ARIZONA STATE UNIVERSITY

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GENERAL STUDIES PROGRAM COURSE PROPOSAL COVER FORM

Courses submitted to the GSC between 2/1 and 4/30 if approved, will be effective the following Spring.

Courses submitted between 5/1 and 1/31 if approved, will be effective the following Fall.

(SUBMISSION VIA ADOBE.PDF FILES IS PREFERRED)

DATE 15 Jan 2010

1. ACADEMIC UNIT: Division of Mathematics and Natural Sciences

2. COURSE PROPOSED: LSC (prefix) 294 (number) Special Topics: Dinosaurs (title) 4 (semester hours)

3. CONTACT PERSON: Name: Todd Sandrin Phone: 3-6934

   Mail Code: 2352 E-Mail: Todd.Sandrin@asu.edu

4. ELIGIBILITY: New courses must be approved by the Tempe Campus Curriculum Subcommittee and must have a regular course number. For the rules governing approval of omnibus courses, contact the General Studies Program Office at 965–0739.

5. AREA(S) PROPOSED COURSE WILL SERVE. A single course may be proposed for more than one core or awareness area. A course may satisfy a core area requirement and more than one awareness area requirements concurrently, but may not satisfy requirements in two core areas simultaneously, even if approved for those areas. With departmental consent, an approved General Studies course may be counted toward both the General Studies requirement and the major program of study. **(Please submit one designation per proposal)**

   Core Areas

   Literacy and Critical Inquiry–L ☐
   Mathematical Studies–MA ☐ CS ☐
   Humanities, Fine Arts and Design–HU ☐
   Social and Behavioral Sciences–SB ☐
   Natural Sciences–SQ ☐ SG ☒

   Awareness Areas

   Global Awareness–G ☐
   Historical Awareness–H ☐
   Cultural Diversity in the United States–C ☐

6. DOCUMENTATION REQUIRED.
   (1) Course Description
   (2) Course Syllabus
   (3) Criteria Checklist for the area
   (4) Table of Contents from the textbook used, if available

7. ***In the space provided below (or on a separate sheet), please also provide a description of how the course meets the specific criteria in the area for which the course is being proposed.***

CROSS-LISTED COURSES: ☒ No ☐ Yes; Please identify courses: _____

Is this amultisection course?: ☒ No ☐ Yes; Is it governed by a common syllabus? _____

Roger L Berger
Chair/Director (Print or Type)

Roger L Berger
Chair/Director (Signature)

Date: 1/15/10

Rev. 1/94, 4/95, 7/98, 4/00, 1/02, 10/08

Request for General Studies Designation for:
LSC 294 — Special Topics: Dinosaurs

Course Description [This is specific to this topic, not the generic special topics description]: The anatomy, physiology, behavior, ecology and evolution of dinosaurs and other extinct life. Geological processes and the fossil record. Weekend field trip required. Cannot be used for major credit in the biological sciences. Fee.

Attached Documents:

- Course Proposal Cover Form
- Criteria Checklist for General Studies SG designation, including descriptions of how the course meets the specific criteria
- Course Catalog Description (this document)
- Proposed Course Syllabus
- Table of contents (and preface) from the intended textbook (Fastovsky & Weishampel)

Proposer: Please complete the following section and attach appropriate documentation.

