



# Course Approval Form

For approval of new courses and deletions or modifications to an existing course.

More information is located on page 2.

### Action Requested:

Create new course       Delete existing course

Modify existing course (check all that apply)

Title       Credits       Repeat Status       Grade Type

Prereq/coreq       Schedule Type       Restrictions

### Course Level:

Undergraduate

Graduate

College/School:       Department:

Submitted by:       Ext:       Email:

Subject Code:       Number:       Effective Term:  Fall  
 Spring      Year   
 Summer

(Do not list multiple codes or numbers. Each course proposal must have a separate form.)

Title: Current

Banner (30 characters max including spaces)

New

Credits:  Fixed       Variable       or

Repeat Status:  Not Repeatable (NR)  
 Repeatable within degree (RD)      Total repeatable credits allowed:   
 Repeatable within term (RT)

Grade Mode:  Regular (A, B, C, etc.)  
 Satisfactory/No Credit  
 Special (A, B, C, etc. +IP)

Schedule Type Code(s):  Lecture (LEC)       Independent Study (IND)  
 Lab (LAB)       Seminar (SEM)  
 Recitation (RCT)       Studio (STU)  
 Internship (INT)

Prerequisite(s):

Corequisite(s):

Special Instructions: (restrictions for major, college, or degree; cross-listed courses; hard-coding; etc.)

### Catalog Copy for NEW Courses Only (Consult University Catalog for models)

Description (No more than 60 words, use verb phrases and present tense)	Notes (List additional information for the course)
Vertebrate Paleontology explores the evolution of vertebrates from the early Paleozoic to Recent. The course will cover the systematics, anatomy, paleogeography, and ecology of extinct vertebrates. Discussions will include fishes, early tetrapods & amniotes, dinosaurs, birds and mammals. Lab portion includes paleontology techniques, analysis, and study of fossil specimens and casts. A weekend field trip is included. Students who have taken GEOL 334 as an undergraduate may NOT take 534 as a graduate student.	
Indicate number of contact hours: When Offered: (check all that apply) <input type="checkbox"/> Fall <input type="checkbox"/> Summer <input checked="" type="checkbox"/> Spring	Hours of Lecture or Seminar per week: <input type="text" value="3"/> Hours of Lab or Studio: <input type="text" value="3"/>

## Approval Signatures

Department Approval \_\_\_\_\_ Date \_\_\_\_\_      College/School Approval \_\_\_\_\_ Date \_\_\_\_\_

If this course includes subject matter currently dealt with by any other units, the originating department must circulate this proposal for review by those units and obtain the necessary signatures prior to submission. Failure to do so will delay action on this proposal.

Unit Name	Unit Approval Name	Unit Approver's Signature	Date

### For Graduate Courses Only

Graduate Council Member \_\_\_\_\_      Provost Office \_\_\_\_\_      Graduate Council Approval Date \_\_\_\_\_

## General Information

New courses and deletions or modifications of an existing course all require approval through the college/school curriculum committee, and, if needed, the Graduate Council.

If you would like to request the course to fulfill a **general education requirement**, please go to the Provost's website at <http://provost.gmu.edu/gened/faculty.html> for the appropriate forms and process.

A course approval form must be filled out for the following modifications:

- Title
- Credits
- Grade type
- Prerequisite
- Corequisite
- Schedule Type
- Repeat Status
- Restrictions (Major, college, or degree)

### Please note:

- Changes to the course description of an existing course should be submitted during the catalog copy review.
- Changing the subject code or course number requires deletion of the old course and creation of a new course.
- Course numbers cannot be reused unless they have been inactive for 5 years or more.

