

Submit original with signatures + 1 copy + electronic copy to Faculty Senate (Box 7500).
 See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures/> for a complete description of the rules governing curriculum & course changes.

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	Geology & Geophysics	College/School	CNSM
Prepared by	Sarah Fowell	Phone	474-7810
Email Contact	sjfowell@alaska.edu	Faculty Contact	Sarah Fowell

1. ACTION DESIRED (CHECK ONE):

Trial Course New Course

2. COURSE IDENTIFICATION:

Dept Course # No. of Credits

Justify upper/lower division status & number of credits:

This course is an interdisciplinary, upper-division course for the proposed Paleontology Option in Geological Sciences. Prerequisites include 300- and 400-level courses in geology and paleontology, or current enrollment. Students will meet with instructors for 3 hours/week for lectures and discussion.

3. PROPOSED COURSE TITLE:

Mass Extinctions, Neocatastrophism and the History of Life

4. To be CROSS LISTED? YES/NO

 If yes, Dept: Course #

(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. To be STACKED? YES/NO

 If yes, Dept: Course #

6. FREQUENCY OF OFFERING:

Spring, Odd-numbered years

Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (AY2011-12 if approved by 3/1/2012; otherwise AY2012-13)

Spring AY2012-2013

RECEIVED

SEP 26 2011

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than three days must be approved by the college or school's curriculum council. Furthermore, any core course compressed into fewer than three days must be approved by the core review committee.

Dean's Office
College of Natural Science & Mathematics

COURSE FORMAT: (check all that apply)

1 2 3 4 5 6 weeks to full semester

OTHER FORMAT (specify)

Mode of delivery (specify lecture, field trips, labs, etc) Lecture and discussion

9. CONTACT HOURS PER WEEK:

LECTURE hours/weeks LAB hours/week PRACTICUM hours/week

Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See <http://www.uaf.edu/uafgov/faculty-senate/curriculum/course-degree-procedures-/guidelines-for-computing/> for more information on number of credits.

OTHER HOURS (specify type)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title, credits, credit distribution, cross-listings and/or stacking (50 words or less if possible):

GEOS 485 Mass Extinctions, Neocatastrophism and the History of Life
3 Credits Offered Spring Odd-numbered Years

In-depth analysis of the literature regarding mass extinction, focusing on evidence for catastrophes and impact on the uniformitarian paradigm. Effects of mass extinctions on the evolutionary history of extant and fossil animals and plants will be explored through readings from the classic and current literature in paleontology. The course will

Governance 10/7/11 K&R

emphasize critical reading and application of scientific methods to reconstruction of geologically rapid events in deep time.

Prerequisites: GEOS 322 and GEOS 315, or permission of instructor. (3+0)

^GEOS F315W

11. **COURSE CLASSIFICATIONS:** Undergraduate courses only. Consult with CLA Curriculum Council to apply S or H classification appropriately; otherwise leave fields blank.

H = Humanities

S = Social Sciences

Will this course be used to fulfill a requirement for the baccalaureate core? If YES, attach form.

YES: NO:

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6

W = Writing Intensive, Format 7

Natural Science, Format 8

12. **COURSE REPEATABILITY:**

Is this course repeatable for credit?

YES

NO

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

How many times may the course be repeated for credit?

TIMES

If the course can be repeated for credit, what is the maximum number of credit hours that may be earned for this course?

CREDITS

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?

CREDITS

13. **GRADING SYSTEM:** Specify only one. Note: Later changing the grading system for a course constitutes a Major Course Change.

LETTER:

PASS/FAIL:

RESTRICTIONS ON ENROLLMENT (if any) and GEOS F322 AND GEOS F315W, or permission of instructor.

14. **PREREQUISITES**

GEOS 322, GEOS 315W, or permission of instructor

These will be required before the student is allowed to enroll in the course.

15. **SPECIAL RESTRICTIONS, CONDITIONS**

none

16. **PROPOSED COURSE FEES**

none

Has a memo been submitted through your dean to the Provost for fee approval?

Yes/No

17. **PREVIOUS HISTORY**

Has the course been offered as special topics or trial course previously?

Yes/No

Yes

If yes, give semester, year, course #, etc.:

Geos 492/692 (Biotic Crises and Mass Extinctions) was offered spring 1998. At that time it was co-taught by Whalen and Gangloff (retired). In addition, Fowell taught a 300-level Mass Extinctions course for a study-abroad program in Italy during the fall 2010 semester. The proposed course will be co-taught by Whalen and Fowell and include elements from both prior offerings.

18. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

The course will form a regular portion of the teaching workloads for both Whalen and Fowell. Co-teaching allows the department to expand course offerings without overloading the faculty. We anticipate needing a classroom that seats 15-25 students. Such classrooms are available in the Reichardt Building.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No

Yes

The books are available at the library, but we will ask students to purchase copies so that they can make notes in the margins. We intend to post course content on e-reserves, which Fowell uses regularly.