ASU--[SG] CRITERIA			
I. - FOR ALL *GENERAL* [SG] NATURAL SCIENCES CORE AREA COURSES, THE FOLLOWING ARE CRITICAL CRITERIA AND MUST BE MET:			
YES	**NO**		**Identify Documentation Submitted**
✓		**1.** Course emphasizes the mastery of basic scientific principles and concepts.	Syllabus; see page 5 below
✓		**2.** Addresses knowledge of scientific method.	Syllabus; see page 5 below
✓		**3.** Includes coverage of the methods of scientific inquiry that characterize the particular discipline.	Syllabus; see page 5 below; Textbook table of contents
✓		**4.** Addresses potential for uncertainty in scientific inquiry.	Syllabus; see page 6 below
✓		**5.** Illustrates the usefulness of mathematics in scientific description and reasoning.	Syllabus, esp. lab portion; see page 6 below
✓		**6.** Includes **weekly** laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.	Syllabus: laboratory schedule; see page 6 below
✓		**7.** Students submit written reports of laboratory experiments for constructive evaluation by the instructor.	Syllabus
✓		**8.** Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity.	Syllabus; Textbook table of contents; see page 7 below
II. - AT LEAST ONE OF THE ADDITIONAL CRITERIA THAT MUST BE MET WITHIN THE CONTEXT OF THE COURSE:			
✓		**A.** Stresses understanding of the nature of basic scientific issues.	See page 7 below
✓		**B.** Develops appreciation of the scope and reality of limitations in scientific capabilities.	See page 7 below
	✓	**C.** Discusses costs (time, human, financial) and risks of scientific inquiry.	Only to a very limited extent

[SG] REQUIREMENTS CANNOT BE MET BY COURSES:		
	• Presenting a qualitative survey of a discipline.	
	• Focusing on the impact of science on social, economic, or environmental issues.	
	• Focusing on a specific or limiting but in-depth theme suitable for upper-division majors.	

Course Prefix	Number	Title	Designation
LSC	294	Special Topics: Dinosaurs	SG

Explain in detail which student activities correspond to the specific designation criteria. Please use the following organizer to explain how the criteria are being met.

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
1. Course emphasizes the mastery of basic scientific principles and concepts.	The course will emphasize understanding evolutionary principles including natural selection, adaptation, phylogenetic relationships, etc. Various other selected topics in animal biology will be explored as well, including basic principles of anatomy and physiology, ecology, and animal behavior.	See lecture schedule and lab schedule of syllabus and table of contents of textbook
2. Addresses knowledge of scientific method.	The basic process of the scientific method is explicitly covered in the lecture portion of the class; the scientific method is applied throughout course as we ask how we our understanding of extinct organisms comes about and address specific controversies.	Week 1 of lecture schedule. Laboratory reports will require students to formulate and test hypotheses
3. Includes coverage of the methods of scientific inquiry that characterize the particular discipline.	This course in is especially well suited for this, since we will frequently ask how we know about various aspects of dinosaur biology. It will include how fossils are dated, how exinct organisms are reconstructed, how we determine evolutionary relationships, how we can determine diet and lifestyles of extinct organisms.	Phylogenetic thinking (i.e., evolutionary relationships) will be emphasized throughout. More specifically, note labs for weeks 2-5, 7, 12-14

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Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
4. Addresses potential for uncertainty in scientific inquiry.	Again, this course is especially well suited for addressing uncertainty, as there is much we don't and can't know. Our views of dinosaurs have changed dramatically in the past decades, even the way they are reconstructed. Comparisons of traditional and more modern views will be made extensively in lecture and to a lesser extent in lab (by for example comparing older and newer models). There will also be substantial emphasis on distinguishing what is conjecture vs. what is known more definitively.	Lecture includes topics such as warm-blooded dinosaurs and extinctions where there is much debate. Lab worksheets will ask students to identify which aspects of the models are likely to be well-supported by evidence and which are more conjectural
5. Illustrates the usefulness of mathematics in scientific description and reasoning	Mathematical approaches will be used in phylogenetic analysis, estimating the age of rocks (using the inverse exponential growth equation for half life decay), characterizing community structure (based on fossils collected during field trip), statistical descriptions of variation in a species of fossil, estimating dinosaur mass based on volumetric displacement of scale models, and allometric relationships of brain and body size in primates (using replica hominid skulls)	Phylogenetic and radioisotope problem sets (syllabus: labs for weeks 2 and 3); Labs reports for weeks 4, 5, 12, 14 will involve quantitative data and some analysis
6. Includes **weekly** laboratory and/or field sessions that provide hands-on exposure to scientific phenomena and methodology in the discipline, and enhance the learning of course material.	Hands on work will involve observations of actual fossils, fossil casts (replicas), collection of some invertebrate fossils in the field, observations of skeletons and skulls of living species, as well as scale models of extinct animals. Fossils of larger species will be observed at the Arizona Museum of Natural History. Even in labs involving mostly scale models, students will be asked to think phylogenetically and to question the accuracy and validity of aspects of the models.	See "Lab schedule" and "Assignments and grading" sections of syllabus

