**BIO-217 Mammalogy**

**Fall 2019**

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| **Course Instructor**  **Laura J May-Collado, Ph.D**.  Office: 217 Marsh Life Science Bldg  Office Hours: MWF 10:30 a.m. to 12 p.m.  E-mail: [lmaycoll@uvm.edu](mailto:lmaycoll@uvm.edu)  Website: <http://www.lauramay-collado.com/> | **G.T. A.**  **Emily Beasley**  211 Marsh Life Science Building  Office hours: TBD  E-mail: ebeasley@uvm.edu |

**MEETING TIME:**

**Lecture:** Tuesdays and Thursdays from 10:05-11:20 a.m. MLS 107.

**Labs:** 12:00 to 3:00 pm on Wednesdays or 1:15 to 4:15 pm on Thursdays. Blundell House: 342 So. Prospect St. Redstone Campus

**COURSE DESCRIPTION**

Mammalia is perhaps one of the most morphologically and ecologically diverse groups of vertebrates. The diversity of this group includes tiny shrews to the 30-meter long blue whales. Some mammals have adaptations for an underground and aquatic lifestyle and others have evolved morphological modifications to fly and swim. While some mammals are considered ‘solitary’ like cats and baleen whales others exhibit various degrees of social organization. For example, dolphins and African ungulates live in groups that can have thousands of individuals, and mole rats live in society like bees!

Current molecular techniques have made possible the discovery several new cryptic species, including the Tapanuli Orangutan and the Araguaian River dolphin. Mammals occupy many important ecological roles in biological communities. Large whales are important ecosystem engineers that not only impact nutrient distribution (horizontally and vertically) in the oceans but also in land. Furthermore, mammals are an important part of the life cycle of many parasites and associated diseases (e.g., Ebola, HIV, etc.). Therefore, they are valuable in laboratories aiming to understand human diseases and drug efficiency. Unfortunately, extant mammals are facing many challenges; about 173 mammal species are declining, with half of this species are losing their historic distribution range primarily due to human activities. Defaunation (the loss of fauna) is deeply affecting trophic interactions and ecological processes all over the world. For example, mammals play key ecological roles such as pollinators and seed dispersers. Therefore, their extinction can have a cascading effect at various geographical scales.

This semester will begin first establishing basic aspects of mammal morphology, systematics, evolution, and reproduction. Then we will dive into the tree of life of mammals. We will learn about major groups (e.g., orders, families, species) behavioral ecology and adaptive strategies in their morphology and physiology, their life histories, habitat selection, behavior, and communication. Because my training is multi-disciplinary, I will take that same approach to teach this course.

Now, **this is an advanced Biology course, and this means it's a demanding course**! In general, **you should plan on dedicating at least 10 to 12 hours a week to this course,** if you expect to do well. BCOR 102, Ecology and Evolution are prerequisites of this course; if you are taking this course without the prerequisite you will likely need to budget additional time for this course. Biology and Zoology majors are advised to take only one addition course with a lab while taking this course, and generally enroll in only 4 courses per semester.

During this course, you will have the opportunity to conduct research project, and contribute to in-class discussion. There are two field trips, in one you will have the opportunity to capture and examine small mammals and a trip to Boston (or NH, TBD) to see whales. If you are interested in museums, you can assist with the curation of the mammal research collection at Blundell House (opportunity limit to 4 students) under the supervision of Dr. Bill Kilpatrick. Your lab work will account for 40% of your grade (see break down for the lab in the Lab Syllabus). **What this means is that you have an opportunity to demonstrate your knowledge and abilities in ways other than traditional exams.**

**Learning Outcomes**

* Understand the geological, environmental and biological factors that contributed to the radiation of mammals.
* Learn about the morphological and physiological adaptations of mammals to a wide range of habitats.
* Apply evolutionary and systematic principles to understand the wide diversity of mammal reproductive, ecological, physiological and communicative strategies.
* Appreciate the importance of protecting mammals worldwide.
* Recognize and utilize the scientific method in the study of mammals
* Be able to critically analyze literature by synthesizing literature and forming own opinions for class discussion.
* Learn about traditional methods to study mammals and convert data into summary figures, identify patterns, and use statistical analysis to support conclusions

**Lectures:**

Tuesdays and Thursdays from 10:05 to 11:20 a.m. **please be on time; turn off your cell phone, do not leave your seat during a presentation**. PowerPoint slides will be available on BB by the end of the week. So be prepared to take notes in class! I do not encourage the use of laptops or any other electronics for note taking, as students end up using social media instead of pay attention to class. **So, no computers allow unless you have a good reason.**