20. IMPACTS ON PROGRAMS/DEPTS

*What programs/departments will be affected by this proposed action?
Include information on the Programs/Departments contacted (e.g., email, memo)*

The proposed course will be an elective for the new Paleontology Option under the proposed changes to the BS program in Geology.

21. POSITIVE AND NEGATIVE IMPACTS

Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.

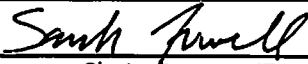
Proposed changes to the BS program in Geology include several new options. We expect the Paleontology Option to attract students and lead to increased enrollments. In general, this is a positive impact, but it is important to note that several required geology courses are currently operating at maximum capacity. Increased enrollments in prerequisite courses will require larger classrooms and additional lab sections. The latter also requires additional TAs. Although larger classrooms are few and additional TAs require additional funding, these are issues that the Dept. of Geology and Geophysics must deal with independent of the proposed new course.


JUSTIFICATION FOR ACTION REQUESTED

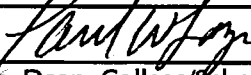
The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. Use as much space as needed to fully justify the proposed course.

The new Paleontology Option will require students to complete most of the courses currently required for Geology majors and earn a Biology minor. Students who select this interdisciplinary option will be well served by GEOS 485, which provides an interesting entrée into the paleontological literature and builds upon prior courses in both biological and geological sciences. The "lecture" portion of the course will be student-centered, with clicker questions, small group discussions and reading assessments to gauge students' understanding of classic books and current journal articles. These activities are designed to foster critical reading skills and analytical abilities, both of which are essential for success in graduate studies and the workplace.

APPROVALS: Add additional signature lines as needed.

	Date	9/23/11
Signature, Chair, Program/Department of: <u>Geology + Geophysics</u>		

	Date	10/5/11
Signature, Chair, College/School Curriculum Council for: <u>CNSM</u>		

	Date	Oct 7, 2011
Signature, Dean, College/School of: <u>CNSM</u>		

	Date	
--	------	--

Signature of Provost (if applicable)

Offerings above the level of approved programs must be approved in advance by the Provost.

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	
--	------	--

Signature, Chair

Faculty Senate Review Committee: Curriculum Review GAAC

Core Review SADAC

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

	Date	
Signature, Chair, Program/Department of:		

	Date	
Signature, Chair, College/School Curriculum Council for:		

	Date	
Signature, Dean, College/School of:		

Mass Extinctions, Neocatastrophism and the History of Life

GEOS 485 Course Syllabus

Lectures, Activities, and Discussions:
TR
233 Reichardt Building

3 Credits

**Prerequisites: GEOS 322 and GEOS 315,
or permission of instructor**

Instructors: Dr. Sarah J. Fowell
E-mail: sjfowell@alaska.edu
Phone: 474-7810
Office Hours: M 11:30-1:30, W 1:00-3:00

Dr. Michael Whalen
mtwhalen@gi.alaska.edu
474-5302
TR 4:00-5:00 PM or by appt.

Required Materials:

- Alvarez, W., 2008. *T. rex and the Crater of Doom*. Princeton University Press.
- Leakey, R. and Lewin, R., 1996. *The Sixth Extinction*. Anchor Books.
- Additional journal articles (see attached citations) available on E-reserves

Course Description

In 1980, a team led by physicist Luis Alvarez and geologist Walter Alvarez discovered high concentrations of iridium in rocks near Gubbio, Italy. These layers of limestone were already known to paleontologists, because they preserve a record of marine life before and after the Cretaceous mass extinction. The Alverezes' seemingly esoteric result captured the public imagination, because it suggested that dinosaurs were wiped out by an asteroid. Through examination and discussion of classic and contemporary literature in paleontology, this course will examine the impact of the Gubbio discovery on 20th century the geosciences, evaluate the evidence for extraterrestrial impacts, and consider the environmental and biotic effects of asteroids, supervolcanos, and other global catastrophes throughout the Phanerozoic.

Course Objectives

The recognition of a geochemical anomaly coincident with the disappearance of Late Cretaceous marine fossils in the rocks at Gubbio sparked one of the greatest debates in 20th century paleontology. Despite the discovery of a coeval impact crater in the 1990s, the cause of the Cretaceous mass extinction remains uncertain. The primary mission of this course is to examine how the Gubbio section changed our understanding of both mass extinctions and the history of life on Earth. We will also consider the nature and limits of scientific methods applied to studies of deep time. To achieve these goals, we will focus on four primary objectives: 1) Assess the evidence for an asteroid impact and coincident extinction recorded in rocks around the world. 2) Compare and contrast the Cretaceous mass extinction with the Ordovician, Devonian, Permian, Triassic and Pleistocene extinctions. 3) Understand the effects of geological catastrophes, including extraterrestrial impacts, eruption of supervolcanos, and changes in ocean circulation on the global environment. 4) Evaluate the effects of mass extinctions on the course of evolution. 5) Read, discuss, debate, and critique popular and scientific articles about mass extinctions.

