

GRANDE PRAIRIE REGIONAL COLLEGE

DEPARTMENT OF SCIENCE

ZOOLOGY 2410 - VERTEBRATE PHYSIOLOGY

1994

INSTRUCTOR: PAUL LEMAY J224

CLASSES: MONDAY, WEDNESDAY, FRIDAY 11:00 AM. - 12:00 PM.  
(First Term 3-0-0) UT (3) 1993

COURSE OBJECTIVES: Functional biology at the organ system level.

COURSE DESCRIPTION: A review of the general concepts in animal physiology with an emphasis on structure and function and adaptive significance to the animal in its own environment. The mammals, including man, will be used frequently to illustrate the relevance of basic physiological and biochemical mechanisms governing bodily functions.

PREREQUISITES: Zoology 1200. A student may not register concurrently for Zoology 2410 and either Zoology 2420 or Physiology 3100. A student with credit in either Zoology 3420 or Physiology 3100 may not obtain credit.

TEXT: Schmidt-Nielsen, K. Animal Physiology: Adaptation and Environment, 4th Edition. Cambridge University Press.

GRADE DISTRIBUTION:	Quizzes	35% (Includes article review and class presentation 10%)
	Mid-Term Exam	25%
	Final Exam	40%

COURSE OUTLINE:

1. Introduction to Physiology
2. Energy Metabolism:
  - calorimetry and metabolic rate
  - factors affecting metabolic rate:
    - a) body size
    - b) temperature
    - c) location
  - temperature relationships of:
    - a) ectotherms
    - b) heterotherms
    - c) endotherms
  - thermostatic regulation of body temperature
3. Respiration:
  - general considerations
  - the gas laws
  - gases in the blood
  - the vertebrate lung
  - the vertebrate gill
  - regulation of gas transfers and respiration
  - regulation of body ph

## 4. Circulation:

- the mammalian heart
- electrical activity of the heart
- mechanical properties of the heart
- morphology of other vertebrate hearts
- haemodynamics
- regulation of capillary blood flow
- cardiovascular control by CNS

## 5. Nerves:

- general laws
  - Donnan's Equilibrium
  - Nernst's Equation
- resting potential
- action potential
- structure of neuron
- structure and function of synapses
- biological transducers
- integration of nerve and muscle (reflex arc)
- intensity coding
- autonomic nervous system

## 6. Muscles:

- classification of muscles
- skeletal muscle
  - structure
  - sliding filament theory
  - excitation
  - length - tension
  - contraction mechanics
  - metabolic sub-types
- cardiac muscle
- smooth muscle

## 7. Endocrines:

- definition of hormones
- types of hormones (by structure and function)
- mechanism of hormonal action
- regulation of hormonal action
- hormonal diseases

## 8. Water and solute metabolism:

- physical principle
  - diffusion
  - osmosis
  - active transport
  - osmoregulation
- problems of osmoregulation
- osmoregulatory organs - vertebrate kidney
  - extrarenal organs
- osmoregulation in
  - aqueous habitats
  - terrestrial habitats
- nitrogenous wastes