**Textbooks**

I never post lectures before class because I am constantly updating my lectures according to present knowledge. While I do not request for textbooks, I do use the two books below for basic knowledge on mammals. If you are interested in purchasing one of these books, I recommend Feldhamer as the chapters in the calendar are based on it. We have copies in the lab for you to use or you can purchase used copies at low prices here: <http://www.abebooks.com>

* **Nomenclature based on** Asher and Helgen. 2010. Nomenclature and placental mammal phylogeny. BMC Evolutionary Biology, 10:102**:** <https://bmcevolbiol.biomedcentral.com/articles/10.1186/1471-2148-10-102>
* Feldhamer, G.A., Drickamer, L.C., Vessey, S. H., Merritt, J. F., and C. Krajewski. Mammalogy: adaptation, diversity, and ecology. 2015. (4th edition). Johns Hopkins University Press. **[copy available in lab].**
* Vaughan, T. A., j. M. Ryan, and N. J. Czaplewski. 2014. Mammalogy (6th edition). Jones and Bartlett publishers, Sudbury, ma 750 pp. **[copy available in lab].**

**Key mammalian online resources**

Mammalian Species Accounts: <http://www.science.smith.edu/departments/Biology/VHAYSSEN/msi/msiaccounts.html>

Animal Diversity Web

<http://animaldiversity.ummz.umich.edu/site/accounts/information/Mammalia.html>

Mammal Species of the World

[www.bucknell.edu/msw3](http://www.bucknell.edu/msw3) or <http://vertebrates.si.edu/mammals/msw>

Ultimate Ungulate

<http://www.ultimateungulate.com/>

Marine Mammals

<http://www.nmfs.noaa.gov/pr/species/mammals/>

EDGE

<http://www.edgeofexistence.org/mammals/species_info.php?id=1396>

Smithsonian Institution

http:// [www.vertebrates.si.edu/msw/mswcfapp/msw/index/cfm](http://www.vertebrates.si.edu/msw/mswcfapp/msw/index/cfm)

University of Michigan

<http://animaldiversity.ummz.umich.edu/accounts/Mammalia>

Will’s skull page

<http://www.skullsite.co.uk/>

Comparative Mammalian Brain Collections

<http://brainmuseum.org/>

American Society of Mammalogists

<http://www.mammalsociety.org/>

Faunmap: <http://www.museum.state.il.us/research/faunmap/aboutfaunmap.html>

The Paleobiology Database

<https://paleobiodb.org/#/> Video on how to use <https://www.youtube.com/watch?v=n_FkX4Vf_8I>

North American Mammals

<https://wayback.archiveit.org/3340/20180625185649/https://naturalhistory.si.edu/mna/main.cfm?lang=_en>

**GRADING:**

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| Class attendance and participation | 5% |
| 3 Exams | 35% |
| Weekly Mammal Science Blog (8 blogs total) | 10% |
| Species of the Day | 10% |
| Laboratory | 40% |

Final Grades will be as follows. However, the distribution of grades can be adjusted depending on overall class performance.

A: 90 – 100%

B: 80 – 89%

C: 70 – 79%

D: 60 – 69%

F: below 60%

**Exams:** Exams consist of a combination of multiple-choice questions, short answer questions, and essay questions (proportion of these sections varies depending of the material for the exam). Exams will cover all discussed material in class including lectures, guest talks, species of the day, and assigned scientific literature/book chapters. Any information in the lecture presentation is consider exam material. **Do not make travel arrangements to leave campus before midterm exams.** Barring ***extraordinary*** circumstances, **There will be no make-up exams** and **exams will not be rescheduled to accommodate travel plans during the semester**. The only legitimate excuse for rescheduling an exam are if you have:

* three exams or more exams in one day
* a documented medical condition
* a family emergency
* to be off-campus for a university sponsored event or religious holiday.

**Note**: Discuss such exam conflicts with me as soon as possible so that we can make arrangements.

**ASSIGMENTS**

1. **Species Presentation (10%): Check your assigned species below.**

Each student has an assigned species. See calendar to find out your species and presentation date. This assignment consists of two parts: (1) a 2-page written summary on the biology of the species (5%) and (2) a **5 min** presentation in class (3 PowerPoint slides maximum!). The summary must have information sections:

* Global distribution
* Habitat
* Diet
* Social organization (social or solitary, group size, type of society etc.)
* Behavior (communication i.e., acoustic, olfactory; foraging i.e., strategies and adaptations, reproduction i.e. litter size, mating system)
* Conservation status (i.e., IUCN status, threats, conservation efforts)
* Any new cool discovery or fact about this species that you want to share.

