IB 173LF – Mammalogy (5 units)

Fall 2022

Lectures: TuTh 10:00 - 11:00 am, 3095 Valley Life Sciences Bldg. (VLSB)

Labs: TuTh 2:00 – 5:00 pm, 3095 VLSB

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Class website: bcourses.berkeley.edu (IB 173)

General Course Content

This is a course on the biology of mammals of the world. It will combine experience from laboratories, lectures, and field work. The laboratory portion of the course will rely on the collections of the UC Berkeley Museum of Vertebrate Zoology. One major goal is to have students become familiar with the evolutionary diversification of mammals of the world and also with the ecology and evolution of the local mammalian fauna. Students will therefore be expected to learn the defining characteristics of mammalian Orders and Families worldwide as well as those of many California species. We will take a phylogenetic perspective and emphasize a functional understanding of the characters that define lineages. The goal is not simply to memorize characters (although there will be considerable memorization), but to learn their evolutionary and functional significance. At the end of the course you should be able to identify any mammalian specimen to Order and Family, and you should be able to describe aspects of its ecology, such as its food habits from an examination of its teeth and jaw structure, or its locomotory mode (and thus habitat) from an examination of its skeleton. By studying a single adaptive radiation in depth, you will hopefully come to appreciate more fully the details of the evolutionary process. The lecture portion of the course will cover a wide range of subjects in the ecology and evolution of mammals. Students will be expected to read from texts and from the primary literature. A portion of one lecture each week will be used for discussion of an assigned reading from the primary literature. There will be three required field trips in California. Field work is a critical part of the class: we will have the opportunity to observe, handle, and study wild mammals first-hand. These trips are intended to introduce students to the field identification of mammals and techniques used to study their population biology.
## Lecture Schedule - Fall 2022

<table>
<thead>
<tr>
<th>Date</th>
<th>Week</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 25</td>
<td>1</td>
<td>Introduction (ch 1-2)</td>
</tr>
<tr>
<td>Aug. 30</td>
<td>2</td>
<td>Mammalian origins (ch 4)</td>
</tr>
<tr>
<td>Sept. 1</td>
<td>3</td>
<td>Mammalian origins <em>(Discussion: Morens et al. 2020)</em></td>
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<tr>
<td>Aug. 6</td>
<td>4</td>
<td>Dentition (ch 4)</td>
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<tr>
<td>Aug. 8</td>
<td>5</td>
<td>Dentition <em>(Discussion: Mao et al. 2020)</em></td>
</tr>
<tr>
<td>Aug. 13</td>
<td>6</td>
<td>Locomotion (ch 6)</td>
</tr>
<tr>
<td>Aug. 15</td>
<td>7</td>
<td>Locomotion <em>(Discussion: Wilson et al. 2013)</em></td>
</tr>
<tr>
<td>Aug. 20</td>
<td>8</td>
<td>The mammalian radiation (ch 3)</td>
</tr>
<tr>
<td>Sept. 22</td>
<td>9</td>
<td>The mammalian radiation <em>(Discussion: Springer et al. 2004)</em></td>
</tr>
<tr>
<td>Aug. 27</td>
<td>10</td>
<td>Feeding mechanisms and physiological ecology (ch 7-8)</td>
</tr>
<tr>
<td>Aug. 29</td>
<td>11</td>
<td>Physiological ecology <em>(Discussion: Goldbogen et al. 2019)</em></td>
</tr>
<tr>
<td>Oct. 4</td>
<td>12</td>
<td>Echolocation (ch 21)</td>
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<tr>
<td>Oct. 6</td>
<td>13</td>
<td>Reproduction (ch 9) <em>(Discussion: Corcoran and Conner 2014)</em></td>
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<tr>
<td>Oct. 11</td>
<td>14</td>
<td>Reproduction</td>
</tr>
<tr>
<td>Oct. 13</td>
<td>15</td>
<td>Catch-up lecture and review</td>
</tr>
<tr>
<td>Oct. 18</td>
<td>16</td>
<td><strong>Mid-term exam 1</strong></td>
</tr>
<tr>
<td>Oct. 20</td>
<td>17</td>
<td>Behavior and social systems (ch 22)</td>
</tr>
<tr>
<td>Oct. 25</td>
<td>18</td>
<td>Social systems <em>(Discussion: Lim et al. 2004)</em></td>
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<tr>
<td>Oct. 27</td>
<td>19</td>
<td>Population ecology (ch 25)</td>
</tr>
<tr>
<td>Nov. 1</td>
<td>20</td>
<td>Population ecology <em>(Discussion: Krebs et al. 1995)</em></td>
</tr>
<tr>
<td>Nov. 3</td>
<td>21</td>
<td>Community ecology (ch 26)</td>
</tr>
<tr>
<td>Nov. 8</td>
<td>22</td>
<td>Community ecology <em>(Discussion: Mills et al. 2018)</em></td>
</tr>
<tr>
<td>Nov. 10</td>
<td>23</td>
<td>Population genetics and geographic variation</td>
</tr>
<tr>
<td>Nov. 15</td>
<td>24</td>
<td>Population genetics <em>(Discussion: Barrett et al. 2019)</em></td>
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<tr>
<td>Nov. 17</td>
<td>25</td>
<td>Speciation and zoogeography (ch 5, 28)</td>
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<tr>
<td>Nov. 22</td>
<td>26</td>
<td>Zoogeography <em>(Discussion: Moritz et al. 2008)</em></td>
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<tr>
<td>Nov. 24</td>
<td>27</td>
<td>No class - Thanksgiving</td>
</tr>
<tr>
<td>Nov. 29</td>
<td>28</td>
<td><strong>Mid-term exam 2</strong></td>
</tr>
<tr>
<td>Dec. 1</td>
<td>29</td>
<td>No lecture</td>
</tr>
</tbody>
</table>

