructor to make arrangements for accommodations.”

Wellness Statement:

Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness; www.wellness.utah.edu; 801-581-7776.

Non-Contract Note:

"Note: The syllabus is not a binding legal contract. It may be modified by the instructor when the student is given reasonable notice of the modification."

Plagiarism Software Policy:

"Your professor may elect to use a plagiarism detection service in this course, in which case you will be required to submit your paper to such a service as part of your assignment."