**Note:** The written summary must be turn on the day of your presentation and you should bring copies for everyone as this information will be part of the exams.

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| Date | Species Assigment | Student | Species Assigment | Student |
| 12-Sep | *Ornytorhynchus anatinus* | Zoe Albion | *Tachyglossus aculeata* | Lexy Avonda |
| 17-Sep | *Antechinus stuartti* | Eric Baseman | *Dromiciops* *gliroides* | Reilly Becchina |
| 3-Oct | *Ochotona collaris* | Grace King | *Hemiechinus auritus* | Amanda Holmsten |
| 8-Oct | *Priodontes maximus* | John Benner | *Cyclopes didactylus* | Lauren Berkley |
| 10-Oct | *Hemicentetes semispinosus* | Mady Corkum | *Orycteropus afer* | Dylan Depalma |
| 15-Oct | *Ptilocercus lowii* | Rachael Dubrul | *Galeopterus variegates* | Eli Estey |
| 15-Oct | *Hapalemur aureus* | Ben Gluhosky | *Daubentonia madagascariensis* | Isaac Grosner |
| 22-Oct | *Antilocapra americana* | Kyla Schmeck | *Jaculus orientalis* | Sophie Marinace |
| 29-Oct | *Tragulus javanicus* | Danielle McAree | *Giraffa giraffa* | Jade McMillan |
| 31-Oct | *Eubalaena glacialis* | Luther Millison | *Balaenoptera brydei* | Faith Novella |
| 5-Nov | *Globlicephala melas* | Caleb O’connor | *Lissodelphis spp.* | Riley O’Halloran |
| 7-Nov | *Ceratotherium simum* | Emma Wright | *Desmodus rotundus* | Geena Zick |
| 12-Nov | *Hypsignathus monstrosus* | Kevin Ostrander | *Vampyrum spectrum* | Zoe Rosen |
| 14-Nov | *Manis pentadactyla* | Zoe Katz | *Crocuta crocuta* | Mikayla Kass |
| 19-Nov | *Ailurus fulgens* | Ali Korin | *Aiuloropoda melanoleuca* | Sam Schorno |
| 21-Nov | *Monachus monachus* | Olivia Siroonian | *Pusa sibirica* | Claire Tellekson |
| 3-Dec | *Sarcophilus harrisii* and cancer | Ben Upton | *Peromyscus* and Lyme disease | Maggie Wertheimer |

1. **Mammal Science Blog (10%)**: **due @ midnight see dates below**

Scientists regularly keep up with discoveries and innovations in their field through reading of scientific literature. The goal of this assignment is not only to cultivate this habit in you but also to encourage you to put in context what we learn in class. In our BB page, you will find a tab called Science Blog. There are 8 blogs in your calendar to complete throughout the semester. Here is what I expect you to do:

1. Post a science news related to the topic of the week: provide the link so that I can check if the sources are appropriate.
2. Write a short summary about your selected sciences news (10-20 sentence)
3. Make connections! Write a short perspective (10-20 sentences) about how the science news you chose relates to concepts or processes discussed in class.
4. Sources acceptable for this assignment are: *Science News Magazine, BBC Earth, BBC Science and Technology, Nature News, Popular Science, Live Science, Phys.org, National Geographic, Wired, New Scientists, Science Daily, Smithsonian, Cal Academy, Newsweek, NPR, Woods Hole Oceanographic Institute, SCRIPPS, eurekalert, Scientific American, Gizmodo*.

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| Date | Science News Blog |
| 3-Sep | Most recent fossil discoveries of **early** mammals and their importance om piecing together the early origins of mammals. |
| 17-Sep | Why so few marsupial carnivores? Factors proposed for their low present diversity |
| 26-Sep | Why is Rodentia the most species rich order of mammals? ecological and evolutionary factors |
| 10-Oct | Acoustic communication of elephants: signal diversity and function in their society |
| 24-Oct | Why migrating? Factors shaping the migration of African (or North American) artiodactyls |
| 5-Nov | Not enough time to evolve: how do whales are facing increasing noise levels in their habitat? |
| 14-Nov | Anything you ever wanted to know about the evolution of echolocation in bats |
| 3-Dec | Global patterns of zoonotic diseases in mammals: what are the concerns regarding climate change |