Learning Outcomes

This course will emphasize analytical thinking. Readings, lectures, and exercises will provide the necessary geological background and allow you to evaluate the evidence firsthand. Projects, critiques and discussions will encourage you to read critically and express your ideas in an organized format. Upon completing this course, you will be able to:

- ④ Outline evidence discovered in the rocks near Gubbio, Italy for an extraterrestrial impact at the end of the Cretaceous period
- ④ Describe the environmental effects of asteroid impacts and supervolcanos
- ④ Discuss how the Ordovician, Devonian, Permian, Triassic, and Cretaceous extinctions changed the course of evolution
- ④ Create a poster that illustrates the history of one fossil group or the evidence from one boundary section
- ④ Critique articles about mass extinction in the popular media
- ④ Evaluate the impact of the Gubbio section with respect to theories of mass extinction and the tempo and mode of evolutionary change

Instructional Methodology

Classes will typically include a reading assessment activity, a mini-lecture (~45 minutes) and a group discussion, debate or brainstorming activity. Reading assessment activities are intended to evaluate comprehension and forge connections between reading assignments and lecture topics. Lectures will provide necessary background and visual examples. Group discussions and brainstorming activities are designed to reinforce material uncovered during the mini-lectures, encourage critical thinking, and promote a learning community in which students have the opportunity combine their abilities and teach each other.

Course Policies

Attendance: Participation in activities and discussions is essential in order to master the material. You can't participate if you aren't here! Therefore, **class attendance is absolutely required** and 10% of your final grade will be based on participation. Rewards for flawless attendance include enhanced understanding and retention and an 'A' for participation. The penalty for an unexcused absence is reduction of your final grade by one increment. For example, if your final grade is a B and you have one unexcused absence, you will receive a B-; if you have two unexcused absences, you will receive a C+ and so on. Try to be prompt! Three late arrivals (10 minutes or more after class begins) will count as an absence.

Phones and Computers: Turn off your electronics during class. Take notes with a pen or pencil; the process of writing promotes retention and allows you to add arrows or draw sketches in the margins. In addition, highlighting and editing your notes by hand is far more effective than re-reading typed material. Therefore, there is no need to have your laptop in class.

Late Work: Reading assignments should be completed prior to class on the day assigned (see schedule of topics and assignments). Homework exercises and projects are due at the beginning of class on the due date. Late assignments will be accepted for one week after the due date and assessed a penalty of 5 points per day. Assignments will no longer be accepted after 7 days.

Conduct: The **Student Code of Conduct** (p. 51 in the UAF Catalog) outlines your rights and responsibilities, as well as prohibited forms of conduct. Please be aware of the contents of the code.

Project: Each of you will research one of the “lesser” extinctions and prepare a poster to display your findings. Your job is to explore the subject in depth and prepare an overview for the class. The final poster should contain both a concise summary of your findings and some informative graphics. Completed posters will be put on display during the last week of the semester.

Disability Services: The Office of Disability Services implements the Americans with Disabilities Act (ADA) and ensures that UAF students have equal access to the campus and course materials. I will work with the Office of Disability Services (474-7043) to provide reasonable accommodation to students with disabilities. Please let me know at the beginning of the course if accommodations should be provided.

Support Services:

Geology Computer Lab: The Department of Geology & Geophysics computer lab is located in 316 Reichardt. If you wish to use these computers to complete course work or design your fossil key or final project, you can obtain a computer account from Instructor Chris Wyatt (email: chris.wyatt@alaska.edu). Be sure to explain that you are enrolled in Geos 485, and include your full name and UAF login (typically your initials+last name), which will be your geology computer lab login. Chris will send you a temporary password, which you will change the first time you log on.

Large Format Printer: As a student of geology, you are each allowed to print one 36 inch x 40 inch color poster on the department’s large format printer. Go to <http://www.uaf.edu/geology/facilities/computer/poster-printing/> to view the printing schedule and review the list of supported sizes and graphics programs. To schedule a printing time, e-mail Instructor Chris Wyatt (chris.wyatt@alaska.edu). Be sure to explain that you are printing a poster for Geos 485 and the day/time you would like to print (allow 1 hour).