## How to Process a Course Approval Form

1. Complete the course approval form to create a new course, modify, or delete an existing course and attach a justification for the proposal. For **new courses only**, attach a copy of the syllabus as well. For **modified courses**, fill out only the sections that are being modified with the new information.
  - For **title**: If you are requesting a substantive title change, you must delete the old course and create a new course.
  - For **credits**: If the course has a lab or recitation component, please indicate the credits for the lecture and 0 credits for the lab or recitation.
  - For **repeat status**: If the course is repeatable, you must indicate the total number of credits that a student may take the course.  
For example: If the course is a fixed 3 credit course and the student is allowed to take it 3 times, indicate 9 in the total number of credits allowed.
  - For **grade mode**: Indicate whether the course will have standard grading (undergraduate or graduate) or whether it will have one of the alternative grade types (S/NC, IP). For more detailed information, go to the Registrar's Office website ([registrar.gmu.edu](http://registrar.gmu.edu)).
  - For **schedule type**: Indicate what type of course this will be. If the course has a lab or recitation component, please indicate the credits for the lecture and 0 credits for the lab or recitation.
  - For **prerequisite** and **corequisite**: List all the prerequisites and corequisites for the course.
  - **Special Instructions**: Courses can be restricted to specific groups of students in a school/ college, major, or degree. If you place a restriction on a course, the restriction will be placed on all sections currently scheduled and any future sections. If the restriction should only be on a specific section of a course, the department scheduling coordinator should send an email to [schedule@gmu.edu](mailto:schedule@gmu.edu) with the type of restriction along with the major, college, or degree code. The codes can be found in the Catalog.
2. Submit the form and attachments to your departmental curriculum committee for approval then to your College/School curriculum committee for approval.
3. If the form is for an **undergraduate course**, forward the form with approval signatures to the Academic Scheduling Office, MS 3D1. If it is for a **graduate course**, please see the additional instructions below.

### For graduate courses only:

4. Save the word document as the subject and course number without spaces (ex: PSYC648)
5. Send the document as an email attachment to Jennifer Bazaz ([jbazaz@gmu.edu](mailto:jbazaz@gmu.edu)). Remember to include any related documents.
6. Bring the form with department and college/school approval signatures to the Graduate Council meeting. If approved by the Graduate Council, it will then be forwarded to the Academic Scheduling Office by the Provost's Office.

## **COURSE JUSTIFICATION**

### **Course Objective**

The objective of Vertebrate Paleontology is demonstrate to students that the rich diversity of vertebrate organisms is a result of their long history of evolution in the context of the changes that have taken place on the surface of the earth. Students study the evolution of vertebrates from the early Paleozoic to Recent, including their systematics, anatomy, paleogeography, and ecology. Discussions will include fishes, early tetrapods & amniotes, dinosaurs, birds and mammals. The laboratory section will explore paleontological study techniques, data analysis, and the study of fossil specimens and casts. A weekend field trip is included to a local fossil vertebrate locality to teach students how to collect fossil vertebrates in their geologic context.

### **Course Necessity** [explain why new course is needed]

This course is a graduate level version of the undergraduate course GEOL 334. Offering this course will allow graduate students to participate in and receive credit for learning this material. This course is needed because the fossil history of vertebrates, as a whole, is not currently covered by a single class here at Mason (see below). A preliminary version of this course was offered for three credits as Special Topics in Geology (GEOL 315) in the spring term of 2010. The undergraduate version of this course has already been approved by the COS Curriculum Committee to be offered in the Spring of 2011. The response of students was very enthusiastic. It was originally opened for 15 students and immediately filled. The course was expanded to 30 students, and it filled again. This student interest reflects a great deal of interest of the general public in vertebrate paleontology, and demonstrates the need for this course at Mason.

### **Course Relationship to Existing Programs**

Students enrolled in the Earth Systems Science (ESS) MS, Biology MS (particularly the systematics and Evolutionary Biology concentration), and Environmental Science and Policy (ESP) MS graduate programs would be prime candidates for this course. Students in the ESS program would greatly enhance their knowledge of the relationship of earth systems to biological systems over time, and the biology and ESP students would gain a clear perspective on the time depth of current biological systems and how they have evolved over time.

### **Course Relationship to Existing Courses**

Mason currently offers two undergraduate courses that focus specifically on paleontology other than vertebrate paleontology: GEOL 312, Invertebrate Paleontology and BIOL 470, Dinosaur Biology. Invertebrate Paleontology covers animal phyla known as fossils except the Chordata, which will be covered by Vertebrate Paleontology. Dinosaur biology focuses specifically on Dinosauria and covers this group in a more comprehensive fashion than will be done in GEOL 322, which will cover Dinosauria in a much less comprehensive fashion. There are currently no graduate course at Mason that focus on vertebrate paleontology.