**COURSE CONTENT AND DATA IS THE PROPERTY OF THE INSTRUCTOR**.

Consistent with the University’s policy on intellectual property rights, all teaching and curricular materials (including but not limited to classroom lectures, class notes, exams, handouts, and presentations), and **research data use for projects**, are the property of the instructor. Therefore, electronic recording and/or transmission of classes or class notes is prohibited without the express written permission of the instructor. Such permission is to be considered unique to the needs of an individual student (e.g. ADA compliance), and not a license for permanent retention or electronic dissemination to others. For more information, please see the UVM policy on Intellectual Property, sections 2.1.3 and 2.4.1

**HOW TO SUCCEED IN THIS CLASS?**

*Be driven, motivated, persistent, and positive*

To pass this course, you must achieve a passing grade in **BOTH the lecture and laboratory portions** of the class. Please do not use high performance in one part to justify less effort in the other!

**COME TO CLASS.** Instructors draw from their own knowledge and expertise when preparing teaching materials, so we often cover topics and examples that you will not find easily in a book or the web. You also have no way of knowing what material I emphasized or how, without coming to class.

**ATTENDANCE –** Your participation and attendance is paramount in succeeding this class. I have no specific attendance policy, but it is my hope that you will WANT to attend and participate in order to advance your academic career and obtain a better understanding of the core concepts in the field of Mammalogy. If extenuating circumstances do occur, please discuss them with me as soon as possible and I will do my best to accommodate you.

**KEEP UP.** There is a lot of material covered in this course, so do not expect to learn it the night before the exam! You must dedicate time to this course. I as said before THIS IS A VERY DEMANDING COURSE.

**ACADEMIC HONESTY**

Academic honesty is expected of all students. The University of Vermont has a very strict policy concerning academic honesty and plagiarism. Please see the statement on academic honesty http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf.

**Plagiarism constitutes a violation of Academic Honesty.** Plagiarism of ANY sort will NOT be tolerated. The consequences of plagiarism or cheating range from a score of zero on the assignment, failure in the course, to filing a complaint with the University’s Coordinator for Academic Honesty, which can result in expulsion from the University.

**CLASSROOM RESPECT:** It is important to maintain a respectful environment in class, and I expect this from all of you as you should expect this from me. You are here to learn, and I am here to help you learn with mutual respect. Please **arrive on time** and **do not leave early** without permission. When you come to lecture and lab, please **turn off your cell phone**. I will not tolerate phone conversations or texting during lecture or lab.

**EMAIL ETIQUETTE:** Emily and me will make every effort to answer your emails promptly. Please return the courtesy by responding. Also, please address your queries respectfully. “Hey” does not fall in this category, and any such messages risk being ignored (perhaps the best litmus test is to ask the following: “if you were looking for a job, would you greet your prospective new employer in that manner?”). **Also, it is important to properly identify yourself and the particular course you are inquiring about. I teach several other courses.**

**RELIGIOUS HOLIDAYS:** Students should submit in writing to their instructors **by the end of the second full week of classes** their documented religious holiday schedule for the semester. Students who miss work for the purpose of religious observance will be allowed to make up this work.

**STUDENT DISABILITY POLICY.** In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact ACCESS, the office of Disability Services on campus.  ACCESS works with students and faculty in to find reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter.  Contact ACCESS: A170 Living/Learning Center; 802-656-7753; [**access@uvm.edu**](mailto:access@uvm.edu); or [**www.uvm.edu/access**](http://www.uvm.edu/access)**.**

