

DEPARTMENT OF SCIENCE

COURSE OUTLINE – Winter 2023

ZO2420 (A3) – Animal Physiology II, Intercellular Communications - 3 (3-1-0), 60 hours for 15 weeks

Northwestern Polytechnic acknowledges that our campuses are located on Treaty 8 territory, the ancestral and present-day home to many diverse First Nations, Metis, and Inuit people. We are grateful to work, live and learn on the traditional territory of Duncan's First Nation, Horse Lake First Nation and Sturgeon Lake Cree Nation, who are the original caretakers of this land.

We acknowledge the history of this land and we are thankful for the opportunity to walk together in friendship, where we will encourage and promote positive change for present and future generations.

INSTRUCTOR: Beatrice Amar, Ph.D. **PHONE:** 780-539-2031
OFFICE: J208 **E-MAIL:** Bamar@NWPolytech.ca
OFFICE HOURS: Mon & Wed 1-3 p.m. or by appointment

CALENDAR DESCRIPTION:

Endocrinology, immunology and neural, sensory, motor and reproductive physiology. Examples from invertebrates and vertebrates.

PREREQUISITE(S)/COREQUISITE: BI1070

REQUIRED TEXT/RESOURCE MATERIALS:

Moyes, C. D., and Schulte, P. M. 2015.
Principles of Animal Physiology, Third Edition. Pearson Education, Don Mills, ON. (Highly recommended but not required).

DELIVERY MODE(S): Lecture: 11.30 - 12.50 a.m. (J204)
Seminar 8.30 - 9.20 a.m. Friday (J228)

COURSE OBJECTIVES:

This course will cover cell signaling and endocrine regulation, neuron structure and function, nervous systems, muscles and locomotion, immune systems, and reproductive physiology. Students will gain an understanding of these systems through lectures, tutorial work, assigned readings, discussions, laboratory exercises, and student presentations.

LEARNING OUTCOMES:

By the end of the course, students should be able to:

- Compare and contrast the major chemical classes of signaling molecules, and explain how these molecules communicate their signals to a target cell.
- Compare the general features of the most common types of signal transduction pathways.
- Describe the structure of neurons and how they receive and transmit electrical and chemical signals.
- Compare and contrast the actions of different classes of neurotransmitters.
- Describe the organization of the nervous systems of the major animal phyla.
- Describe how the vertebrate brain helps to maintain homeostasis in various physiological systems.
- Describe the mechanisms involved in sensory perception, including chemoreception, mechanoreception, photoreception, thermoreception, electroreception, and magnetoreception.
- Explain the sliding filament model of muscle contraction.
- Discuss the anatomical and physiological differences among major muscle types, including modified muscles.
- Describe the relationship between energy metabolism and locomotion, and discuss the factors that affect the energetic costs of movement.
- Explain how immune cells detect and respond to foreign molecules and cells.
- Compare the roles of major types of immune cells and describe the events that occur in an immune response.
- Explain the roles of various vertebrate and invertebrate reproductive hormones, explain the origins of sex determination in major animal groups, and compare and contrast the events surrounding fertilization in major animal groups.

TRANSFERABILITY:

Please consult the Alberta Transfer Guide for more information. You may check to ensure the transferability of this course at the Alberta Transfer Guide main page <http://www.transferalberta.ca>.

**** 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**

EVALUATIONS:

Seminar 30%*

Midterm Exam I 20%

Midterm Exam II 20%

Final Exam 30% (TBA, held during final exam period)

*The seminar grade will consist of a presentation and accompanying short paper worth 10%, two written assignments worth 5% each, and four online assignments (10%).

All exam dates will be announced in class

GRADING CRITERIA: (The following criteria may be changed to suite the particular course/instructor)

Please note that most universities will not accept your course for transfer credit **IF** your grade is **less than C-**.

Alpha Grade	4-point Equivalent	Percentage Guidelines		Alpha Grade	4-point Equivalent	Percentage Guidelines
A+	4.0	90-100		C+	2.3	67-69
A	4.0	85-89		C	2.0	63-66
A-	3.7	80-84		C-	1.7	60-62
B+	3.3	77-79		D+	1.3	55-59
B	3.0	73-76		D	1.0	50-54
B-	2.7	70-72		F	0.0	00-49

COURSE SCHEDULE/TENTATIVE TIMELINE:

Topics

- **Cell Signaling and Endocrine Regulation (Chapter 4)**
 - General features of cell signaling
 - Peptide, steroid, amine, lipid, gas, and purine chemical messengers
 - Signal transduction pathways
 - Endocrine systems and their evolution
- **Neuron Structure and Function (Chapter 5)**
 - Signaling in vertebrate motor neurons
 - Diversity of neural signaling
- **Functional Organization of Nervous Systems (Chapter 8)**
 - Evolution of nervous systems
 - The central nervous system of vertebrates
 - The peripheral nervous system of vertebrates
 - Integrative functions of nervous systems
- **Sensory Systems (Chapter 7)**
 - General properties of sensory reception
 - Chemoreception, mechanoreception, photoreception, thermoreception, electroreception, and magnetoreception.
- **Cellular Movement and Muscles (Chapter 6)**
 - Cytoskeleton and motor proteins
 - Muscles: Function of skeletal, smooth and cardiac muscles

- Invertebrate muscles
- Locomotion (Chapter 12)
 - Locomotor systems
 - Moving in the environment
- Immune Systems (Chapter 10)
 - Innate Immunity
 - Adaptive immunity of vertebrates
 - Integration with other physiological systems
- Reproductive Physiology (Chapter 16)
 - Reproductive endocrinology
 - Gametogenesis and fertilization
 - Regulation of reproduction and development in mammals.

STUDENT RESPONSIBILITIES: Students are expected to attend all classes and complete all assigned readings. Failure to write an exam will result in a grade of zero unless appropriate documentation is provided.

STATEMENT ON PLAGIARISM AND CHEATING:

Cheating and plagiarism will not be tolerated and there will be penalties. For a more precise definition of plagiarism and its consequences, refer to the Student Conduct section of the Northwestern Polytechnic Calendar at <https://www.nwpolytech.ca/programs/calendar/> or the Student Rights and Responsibilities policy which can be found at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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