DEPARTMENT OF SCIENCE

COURSE OUTLINE – ZOOLOGY 2410

ANIMAL PHYSIOLOGY I: HOMEOSTASIS

INSTRUCTOR: Dr. Georgia Goth **PHONE:** 780-539-2827
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OFFICE HOURS: Tuesday 10:30-11:20; Thursday 10:30-12:50; Friday 1:00-1:30

PREREQUISITE(S)/COREQUISITE: BI1070

TEXT/RESOURCE MATERIALS:

Moyes, C.D. and P.M. Schult,2008, Principles of Animal Physiology, Pearson/Benjamin Cummings, 754pp **(Suggested but not required)**

CALENDAR DESCRIPTION:

Systems/topics involved in homeostasis are covered in this course. These topics include enzyme kinetics, thermal physiology, circulation, respiration, excretion, osmoregulation, and digestion. Examples from vertebrates and invertebrates are included.

CREDIT/CONTACT HOURS: 3 (3-1-0)

DELIVERY MODE(S): Lecture and seminar

OBJECTIVES (OPTIONAL):

This course examines how animals function at the organ/system level of organization. Particular attention is given to the adaptive significance of different modes of functioning. We explore how animals are able to survive in their individual environments.

Comparing diverse mechanisms for solving problems, with examples taken from both vertebrates and invertebrates, provides the student with a broad understanding of animal physiology. All animals must solve similar problems related to regulating levels of gases, energy, temperature, water and ions. The process of natural selection has resulted in the formation of various solutions, enabling animals to occupy a wide variety of different habitats.

TRANSFERABILITY: UA, UC, UL, AU, AF, CUC, KUC

**** Grade of D or D+ may not be acceptable for transfer to other post-secondary institutions. Students are cautioned that it is their responsibility to contact the receiving institutions to ensure transferability**

GRADING CRITERIA:

GRANDE PRAIRIE REGIONAL COLLEGE			
GRADING CONVERSION CHART			
Alpha Grade	**4-point Equivalent**	**Percentage Guidelines**	**Designation**
A^{+}	**4.0**	**90 – 100**	**EXCELLENT**
A	**4.0**	**85 – 89**	
A^{-}	**3.7**	**80 – 84**	**FIRST CLASS STANDING**
B^{+}	**3.3**	**77 – 79**	
B	**3.0**	**73 – 76**	**GOOD**
B^{-}	**2.7**	**70 – 72**	
C^{+}	**2.3**	**67 – 69**	**SATISFACTORY**
C	**2.0**	**63 – 66**	
C^{-}	**1.7**	**60 – 62**	
D^{+}	**1.3**	**55 – 59**	**MINIMAL PASS**
D	**1.0**	**50 – 54**	
F	**0.0**	**0 – 49**	**FAIL**
WF	**0.0**	**0**	**FAIL, withdrawal after the deadline**

EVALUATIONS:

Seminars	10%
Mid-term Exam I	25%
Mid-term Exam II	25%
Final Exam	40%

STUDENT RESPONSIBILITIES:

Since participation in lectures and completion of assignments are important components of this course, students will serve their best interests by regular attendance at both lectures and seminar sessions. Those who choose not to attend must assume whatever risks are involved.

The objective of the seminars is to clarify information that has been presented in class during the previous week. Students are advised to review their notes prior to each seminar. Quizzes may be given during the seminar period.

STATEMENT ON PLAGIARISM AND CHEATING:

Refer to the Student Conduct section of the College Admission Guide at http://www.gprc.ab.ca/programs/calendar/ or the College Policy on Student Misconduct: Plagiarism and Cheating at www.gprc.ab.ca/about/administration/policies/**

**Note: all Academic and Administrative policies are available on the same page.

COURSE SCHEDULE/TENTATIVE TIMELINE:

1. **Introduction to Physiology – Chp 1**

2. **Overview of Enzyme Kinetics and Cellular Metabolism – Chp 2**
   A. Metabolism – general
   B. Enzymes
      - enzyme kinetics [zero order, 1st order, 2nd order reactions]
      - substrate affinity
      - Km, V_{max}, Michaelis-Menton & Lineweaver-Burk equations
      - mechanisms of enzyme control [competitive, non-competitive and allosteric inhibition]
   C. Energy carriers [energy-rich phosphates, nucleotides]
   D. Aerobic and anaerobic metabolic pathways – a review

3. **Thermal Physiology – Chp 13**
   A. Laws of Thermodynamics
   B. Heat fluxes – conduction, convection, radiation
   C. Temperature preference, tolerance, resistance
   D. Ectotherms, endotherms, heterotherm

- Thermal strategies in ectotherms
  - behavioural and metabolic compensation
  - dormancy
  - freeze avoidance & freeze tolerance
- Thermal strategies in endotherms
  - environmental heat exchange
  - heat retention
  - heat generation
- Thermal Strategies in heterotherms
  - regional heterotherms
  - temporal heterotherms

MID-TERM EXAMINATION 1 (30%)

4. Circulation – Chp 8

A. Need for vascular systems
B. Components of circulatory systems
C. Diversity of circulatory systems
D. Circulatory system of vertebrates
E. Flow of blood through the circulatory system
F. Hearts
   - Arthropod hearts
   - Diversity in vertebrate hearts
   - Cardiac cycle
   - Control of contraction
G. Regulation of blood pressure
H. Blood

5. Respiration - Chp 9

A. General considerations
B. Need for respiratory systems
C. Types of Respiratory Systems
D. Regulation of gas exchange
E. Gas transport
F. Vertebrate respiratory systems – a comparison
G. Respiration in diving mammals
H. Respiration at high altitudes

MID-TERM EXAMINATION II (30%)

6. Excretory System – Chp 10

A. Functions of the excretory system
B. Strategies for osmoregulation

C. Role of epithelial tissue
D. Nitrogen excretion
E. The mammalian kidney

7. Osmoregulation – Chp 10

A. Intracellular fluid (ICF versus extracellular fluid (ECF)
B. Osmoconformers versus osmoregulators
C. Survey of osmoregulation in major animal phyla
D. Hyperosmotic regulation (eg, freshwater bony fishes)
E. Hypo-osmotic regulation (eg, marine vertebrates)
F. Osmotic balance in mammals
G. Regulation of pH

8. Acquiring Energy: Feeding, Digestion and Metabolism – Chp 15

A. Feeding methods; finding food
B. Alimentary systems
C. Influence of diet on gut structure
D. Gastrointestinal secretions
E. Absorption

FINAL EXAMINATION (30%)