



**DEPARTMENT OF SCIENCE**

**COURSE OUTLINE – WINTER 2020**

**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:** J221      **E-MAIL:** JZgurski@gprc.ab.ca  
**OFFICE HOURS:** Mon, Tues 2 – 5 PM, Wed 2:30 – 5 PM, Thurs 11:30 AM – 1:30 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:** BI1080.

**REQUIRED TEXT/RESOURCE MATERIALS:** Futuyma, D. J., and Kirkpatrick, M. 2017. Evolution, Fourth Edition. Sinauer Associates, Inc. Sunderland, Massachusetts. (**Recommended**)

**DELIVERY MODE:** Lectures: Wed. and Fri. 1:00 – 2:20 PM in L229.

**COURSE OBJECTIVES:** Upon completion of this course, students should:

- Appreciate the role and importance of evolution 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 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.

## TRANSFERABILITY:

\*Please consult the Alberta Transfer Guide for more information ([www.albertatransfer.com](http://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 – 20 %  
Final exam – 30 %  
Assignments (X 4) – 25%  
Research Paper or Presentation – 15%  
Participation – 10 %

Instructions and due dates for the midterm and the assignments will be announced in class. The final exam will take place during the scheduled exam period, which runs from April 15 – April 25, 2020 (including evenings and Saturdays). Failure to write the midterm or final exam will result in a grade of zero unless the exam was missed for a compelling reason (such as illness). In such a case, the exam will be deferred.

## 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:

Topic	Textbook Chapters
1. Introduction to BI2210	N/A
2. 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.	Chapter One
3. Taxonomic Practice, Phylogenies and Tree-Thinking.	Chapter Two
4. How Evolution Occurs: - The Raw Material for Selection: Mutation and Genetic Variation	Chapters Four to Seven

<b>Topic</b>	<b>Textbook Chapters</b>
<ul style="list-style-type: none"> <li>- Genetical Theory of Natural Selection</li> <li>- Phenotypic Evolution</li> <li>- Genetic Drift</li> <li>- Gene Flow and Dispersal</li> </ul>	
5. Species and Speciation <ul style="list-style-type: none"> <li>- Species Concepts</li> <li>- Reproductive Isolation and the Geography of Speciation</li> </ul>	Chapters Eight & Nine
6. Sex and Sexual Selection <ul style="list-style-type: none"> <li>- The Evolution of Sex</li> <li>- Sex Determination</li> <li>- Sexual Selection and Alternative Mating Strategies</li> </ul>	Chapter Ten
7. How to be Fit <ul style="list-style-type: none"> <li>- Life History and Parental Care</li> <li>- Cooperation and Conflict</li> </ul>	Chapter Eleven to Thirteen
8. Evolution of Genes and Genomes, and “Evo-Devo”	Chapters Fourteen & Fifteen

**STUDENT RESPONSIBILITIES:** Students are expected to attend classes, and complete all assignments. Refer to the College Policy on Student Rights and Responsibilities at [https://www.gprc.ab.ca/about/administration/policies/#academic\\_policies](https://www.gprc.ab.ca/about/administration/policies/#academic_policies)

**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/\\*\\*](http://www.gprc.ab.ca/about/administration/policies/**)

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

**Additional Information:** Copies of the lecture Powerpoint presentations will be made available on Moodle. I recommend printing out copies of the Powerpoint files prior to class and writing additional notes on them during lecture. Other learning resources, including practice exam questions and supplemental articles to read, will be added to the page during the semester.