Before each lecture, you are expected to read and study the appropriate chapters in Feldhamer (given above).

The textbook (Feldhamer) is on electronic reserve in the Biosciences Library in VLSB.
Laboratory Schedule - Fall 2022

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Aug. 25</td>
<td>Cranial anatomy</td>
</tr>
<tr>
<td>Aug. 30</td>
<td>Post cranial anatomy</td>
</tr>
<tr>
<td>Sept. 1</td>
<td>Cranial and post cranial anatomical diversity</td>
</tr>
<tr>
<td>Sept. 6</td>
<td>Data collection, museum specimens, field notes, zoonoses, CA mammals</td>
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<tr>
<td>Sept. 8</td>
<td>Teeth</td>
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<tr>
<td>Sept. 13</td>
<td>Teeth</td>
</tr>
<tr>
<td>Sept. 15</td>
<td>Locomotor adaptations, horns, antlers, integument, pelage, age determination</td>
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<tr>
<td>Sept. 20</td>
<td>Monotremata, Didelphimorphia, Paucituberculata, Microbiotheria, Notoryctemorphia</td>
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<tr>
<td>Sept. 22</td>
<td>Dasyuromorphia, Peramelemorphia, Diprotodontia</td>
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<tr>
<td>Sept. 27</td>
<td>Cingulata, Pilosa</td>
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<tr>
<td>Sept. 29</td>
<td>Tubulidentata, Macroscelidea, Tenrecoidea, Hyracoidea, Proboscidea, Sirenia</td>
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<tr>
<td>Oct. 4</td>
<td>Chiroptera</td>
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<tr>
<td>Oct. 6</td>
<td>Chiroptera</td>
</tr>
<tr>
<td>Oct. 11</td>
<td>Review</td>
</tr>
<tr>
<td>Oct. 13</td>
<td>Lab Mid Term Exam</td>
</tr>
<tr>
<td>Oct. 18</td>
<td>Dermoptera, Scandentia, Primates</td>
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<tr>
<td>Oct. 20</td>
<td>Primates</td>
</tr>
<tr>
<td>Oct. 25</td>
<td>Rodentia</td>
</tr>
<tr>
<td>Oct. 27</td>
<td>Rodentia</td>
</tr>
<tr>
<td>Nov. 1</td>
<td>Rodentia</td>
</tr>
<tr>
<td>Nov. 3</td>
<td>Rodentia (review), Lagomorpha</td>
</tr>
<tr>
<td>Nov. 8</td>
<td>Erinaceomorpha, Soricomorpha, Pholidota, Carnivora</td>
</tr>
<tr>
<td>Nov. 10</td>
<td>Carnivora</td>
</tr>
<tr>
<td>Nov. 15</td>
<td>Carnivora</td>
</tr>
<tr>
<td>Nov. 17</td>
<td>Cetacea</td>
</tr>
<tr>
<td>Nov. 22</td>
<td>Perissodactyla, Artiodactyla</td>
</tr>
<tr>
<td>Nov. 24</td>
<td>No class - Thanksgiving</td>
</tr>
<tr>
<td>Nov. 29</td>
<td>Review</td>
</tr>
<tr>
<td>Dec. 1</td>
<td>Lab Final Exam</td>
</tr>
</tbody>
</table>

Before each lab, you are expected to read the corresponding taxonomic chapters in Feldhamer (and you are also expected to read and study the appropriate chapters in the lab manual, “A manual of the Mammalia: an homage to Lawlor’s *Handbook to the Orders and Families of Living Mammals*.”)
Field Trips

This course includes three field trips. These trips form an essential component of the course and are mandatory for all students enrolled in the class.