### **Approval History**

This course has not been previously submitted for approval by the College of Science Curriculum Committee. It has been approved as a graduate course by the Atmospheric, Oceanic, and Earth Sciences Department by unanimous vote.

VERTEBRATE PALEONTOLOGY  
GEOLOGY 534, SPRING 2011

Instructor: Dr. Mark D. Uhen

Texts: Benton, *Vertebrate Paleontology*, 3rd edition, Blackwell  
Foote & Miller, *Principles of Paleontology*, 3<sup>rd</sup> edition, Freeman

Class	Topics	Reading	Assignments/ Quizzes	Lab
1	Introduction	Benton, Ch. 1	--	Class project introduction & PaleoDB practice
2	Vertebrate Origins, Nature of the Fossil Record	Foote & Miller, Ch. 1	--	
3	Vertebrate Paleontology basics	Benton, Ch. 2:	Quiz	Early Vertebrata
4	Systematics	Foote & Miller, Ch. 4	--	
5	Early Paleozoic Fishes	Benton, Ch. 3:	PaleoDB entry	Paleozoic fishes
6	Phylogenetic Reconstruction	<a href="http://evolution.berkeley.edu/evolibrary/article/evo_05">http://evolution.berkeley.edu/evolibrary/article/evo_05</a>	--	
7	Early Tetrapods, amphibians	Benton, Ch. 4	Quiz	Phylogeny
8	Understanding fossil data	TBA	--	
9	Early amniotes	Benton, Ch. 5	None	Early amniotes
10	<b>Exam 1</b>	--	--	
11	Triassic Tetrapods, Post-Devonian Fishes	Benton, Ch. 6-7	Early amniote ADW report	Paleozoic Tetrapoda
12	Populations & Species	Foote & Miller, Ch. 3	--	
13	Testudines, Marine Reptiles	Benton, Ch. 8	Quiz	Measuring fossils
14	Growth & Form	Foote & Miller, Ch. 2	--	
15	Crocodylia, Pterosauria	Benton, Ch. 8	Archosaur ADW report	Non-dinosaurian Archosauria
16	Evolutionary Morphology	Foote & Miller, Ch. 5	--	
17	Dinosauria	Benton, Ch. 8	Quiz	Dinosauria
18	Biostratigraphy	Foote & Miller, Ch. 6	--	
19	Dinosauria (including Aves)	Benton, Ch. 9	Dinosaur ADW report	Biostratigraphy
20	<b>Exam 2</b>	--	--	
21	Lepidosauria, Mammal-like Reptiles	Benton, Ch. 8 & 10	Quiz	Other "reptiles"
22	Evolutionary Rates & Trends	Foote & Miller, Ch. 7	--	
23	Terrestrial Mammals	Benton, Ch. 10	Mammal ADW report	Class project compilation
24	Diversification & Extinction	Foote & Miller, Ch. 8	--	
25	Terrestrial Mammals	Benton, Ch. 10	Quiz	Mammalia
26	Paleoecology and Paleobiogeography	Foote & Miller, Ch. 9	--	
27	Marine Mammals	TBA		Class project completion
28	Human Evolution	Benton, Ch. 11		
	<b>Final exam</b>	--	--	

## **STUDENT RESPONSIBILITIES**

Students are expected to have read the syllabus and be familiar with expectations, due dates for assignments, and dates and times for quizzes and exams. The syllabus will be posted on the Blackboard system and students are expected to pay attention to any changes that are made over the course of the semester.

This course operates under the rules of the honor code. Please be familiar with the code. You can read the code at: <http://mason.gmu.edu/~montecin/plagiarism.htm>. Quizzes and exams are closed book and your answers must be your own.

Students are expected to be respectful of the instructor and each other during class. Demonstrate that respect by please, not talking out of turn during class, turning off your cell phone and instant messaging during class, and trying not to disturb class if you enter late or leave early.

If you are a student with a disability and you think that you need academic accommodations, contact the Office of Disability Resources at 703-993-2472 immediately if you have not already done so. All academic accommodations must be arranged through that office. You must then bring the accommodation recommendations to me immediately.