Criteria (from checksheet)	How course meets spirit (contextualize specific examples in next column)	Please provide detailed evidence of how course meets criteria (i.e., where in syllabus)
7. Students submit written reports of laboratory experiments for constructive evaluation by the instructor.	Written reports include 4 lab reports that are completed at home using data collected in the lab (or field trip) and 7 in-class worksheets in which students address specific questions pertaining to the specimens at hand.	Syllabus: "Assignments and grading" section
8. Course is general or introductory in nature, ordinarily at lower-division level; not a course with great depth or specificity	Students will need to know only the broadest groups of dinosaurs and other extinct vertebrates, and will not be expected to know detailed classification or dinosaur diversity. Instead, emphasis will be placed on understanding various geological and biological principles as they pertain to dinosaurs. These include plate tectonics and geological cycles, stratigraphy and radioisotope dating, evolution, including both natural selection, adaptation, speciation, macroevolutionary patterns, extinctions, and phylogenetic analysis, ecomorphology (how anatomy relates to an organism's ecology), anatomical principles, physiology (the warm vs cold blooded debate will be especially emphasized), and behavior (for example the possible role of sexual selection in the evolution or horns and crests). The intended textbook is specifically written for a general audience	See textbook preface and table of contents. Note that only three labs (weeks 8-10) emphasize diversity. Only about 4 weeks of lecture will be devoted to dinosaur diversity. No prerequisites will be required and the course will not count towards any of the majors in the natural sciences.
A. Stresses understanding of the nature of basic scientific issues.	See items 3 and 4 above	See above
B. Develops appreciation of the scope and reality of limitations in scientific capabilities.	Studying past life has many inherent limitations that will be addressed throughout this course. Students will be expected to consider what aspects of an organism's biology as well supported by evidence and which are mere conjecture.	See above

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Arizona State University West Campus

LSC 294 Special Topic: Dinosaurs
Semester 201x

Course Syllabus

Instructor: Dr. Udo M. Savalli
Office: CLCC 116; 602-543-3750
Office hours: TBA
Email: udo.savalli@asu.edu or dr.udo@savalli.us
Course web site: http://www.savalli.us Then click on the LSC294 link.
Also accessible via Blackboard

Required Text: D.E. Fastovsky & D.B. Weishampel 2005. *The Evolution and Extinction of the Dinosaurs*, 2nd ed. Cambridge Univ. Press.

Class Meeting Time and Place: TBA

Description: The anatomy, physiology, behavior, ecology and evolution of dinosaurs and other extinct life. Geological processes and the fossil record. Weekend field trip required. Cannot be used for major credit in the biological sciences. Fee. *General studies: SG.*

Course Overview: Dinosaurs are familiar to all even though they have been extinct for 65 million years. In this class we will study what we know and what we don't know about dinosaurs. In particular, we will emphasize the techniques used to study dinosaurs and how we can use modern species to better understand what dinosaurs might have been like. Students will be introduced to many scientific principles in evolution, ecology, animal behavior, anatomy, physiology, physics, and geology. Laboratories will use a combination of actual fossils, modern animal analogs, and scale models to study the biology of not only dinosaurs, but also other extinct organisms and evolutionary processes. A weekend field trip will be required.

Laboratory requirements: Attendance in all laboratories is required. Closed-toed shoes must be worn during laboratories and the field trip.

Weekend field trip: A half-day field trip to a fossil collecting site near Payson, AZ will be required. At least two different weekend (Saturday or Sunday) dates will be offered. *Closed-toed shoes are required. Transportation to and from the field site is the responsibility of the students. Bring plenty of water.* If you have a medical condition that places you at an increased risk of harm, please bring documentation and suggestions for minimizing risk to the instructor. *Only students enrolled in the course may attend the field trip; friends and family are not permitted* for insurance reasons and to ensure a disruption-free learning environment.