E-Reserves: Course graphics will be available through the UAF electronic reserve system (<http://eres.uaf.edu/>). Go to “Electronic Reserves and Course Materials”, enter the course number and instructor information, and select Geos 485 from the list. The password is: **Chicxulub**

Evaluation/Grading

Grades will be based a museum project, a media critique, an field notebook, reading assessments, participation in class discussions and activities, and two exams (a midterm and a final).

Midterm Exam (15%)

Final Exam (15%)

Media Critique (15%)

Final Project (15%)

Class Participation (10%)

Reading Assessments (15%)

Fossil Key (15%)

Grade Scale

Assignments, reading assessments, and participation will be graded according to the following scale: 100-91% = A, 90% = A-, 89% = B+, 88-81% = B, 80% = B-, 79% = C+, 78-71% = C, 70% = C-, 69% = D+, 68-61% = D, 60% = D-, <60% = F. Midterm exams, final exams, and final weighted scores will be graded on a curve.

Topics and Assignments

Date	Topic	Assignment
	Mass Extinctions and Adaptive Radiations	
Week 1	Mass Extinction and the Geologic Time Scale	
Week 2	Uniformitarianism, Catastrophism and Extinction	<i>T. rex</i> : Ch. 1-3
	Extinction, Radiation and the Meaning of Evolutionary Success	6 th Extinction: Ch. 1-3
	Gubbio, Iridium, and the "Smoking Gun"	
Week 3	UA Museum: Constructing an Electronic Fossil Key	6 th Extinction: Ch. 4-5
	Cretaceous Critters and the Gubbio Fossil Record	6 th Extinction: Ch. 6
Week 4	Asteroid vs. Volcano: Iridium and the "3 S'es"	<i>T. rex</i> : Ch. 4
	Supervolcanoes and Mass Extinctions	Due: Fossil Project
Week 5	Meteorites and Mass Extinctions	<i>T. rex</i> : Ch. 5-6
	Chicxulub and the Smoking Gun	Schulte et al., 2009
Week 6	The Nemesis Theory: Are Mass Extinctions Periodic?	<i>T. rex</i> : Ch. 7
	Midterm Exam	
	Did Asteroids Cause the "Big 5"?	
Week 7	Ordovician: Glaciers and Global Extinctions	6 th Extinction: Ch. 7
	Is an Ordovician Gamma-ray Burst Testable?	Merlott et al., 2004
Week 8	Devonian: Fall of the Primordial Reef Community	Due: Media Critique
	Did Terrestrial Vegetation Kill the Oceans?	Alego & Scheckler, 1998
Week 9	Permian: Mother of All Mass Extinctions	6 th Extinction: Ch. 8
	Panthalassa and Ocean Overturn	6 th Extinction: Ch. 9
Week 10	Anoxia and the Demise of the Giant Dragonflies	
	Clathrates, Coal and Climate Change	Retallack et al., 2006
Week 11	Triassic Extinction and the Rise of the Dinosaurs	Olsen et al., 2002
	Evidence for and Impacts of Rapid Global Warming	McElwain et al., 2002
	Extinctions: Precambrian to Present	
Week 12	Pleistocene Megafauna: Climate Change or Overkill?	6 th Extinction: Ch. 10-11
	Extraterrestrial Impact and Younger Dryas Cooling	Firestone et al., 2007
Week 13	The Great Oxygenation Event: Proterozoic Mass Extinction?	
	Vendobionts and the Cambrian Explosion	Due: Final Project
Week 14	A Sixth Extinction?	6 th Extinction: Ch. 12-14
	Gubbio's Impact: Catastrophism in the 21 st Century	
	Final Exam	

References for Journal Articles:

- Alego, T.J., and Scheckler, S.E., 1998. Terrestrial-marine teleconnections in the Devonian: links between the evolution of land plants, weathering, and marine anoxic events. *Philosophical Transactions of the Royal Society B* 353: 113-130.
- McElwain, J.C., Beerling, D.J., and Woodward, F.I., 1999. Fossil plants and global warming at the Triassic-Jurassic boundary. *Science* 285: 1386-1390.
- Merlott, A.L. and 8 others, 2004. Did a gamma-ray burst initiate the late Ordovician mass extinction? *International Journal of Astrobiology* 3: 55-61.
- Olsen, P.E., and 8 others, 2002. Ascent of the dinosaurs linked to an iridium anomaly at the Triassic-Jurassic boundary. *Science* 296: 1305-1307.
- Retallack, G.J., Metzger, C.A., Greaver, T., Jahren, A.H., Smith, R.M.H., and Sheldon, N.D., 2006. Middle-Late Permian mass extinction on land. *Geological Society of America Bulletin* 118: 1398-1411.
- Schulte, P., and 40 others, 2010. The Chicxulub asteroid impact and mass extinction at the Cretaceous-Paleogene boundary. *Science* 327: 1214-1218.