

11-23-2020

PHOL 485/ORIG 485
“Comparative & Evolutionary Physiology” Syllabus
Fall 2020

Course Instructors: Joseph C. LaManna, PhD and Kui Xu, MD/PhD

Credit Hours: 4

Schedule: Online lectures, Tuesdays and Thursdays

Class Format: Lecture

Focus and Scope of Courses:

PHOL 485 is a graduate course offered in the Department of Physiology & Biophysics in the School of Medicine. This course presents physiological concepts from the comparative and evolutionary perspective. Aspects of vertebrate and mammalian evolution will be considered with respect to the generation of adaptive advantages for organisms to changing environmental challenges since the Cambrian. Comparative physiological concepts include scaling, variations in nutrition, energy metabolism and work efficiency. The important influences of time, temperature, water and energy on mammalian biology will be presented.

Office Hour for Questions and Discussion (Zoom): 3-4 pm Thursday.

Evaluations will be by regular quizzes, and 3 block exams, all MCQ.

Learning Objectives:

The student is expected to meet the following learning objectives:

- 1) The student will be expected to learn the general changes in the earth environment over the past 500 million years that shaped mammalian evolution.
- 2) The student will be expected to know the implications of body size in constraining adaptation to the environment.
- 3) The student will be expected to understand the concept and equations of scaling.
- 4) The student will be expected to understand the role that water plays in mammalian physiology.
- 5) The student will be expected to understand the comparative nature of time and life span.
- 6) The student will be expected to understand homeothermy and poikilothermy and the role of temperature in biology.
- 7) The student will be expected to understand the interactions among feeding, nutrition, energy metabolism and work.

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Required Textbook: “Animal Physiology” (4th edition), Hill, Richard W.; Wyse, Gordon A.; and Anderson, M. Sinauer Associates, Sunderland, MA (2017). Additional reading assignments will be given but are not known at this time.

Grading Criteria:

Grading: A: 85 & above; B: 70-84; C: <70

Weekly Quizzes (around 3 questions each chapter, 1 minute for each question) on previous week's material - 10%; Three Block Exams: 30% each. **Questions for Bonus points are from the Chapters AT WORK.**

Extra credit book report: up to 10 % points to your final grade.

Class Schedule:

PHOL 485/ORIG 485 - "COMPARATIVE & EVOLUTIONARY PHYSIOLOGY"

Schedule: Fall Semester 2020

Instructors: Joseph C. LaManna, PhD; JCL4@case.edu and Kui Xu, MD/PhD; kxx@case.edu

TA: Alireza Abdollahifar (axa860@case.edu)

Classes: February 1, 2021 – May 19, 2021; Online, Tuesday and Thursday

Required Textbook: “Animal Physiology” (4th edition), Hill, Richard W.; Wyse, Gordon A.; and Anderson, M. Sinauer Associates, Sunderland, MA (2017)

Grading: A: 85 & above; B: 70-84; C: <70

Weekly Quizzes (~3 questions each chapter, 1 minute for each question) on previous week's material - 10%; **Three Block Exams**-30% each. **Questions for Bonus points are from the Chapters AT WORK.**

Extra credit book report: up to 10 points.

LECTURE	DATE	TOPIC
		PART I
		FUNDAMENTALS OF PHYSIOLOGY (1)-JCL
1	02/02/2021	Chapter 1: Animals and Environments: Function on the Ecological Stage (3)
2	02/04/2021	Chapter 2: Molecules and Cells in Animal Physiology (35)
3	02/09/2021	Chapter 3: Genomics, Proteomics, and Related Approaches to Physiology (71)

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4 02/11/2021 Chapter 4: Physiological Development and Epigenetics (89)

5 02/16/2021 Chapter 5: Transport of Solutes and Water (103)

PART II FOOD, ENERGY AND TEMPERATURE (129)-JCL

6 02/18/2021 Chapter 6: Nutrition, Feeding, and Digestion (131)

7 03/02/2021 Chapter 7: Energy Metabolism (165)

8 03/04/2021 Chapter 8: Aerobic and Anaerobic Forms of Metabolism (189);

9 03/09/2021 Chapter 9: The Energetics of Aerobic Activity (215)

9 03/11/2021 Chapter 10: Thermal Relations (233)

**Chapter 11 (Learn by yourself): Food, Energy, and Temperature AT WORK: The Lives of Mammals in Frigid Places (287)*

03/16/2021 **No Class Day**

10 03/18/2020 **Block Exam 1**

PART III INTEGRATING SYSTEMS (303)-KX

11 03/23/2021 Chapter 12: Neurons (305);

12 03/25/2021 Chapter 13: Synapses (337)

13 03/30/2021 Chapter 14: Sensory Processes (369)

14 04/01/2021 Chapter 15: Nervous System Organization and Biological Clocks (407);

15 04/06/2021 Chapter 16: Endocrine and Neuroendocrine Physiology (429)

16 04/08/2021 Chapter 17: Reproduction (465);

**Chapter 18 (Learn by yourself): Integrating Systems AT WORK: Animal Navigation (497)*

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		PART IV	MOVEMENT AND MUSCLE (513)-KX
17	04/13/2021		Chapter 19: Control of Movement: The Motor Bases of Animal Behavior (515)
18	04/15/2021		Chapter 20: Muscle (537) <i>*Chapter 21 (Learn by yourself): Movement and Muscle AT WORK: Plasticity in Response to Use and Disuse (565)</i>
20	04/20/2021		Block Exam 2
		PART V	OXYGEN, CARBON DIOXIDE, AND INTERNAL TRANSPORT (583)-KX
21	04/22/2020		Chapter 22: Introduction to Oxygen and Carbon Dioxide Physiology (585) Chapter 23: External Respiration: The Physiology of Breathing (599)
22	04/27/2021		Chapter 24: Transport of Oxygen and Carbon Dioxide in Body Fluids (with an Introduction to Acid-Base Physiology) (635)
23	04/29/2021		Chapter 25: Circulation (667) <i>*Chapter 26 (Learn by Yourself): Carbon Dioxide, and Internal Transport AT WORK: Diving by Marine Mammals (701)</i>
		PART VI	WATER, SALTS, AND EXCRETION (721)-JCL
25	05/04/2021		Chapter 27: Water and Salt Physiology: Introduction and Mechanisms (723)
26	05/06/2021		Chapter 28: Water and Salt Physiology of Animals in their Environments (741)
27	05/11/2020		Chapter 29: Kidneys and Excretion (with Notes on Nitrogen Excretion) (779) <i>*Chapter 30 (Learn by Yourself): Water, Salts, and Excretion AT WORK: Mammals of Deserts and Dry Savannas (815)</i>
29	05/13/2020		Reading day
30	05/18/2020		Block Exam 3
31	05/20/2020		Extra Credit Book Report Due by 5pm EST