Independent Museum Assignment: In lieu of a regular laboratory, students will also be expected to independently complete an assignment at the Arizona Museum of Natural History in Mesa, AZ. Students can complete this assignment at any time of their choosing prior to its due date. *Transportation to and from the museum is the responsibility of the students.* Students are welcome to bring friends and family members with them to the museum so they may show off their newly gained knowledge.

Assignments & Grading: Grades will be based on a combination of both lecture and laboratory performance.

Lecture exams will be based on the material presented in lecture and your readings (but not laboratory material). Exams will be primarily multiple choice using Scantron forms. Use or accessing of cell phones, PDAs and similar electronic devices is strictly prohibited during exams.

Lab quizzes: Students will take a brief quiz at the start of each laboratory session (quizzes may be given online via Blackboard instead). Each quiz will cover material learned in the previous lab as well as the materials provided for that day's lab.

Video worksheets: On occassion, a video may be shown during lecture. During the video students will be expected to fill out a worksheet. Students missing lecture on a day with a video will not be able to make up the worksheet unless they have an excusable absence.

Laboratory reports: Students will write reports interpreting the results of four laboratory investigations (including the field trip). Students are expected to provide statistical summaries of data where appropriate.

Problem sets: Students will be presented with problem sets that allow them to practice key techniques (such as determing phylogenetic relationships and estimating the age of rocks using isotope ratios) learned in lecture and lab.

In-class lab worksheets: Students will fill out questionaires that that pertain to the material presented in lab. These will require students to interpret their observations, such as suggesting possible adaptive significance of particular traits or determining the likely phylogenetic orgin of traits. Discussion with classmates is encouraged.

Course Grading:

Course grades will be based upon an average score of the following:

3 Exams @ 100 pts each	300
Comprehensive Final Exam	100
3 In-class video worksheets @ 20 pts each	60
10 quizzes @ 10 pts each	100
4 laboratory reports @ 20 pts each	80
2 problem sets @ 30 pts each	60
7 in-class worksheets @ 10 pts each	70
Independent museum worksheet	30
TOTAL	800

Course Grades will be based on the following scale:

98 - 100%	A+
≥93 - <98%	A
≥90 - <93%	A–
≥88 - <90%	B+
≥83 - <88%	B
≥80 - <83%	B–
≥77 - <80%	C+
≥70 - <77%	C
≥60 - <70%	D
0 - <60%	E

Missed Examinations: Students missing exams or assignments will get a grade of 0 except for exceptional circumstances (such as severe illness or death in the immediate family; written documentation will be required). Unless the student can arrange to take a lecture exam before it is returned (usually the next class period), makeups (for excused absences only) will be given at a day and time determined by the instructor, but likely towards the end of the semester.

Late Assignments: Assignments are due at the *start of class* on the day indicated on the assignment or announced in class. Work turned in after the due date *and time* will be severely penalized (minimum of 10% per day) and will not be accepted at all once assignments have been graded and returned to students. Exceptions may be made for serious illness or other extenuating and documented circumstances, at the instructor's discretion.

Attendance: Attendance is essential to success in this class. If you miss a lecture class it is your responsibility to get notes from a classmate as well as any announcements and handouts (most handouts can be downloaded from the course web site). *Laboratory attendance is mandatory to pass this course!* Due to the nature of these laboratories, missed laboratory sessions **cannot** be made up. Students will not receive credit for any assignments pertaining to the missed lab. Should medical or personal reasons prevent you from attending the laboratory, a written note from a doctor or other evidence must be submitted. In such a case the worksheet or other assignment may be accepted or excused (with the course grade prorated). This option may be used only in extreme circumstances and at the discretion of the instructor. Please contact the instructor as soon as possible if you must miss a laboratory period. *Students missing more than three laboratories for any reason will not pass this class.* Students arriving late or leaving early will lose points on the relevant assignments.

Disruptive or distracting behavior is not allowed. Students that disrupt the class may be asked to leave. **Be sure to turn off any cell phones before coming to class**: students whose cell phones ring or who are talking on a cell phone during class may be asked to leave; repeated offenses are subject to additional grade penalties. Students with special circumstances (e.g. sick family member) that requires phone access or leaving early should inform the instructor before class begins.