## **COURSE OBJECTIVES**

- Develop your ability to comprehend and analyze scientific concepts, and to critically evaluate ideas
- Give you a better understanding of how vertebrates have evolved in a geological context
- Develop your skills in presenting scientific ideas in a clear and concise manner
- Develop analytical skills in paleontology

## **LAB**

Each week includes a lab that covers a topic being discussed in lecture in a more practical setting. Some labs will feature fossils or casts of fossils for observation and study. Students will be expected to handle these items very carefully, as directed by the instructor. Other labs will feature the compilation and/or analysis of data to emphasize how data is collected and used by vertebrate paleontologists. Some of these labs will include the analysis of data collected for the class project (see below).

## **GRADING**

Every week (with the exception of the first week of class) some graded item will be due. These graded items will consist of: quizzes, written assignments, papers, and exams. Your grade will be calculated as follows:

Quizzes + assignments + lab:	30%
Exam 1 + Exam 2:	30%
Paper:	20%
Final Exam:	20%

Quizzes and assignments will be graded on a scale from 1-10. The lowest of your quizzes + assignments will be dropped from the grade calculation. If you miss a quiz or fail to hand in an assignment by the time it is due, you will receive a zero for that quiz or assignment. Your presentation will include a written paper and a presentation to the class. Format for the paper and presentation will be discussed in class. The final exam will include questions from the last weeks of class, as well as comprehensive questions from the entire semester.

You are expected to arrive on time to take an exam. If you enter an exam late, you may do so only before the first person leaves the exam. You will not be allowed to take the exam after the first person has left the exam after completion. Do not expect that a make-up exam will be given if you miss an exam. If classes (or just this class) are cancelled on the day of an exam, the exam will be given on the next scheduled class day when classes are in session.

Grade scale: A: 90-100 pts; B: 80-89 pts; C: 70-79 pts; F: 0-69 points

Any assignment may be turned in late, but 10% of the possible will be taken off for every day it is late. Anything turned in after the last day of classes will not be graded.

### **STUDENT PAPERS**

All students will be required to write a paper on a topic in Vertebrate Paleontology. The paper will be of publishable quality, and reflect original ideas of the student. The paper may involve original study of fossil material, original study of fossil data, or be an in-depth review paper on a focused topic. Students will be expected to choose a topic for your paper by mid-term, and review that topic and research plan with the instructor. You will need to do your own research on your chosen topic, and properly cite proper scientific sources of information.

### **CLASS PROJECT**

The entire class will be involved in a group research project over the course of the semester. Undergraduate students (those enrolled in GEOL/BIO 334) will be taught how to collect data, enter it in the Paleobiology Database, and to later analyze the data to answer a specific research question. Graduate Students (those enrolled in GEOL 534) will be given additional instruction in the use of the Paleobiology Database by the instructor, and will be expected to act as expert users in the class. As an expert user, the graduate students will lead teams of undergraduate students in their efforts in the class project. As part of this project students will be assigned a list of scientific papers to retrieve, collect data from, and enter into the Paleobiology Database. Students will be provided tools with which to coordinate their efforts with each other and with the instructor.

## GEOL 334/GEOL 534 Vertebrate Paleontology Comparison

Graduate students enrolled in GEOL 534 will be expected to participate in all classroom (both lecture and lab) activities along with students enrolled in GEOL 334. There are two significant differences between the graduate and undergraduate experiences in the class. First, while the undergraduate students are required to write a final paper for the course, the graduate students will be expected to write a paper of publishable quality. This will require the graduate students to select their paper topic much earlier in the semester, and to spend a significant time out of the classroom working on their research. The paper can be a thoughtful review of a vertebrate paleontology topic or original research on particular fossils or particular fossil data. Second, the graduate students will also receive additional training in the use of the Paleobiology Database, to become “expert users” of the database with significantly more knowledge and skills than the undergraduate students. In turn, the graduate students will be expected to take a leadership role in the class project that will be undertaken by the entire class. In this way, the graduate students will be need to be come expert users in order to be able to pass that knowledge along to the undergraduate members of the class.

### Grading Comparison

GEOL 334		GEOL 534	
Quizzes + assignments + lab:	30%	Quizzes + assignments + lab:	30%
Exam 1 + Exam 2:	35%	Exam 1 + Exam 2:	30%
Paper:	15%	Paper:	20%
Final Exam:	20%	Final Exam:	20%