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New Course - PHOL 485/ORIG 485
“Comparative & Evolutionary Physiology” Syllabus
Fall 2017

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

Credit Hours: 4

Time: Mondays and Wednesdays – 1:00 to 3:00 pm, SOM E501

Class Format: Lecture (Two 2-hour lectures per week)

Focus and Scope of Courses:

PHOL 485 is a new graduate course for the Fall 2017 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.

The course is a lecture based course that can be taken in person or on-line. Evaluations will be by regular quizzes, a mid-term and a final exam, 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 (5 questions each, 10 minutes) on previous week's material - 10%; Mid-term MCQ - 45%; Final Exam MCQ - 45%.
Extra credit book report: up to 10 points.

Class Schedule:

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

Schedule: Fall Semester 2017

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

Classes: August 28 - December 8

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 (5 questions each, 10 minutes) on previous week's material - 10%; **Mid-term MCQ** - 40%; **Final Exam MCQ** - 50%. **Extra credit** book report: up to 10 points.

LECTURE	DATE	PART I	TOPIC
1	8/28/2017		FUNDAMENTALS OF PHYSIOLOGY (1) Animals and Environments: Function on the Ecological Stage (3)
2	8/30/2017		Molecules and Cells in Animal Physiology (35)
	9/4/2017		University Holiday
3	9/6/2017		Genomics, Proteomics, and Related Approaches to Physiology (71)
4	9/11/2017		Physiological Development and Epigenetics (89)
5	9/13/2017		Transport of Solutes and Water (103)

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		PART II	FOOD, ENERGY AND TEMPERATURE (129)
6	9/18/2017		Nutrition, Feeding, and Digestion (131)
7	9/20/2017		Energy Metabolism (165)
8	9/25/2017		Aerobic and Anaerobic Forms of Metabolism (189)
9	9/27/2017		The Energetics of Aerobic Activity (215)
10	10/2/2017		Thermal Relations (233) Food, Energy, and Temperature AT WORK: The Lives of Mammals in Frigid Places (287)
		PART III	INTEGRATING SYSTEMS (303)
11	10/4/2017		Neurons (305); Synapses (337); Sensory Processes (369)
12	10/9/2017		Nervous System Organization and Biological Clocks (407)
13	10/11/2017		Endocrine and Neuroendocrine Physiology (429)
14	10/16/2017		Reproduction (465); Integrating Systems AT WORK: Animal Navigation (497)
15	10/18/2017		Midterm Exam
	10/23-10/24		Fall Break
		PART IV	MOVEMENT AND MUSCLE (513)
16	10/25/2017		Control of Movement: The Motor Bases of Animal Behavior (515)
17	10/31/2017		Muscle (537)
18	11/1/2017		Movement and Muscle AT WORK: Plasticity in Response to Use and Disuse (565)
		PART V	OXYGEN, CARBON DIOXIDE, AND INTERNAL TRANSPORT (583)
19	11/6/2017		Introduction to Oxygen and Carbon Dioxide Physiology (585)

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20	11/8/2017	External Respiration: The Physiology of Breathing (599)
21	11/13/2017	Transport of Oxygen and Carbon Dioxide in Body Fluids (with an Introduction to Acid-Base Physiology) (635)
22	11/15/2017	Circulation
23	11/20/2017	Oxygen, Carbon Dioxide, and Internal Transport AT WORK: Diving by Marine Mammals (701)
24	11/22/2017	PART VI WATER, SALTS, AND EXCRETION (721) Water and Salt Physiology: Introduction and Mechanisms (723)
	11/23-11/24	Thanksgiving Holidays
25	11/27/2017	Water and Salt Physiology of Animals in their Environments (741)
26	11/29/2017	Kidneys and Excretion (with Notes on Nitrogen Excretion) (779)
27	12/4/2017	Water, Salts, and Excretion AT WORK: Mammals of Deserts and Dry Savannas (815)
28	12/6/2017	FINAL EXAM