Withdrawal Policy: It is the students' responsibility to withdraw themselves from the course should this be necessary. The deadline for unrestricted withdrawal is [date] (online).

Incomplete Policy: An incomplete grade (I) will only be given to a student that has completed a substantial portion of the class with a grade of C or higher and who is unable to complete the course requirements due to illness or extenuating non-academic circumstances. Documentation will be required.

Students are required to read and act in accordance with University and Arizona Board of Regents policies, including:

The Student Code of Conduct: Arizona Board of Regents Policies 5-301 through 5-308: http://www.abor.asu.edu/1_the_regents/policymanual/chap5/5Section_C.pdf

The Computer, Internet and Electronic Communications Policy http://www.asu.edu/aad/manuals/acd/acd125.html

Lecture Schedule

(Tentative and subject to change)

Week:	Topic	Reading (pp)*
1	Introduction: What are dinosaurs? The scientific method	1
2	How fossils are formed; Stratigraphy and the age of rocks	2
3	Geological History of Earth; Plate tectonics	2
4	Principles of evolution; Understanding phylogenies	3
5	Vertebrate anatomy: skeletons and movement **EXAM 1:**	4
6	Vertebrate relationships: dinosaurs and their relatives	4-5
7	Dinosaur diversity: armored and horned dinosaurs	6-9
8	Dinosaur diversity: duckbills and long-necks	10-11
9	Dinosaur diversity: the meat eaters	12
10	Feathered dinosaurs and the origin of birds **EXAM 2:**	13-14
11	Dinosaur behavior: social behavior and sex	8-12
12	Dinosaur reproduction, growth and development	9, 11-12
13	Dinosaur physiology: the warm-blooded debate	15
14	Patterns in dinosaur evolution and extinction **EXAM 3:**	16-17
15	The Cretaceous-Tertiary extinction	18
	FINAL EXAM: [time tba]	

*Chapters in Fastovsky & Weishampel 2005. *The Evolution and Extinction of the Dinosaurs.*

Laboratory Schedule

(Course schedule is subject to change with notice.)

Week:	Topic	Assignments
1	Introduction to Rocks and Fossils	In-class worksheet
2	Phylogenetic Methods	Phylogenetic analysis problem set
3	Estimating the age of rocks	Radioisotope dating problem set
4	Weekend fossil hunting trip	Invertebrate fossil community laboratory report
5	Measuring variation in a fossil population	Morphological variation laboratory report
6	The vertebrate skeleton	In-class worksheet
7	Diet and tooth morphology	In-class worksheet
8	Dinosaur relatives and the dawn of dinosaurs	In-class worksheet
9	The herbivorous dinosaurs: Ornithischians and Sauropods	In-class worksheet
10	The theropods	In-class worksheet
11	Self-guided tour of the Arizona Museum of Natural History	Independent Worksheet
12	Estimating the mass of dinosaurs	Mass estimation laboratory report
13	*Archaeopteryx* and the evolution of birds	In-class worksheet
14	Human evolution	Estimating brain size laboratory report

The Evolution and Extinction of the Dinosaurs

SECOND EDITION

This new edition of *The Evolution and Extinction of the Dinosaurs* is a unique, comprehensive treatment of a fascinating group of organisms. It is a detailed survey of dinosaur origins, their diversity, and their eventual extinction.

The book is written as a series of readable, entertaining essays covering important and timely topics in dinsoaur paleontology and natural history. It will appeal to non-specialists and all dinosaur enthusiasts, treating subjects as diverse as birds as "living dinosaurs," the new feathered dinosaurs from China, and "warm-bloodedness." Along the way, the reader learns about dinosaur functional morphology, physiology, and systematics using cladistic methodology – in short, how professional paleontologists and dinosaur experts go about their work, and why they find it so rewarding.

The book is spectacularly illustrated by John Sibbick, a world-famous illustrator of dinosaurs, with pictures commissioned exclusively for this book.

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