Sagehen Creek Field Station (1st night)  Depart Friday, Sept 9, 10:00 am
http://sagehen.ucnrs.org/  Return Sunday, Sept 11, 5:00 pm
Camping at Chilcoot, CA (2nd night)

Hastings Natural History Reservation:  Depart Friday, Sept. 23, 10:00 am
http://www.hastingsreserve.org/  Return Saturday, Sept. 24, 5:00 pm

Point Reyes National Seashore  Depart Friday, Nov. 18, 9:00 am
www.nps.gov/pore/  Return Friday, Nov. 18, 5:00 pm

An important goal of these trips is to make you familiar with the natural history of mammals in California. You will have the opportunity to observe, trap, and handle a variety of mammals. Because of the presence of hantavirus and other zoonoses in some rodent populations, you will not be required to trap or handle live animals if you do not wish to do so. However, participation as an observer is still expected. Students who wish to prepare standard museum specimens from animals collected in the field will have the opportunity to do so.

Course Policy and General Expectations

**Grading:**  
Lecture Mid Term 1  100 pts  
Lecture Mid Term 2  100 pts  
Lab Mid Term  100 pts  
Lab Final  200 pts  
Participation (Field and Lab Work)  100 pts

**Expectations:**
1. Regular attendance in lecture and lab is expected. You will need the entire 3 hour lab period every time. Lab exams cannot be made up. The final exam for lab will cover material from the entire course.

2. There are weekly readings from the text and the lab manual. There are also weekly readings from the primary literature (see following pages). We will discuss these papers in class. Everyone is expected to have read each paper before lecture and everyone is expected to participate in these class discussions. Some exam questions will derive from this material.

3. Field trips. All students are expected to attend the field trips.

4. All students are expected to adhere to the UC Berkeley honor code: “As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others.” (see http://asuc.org/honorcode/index.php).

**Required Texts:**
Weekly Readings

Sept 1 – Zoonoses, coronavirus

**Required reading:**

**Additional readings (optional):**

September 8 - Mammalian origins

**Required reading:**

**Additional readings (optional):**

Sept. 15 - Locomotion
Required reading:
Additional readings (optional):

Sept. 22 – The mammalian radiation
Required reading:
Additional readings (optional):

Sept. 29 – Feeding mechanisms
Required reading:
Williams, T.M. 2019. The biology of big; whales became the world’s largest animals thanks to giant gulps of “bit-size” prey. Science 366: 1316-1317.

Oct. 6 - Echolocation
Required reading:
Additional readings (optional):

Oct. 25 – Behavior, reproduction, and social systems
Required reading:
Additional readings (optional):


Nov. 1 - Population and community ecology

*Required reading:*


*Additional readings (optional):*


Nov. 8 – Community ecology, adaptation and climate change

*Required reading:*


Nov. 15 - Population genetics and geographic variation

*Required reading:*


*Additional optional reading:*


Nov. 22 - Zoogeography

*Required reading:*

Useful web sites:

University of Michigan Museum of Zoology, Animal Diversity Web:
http://animaldiversity.ummz.umich.edu/ (click on "mammals")
American Society of Mammalogists Website (has links to many other useful sites)
http://www.mammalogy.org/
The Mammalian Species pdf web site:
https://academic.oup.com/mspecies
Vertnet
http://www.vertnet.org/about/about.html
UC Berkeley Museum of Vertebrate Zoology
http://mvz.berkeley.edu/
National Museum of Natural History, Mammal Division
https://vertbrates.si.edu/mammals/
Morphosource
https://www.morphosource.org/
Digimorph
http://digimorph.org/listbygroup.phtml?grp=Mammals\%20an&sort=SpeciesName
Interactive models of organisms from Sean Beckman
https://docs.google.com/document/d/1yH5_Wuy_R-f8slIdyNGFTlioVv--Zm37YyUTIudN0yo/edit

Journals Specifically Oriented to Mammals

Australian Mammalogy Publication of the Australian mammal society
Bat Research News Informal newsletter on bat biology
Bat Conservation Newsletter Publication of Bat Conservation International
Folia Primatologica Publication of the European Federation for Primatology
Honyurui Kagaku (Mammal Science) Japanese journal
Journal of Mammalogy Publication of the American Society of Mammalogists
Mammalia French journal
Mammal Research Formerly Acta Theriologica
Mammal Review Publication of the Mammal Society (UK)
Theriologica Russian journal
Zeitschrift fur Saugetierkunde German journal
### Additional General References


