



DEPARTMENT OF SCIENCE

COURSE OUTLINE – WINTER 2019

BI2210 (A3) – MECHANISMS OF EVOLUTION – 3 (3-0-0), 45 hours

INSTRUCTOR: Dr. Jessie Zgurski **PHONE:** 780-539-2863 (Office)
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OFFICE HOURS: Mon/Tues/Thurs 1:00 – 5:00 PM

CALENDAR DESCRIPTION: Discusses the major features of the evolutionary process, including the fossil record, basic population genetics, variation, natural selection, adaptation and speciation.

PREREQUISITE(S)/COREQUISITE: BI1070 and BI1080.

REQUIRED TEXT/RESOURCE MATERIALS:

None; Required readings will be placed on Moodle.

DELIVERY MODE: Lectures – Wed/Fri 1:00 – 2:20 PM

COURSE OBJECTIVES: Upon completion of this course, the student should:

- Appreciate the role and importance of evolutionary biology within modern biology and within science;
- Understand the different lines of evidence for evolution as well as the areas where more research is needed;
- Understand the various modes of evolution and the mechanisms by which they occur; and
- Read scientific papers in evolutionary biology with a good level of comprehension.

LEARNING OUTCOMES:

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

1. Describe the history and development of evolutionary thought.
2. List and describe evidence for evolution from different fields of study, including paleontology, genetics, ecology, and developmental biology.
3. Describe the mechanisms by which evolution occurs, and explain the potential effects of mutation, migration, genetic drift, non-random mating, and natural selection on the genetics of a population.
4. Explain the methodologies used to reconstruct phylogenetic trees, and use freely-available software to reconstruct a phylogenetic tree from DNA sequence data.
5. Describe the processes and mechanisms that lead to speciation.
6. Explain the process of sexual selection and describe examples of how it has shaped the morphology and behavior of different animal species.

TRANSFERABILITY:

*Please consult the Alberta Transfer Guide for more information

(www.albertatransfer.com)

** 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 – 25% (February 27)

Final exam – 30% (Date TBA)

Phylogenetics Assignment – 5% (January 25)

Population Genetics Assignment – 5% (February 15)

Speciation Assignment – 10% (March 15)

Research Paper – 15% (April 3)

Participation and Attendance – 10%

The final exam will take place during the scheduled exam period.

GRADING CRITERIA:

Please note that most universities will not accept your course for transfer credit if your grade is less than C-. Do not get less than a "C-" if you plan to transfer to a university.

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:

Topics

- Introduction to BI2210.
- The history and development of modern evolutionary thought.
 - Evolutionary thinking before Darwin.
 - Darwin's Theory: Evolution via Natural Selection.
 - The Evolutionary Synthesis
 - Fundamental principles of biological evolution.
- Taxonomic practice, phylogenies and tree-thinking.
 - Assignment: Inferring Phylogenies from Molecular Data: 5% (Jan 25)*
- Natural Selection and Adaptations
 - Observing and studying adaptive evolution.
 - What not to expect of natural selection.
- How Evolution Occurs:
 - The Raw Material for Selection: Mutation and Genetic Variation
 - Genetical Theory of Natural Selection
 - Phenotypic Evolution
 - Genetic Drift
 - Gene Flow and Dispersal
 - Assignment: Population Genetics Questions 5% (Feb 15)*
- Species and Speciation
 - Species concepts
 - Reproductive Isolation and the Geography of Speciation
 - Assignment: Speciation (Mar 15)*
- Sex and Sexual Selection

- Evolution of sexual reproduction
- Why are (usually) males sexually selected?
- Sexual selection by male-male competition and female choice.
- Mating systems and strategies
- Life history and parental care
 - Life history evolution.
 - Senescence.
- Cooperation and conflict
 - Cooperation and aggression.
 - Kin selection.
- Evolution and Development
 - Gene regulation
 - *Hox* genes
- Macroevolutionary patterns

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 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.