**Calendar 2019 (Tentative to Changes)**

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| **Date** | **Lectures** | **Assigned Literature** | **Corresponding Lab** |
| **27-Aug** | Introduction to this course & Mammalian Characteristic |  | Intro to the lab and Mammalian Characteristics |
| **29-Aug** | Mammalian Characteristics-continuation | Ch. 3 Vaughan |
| **3-Sep** | Origin of the Fuzzballs  <https://science.sciencemag.org/content/339/6120/662>  <http://www.geotimes.org/dec07/article.html?id=feature_ancientlife.html>  <https://link.springer.com/article/10.1007/s10914-018-9449-6> | Ch.5 | Morphology & Order Keys |
| **5-Sep** | Mammalian Biogeography and the Great American Biotic Exchange  <https://link.springer.com/article/10.1007/BF00379638>  <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2987556/>  <https://www.frontiersin.org/articles/10.3389/fgene.2014.00451/full> | Ch. 6 |
| **10-Sep** | Mammalian Diversity and Phylogeny  <https://royalsocietypublishing.org/doi/full/10.1098/rstb.2011.0090>  <https://naturalhistory.si.edu/research/vertebrate-zoology/mammals>  Monotremata: platypus and relatives;  <https://ucmp.berkeley.edu/mammal/monotremesy.html>  Methatheria: Marsupials | Asher and Helgen 2010 | Research Tools-Phylogenies |
| **12-Sep** | Guess Speaker: Eric Ramos Application of UAV in marine mammal studies |  |
| **17-Sep** | Methateria: Marsupials  <https://zookeys.pensoft.net/article/4342/>  <https://ucmp.berkeley.edu/mammal/marsupial/marsupial.html>  Intro to Eutheria <http://tolweb.org/Eutheria/15997> | Ch.12 | Research Tools- Acoustics, PhotoID, Data Management |
| **19-Sep** | Eutheria: Rodentia. **Guess Dr.** **Bill Kilpatrick**  <http://tolweb.org/Rodentia/15959> | Ch.18 |
| **24-Sep** | Eutheria: Rodentia. **Guess Dr.** **Bill Kilpatrick** |  | Monotremes & Marsupials |
| **26-Sep** | Eutheria: Rodentia. **Guess Dr.** **Bill Kilpatrick** |  |
| 1-Oct | **Exam 1 Intro to Rodents** |  | Rodents |
| **3-Oct** | Eutheria: Lipotyphla and Lagomorpha | Ch.18 |
| **8-Oct** | Eutheria: Xenarthra <https://academic.oup.com/jmammal/article/96/4/617/852134>  Intro to Afrotheria | Ch.16,13 |
| **10-Oct** | Eutheria: Afrotheria: <https://www.pnas.org/content/98/1/1.long>  <https://science.umd.edu/classroom/bsci338m/Lectures/Afrotheria.html> | Ch.13, 19 |
| **15-Oct** | Eutheria: Dermoptera, Scandentia, and Primates | Ch.13, 15 | Afrotheria & Xenarthra |
| **17-Oct** | Eutheria: continuation Primates <https://doi.org/10.1371/journal.pbio.0020033> | Ch.15 |
| **22-Oct** | Eutheria: Artiodactyla Terrestrial <http://www.ultimateungulate.com/artiodactyla.html>  <https://ocean.si.edu/through-time/ancient-seas/evolution-whales-animation> | Ch.20 | Dermoptera, Scandentia, and Primates |
| **24-Oct** | Eutheria: Artiodactyla Terrestrial |  |
| 29-Oct | **Exam 2 Lipotyphla to Terrestrial Artiodactyls** |  | Data Analysis Day |
| **31-Oct** | Eutheria: Artiodactyla Aquatic <https://evolution.berkeley.edu/evolibrary/article/evograms_03> | Ch.21 |
| **5-Nov** | Eutheria: Artiodactyla Aquatic |  | Artiodactyla, Perissodactyla, Chiroptera |
| **7-Nov** | Eutheria: Perissodactyla and Chiroptera <http://www.batcon.org/> | Ch.20, 14 |
| **12-Nov** | Eutheria: continuation of Chiroptera  <http://currents.plos.org/treeoflife/article/a-time-calibrated-species-level-3chrbtx927cxs-5/> | Ch.14 | Pholidota & Carnivora |
| **14-Nov** | Eutheria: Pholidota <http://users.tamuk.edu/kfjab02/Biology/Mammalogy/systematics/A3edentates.htm#pangolins>  Carnivora: Feliformia | Ch.17 |
| **19-Nov** | Eutheria: Carnivoran:Carniformia <http://news.bbc.co.uk/earth/hi/earth_news/newsid_8383000/8383070.stm> | ‘’ | Lab Exam |
| **21-Nov** | Mammalian Domestication, Diseases, and Zoonoses | Ch. 28 |
| 26-28 Nov | **Thanksgiving** |  |  |
| **3-Dec** | Mammalian Conservation: Defaunation, Climate Change, and Humans  <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0022562> | Ch. 30 | Mammalian Symposium |
| **5-Dec** | Closing remarks: <https://www.pnas.org/content/115/44/11262> |  |
| 13-Dec | **Exam 3 Aquatic Artiodactyls to Mammalian Conservation (@ 13:30, MLS 107)** |  |  |

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**You have a responsibility to read the syllabus and understand the expectations, and deadlines for this course. After you read the syllabus please sign and returned to me next class.**

I have read the syllabus and fully understand the expectations and responsibilities I will be undertaking during this course. I also understand how I will be graded in this course and I have written down in my calendar deadlines for all assignments \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Name:

Signature:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_