

DEPARTMENT OF SCIENCE

COURSE OUTLINE – Winter 2024

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: Dr. Jessie Zgurski **PHONE:** 780-539-2863
OFFICE: J221 **E-MAIL:** JZgurski@nwpolytech.ca
Monday 1:00 PM – 4:00 PM, Wednesday 11:00 AM – 2:00 PM, Friday
OFFICE HOURS: 11:00 AM – 2:00 PM, 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.

DELIVERY MODE(S): This course is being offered as an independent study course. Weekly readings, assignments, videos, and study guides will be provided to students on the course D2L page. The instructor will contact students weekly to check their progress and answer any questions or concerns they may have. Additionally, exams will be conducted in-person.

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.alberta.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: Midterm: 30%

Final Exam: 30% (During exam week)

Quizzes: 20% (6, Online and Open Book)

Reading Assignments: 20%

GRADING CRITERIA

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	95-100	C+	2.3	67-69
A	4.0	85-94	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:

- Cell Signaling and Endocrine Regulation (Chapter 4) (Weeks 1 – 2)
 - 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) (Weeks 3 – 4)
 - Signaling in vertebrate motor neurons
 - Diversity of neural signaling
- Functional Organization of Nervous Systems (Chapter 8) (Weeks 5 – 6)
 - 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) (Weeks 7 – 8)
 - General properties of sensory reception
 - Chemoreception, mechanoreception, photoreception, thermoreception, electroreception, and magnetoreception.
- Cellular Movement and Muscles (Chapter 6) (Weeks 9 – 10)
 - Cytoskeleton and motor proteins
 - Muscles: Function of skeletal, smooth and cardiac muscles

- Invertebrate muscles
- Locomotion (Chapter 12) (Weeks 10 – 11)
 - Locomotor systems
 - Moving in the environment
- Immune Systems (Chapter 10) (Weeks 11 – 12)
 - Innate Immunity
 - Adaptive immunity of vertebrates
 - Integration with other physiological systems
- Reproductive Physiology (Chapter 16) (Weeks 13 – 15)
 - Reproductive endocrinology
 - Gametogenesis and fertilization
 - Regulation of reproduction and development in mammals.

STUDENT RESPONSIBILITIES: Students may complete assigned readings and videos at a time that is convenient for them. Please complete quizzes and assignments by the deadlines. Students will be permitted to bring one page of notes into the exams.

STATEMENT ON ACADEMIC MISCONDUCT:

Academic Misconduct will not be tolerated. For a more precise definition of academic misconduct and its consequences, refer to the Student Rights and Responsibilities policy available at <https://www.nwpolytech.ca/about/administration/policies/index.html>.

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