FORMAT 1
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
Prepared by: Sarah Fowell
Email Contact: sjfowell@alaska.edu

College/School: CNSM
Phone: 474-7810
Faculty Contact: Sarah Fowell

1. ACTION DESIRED
(CHECK ONE):

☐ Trial Course
☐ New Course

2. COURSE IDENTIFICATION:
Dept: GEOS
Course #: 485
No. of Credits: 3

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

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

5. To be STACKED?
YES/NO

6. FREQUENCY OF OFFERING:
Spring, Odd-numbered Years

7. SEMESTER & YEAR OF FIRST OFFERING (AY2011-12 if approved by 3/1/2012; otherwise AY2012-13)
Spring AY2012-2013

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 core review committee. Furthermore, any core course compressed into fewer than three days must be approved by the core review committee.

COURSE FORMAT:
(check all that apply)

☐ Lecture and discussion

OTHER FORMAT (specify)
Mode of delivery (specify lecture, field trips, labs, etc)

9. CONTACT HOURS PER WEEK:

☐ LECTURE hours/week
☐ 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 labs=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
emphasize critical reading and application of scientific methods to reconstruction of geologically rapid events in depth
time.

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

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.

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  X

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

How many times may the course be repeated for credit?

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

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

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

LETTER: X 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

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 (ktjensen@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 [X] 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?

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.

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<thead>
<tr>
<th>Signature, Chair, Program/Department of:</th>
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Signature of Provost (if applicable)
Offerings above the level of approved programs must be approved in advance by the Provost.

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<td>Signature, Chair</td>
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<td>Faculty Senate Review Committee: ___Curriculum Review ___GAAC</td>
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<td>___Core Review ___SADAC</td>
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<th>ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)</th>
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GEOS 485
Course Syllabus

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:
- 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 Alvarezes' 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:

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

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


