



BIOL 301 - 101
Evolutionary Principles and Methods

2023W T2 [spring 2024]
MonThurs 11:00am - 12:30pm

Instructor:

Dr. Matthew K Nelson

SCI 160

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<http://www.natureboy.com>

Office Hours:

Course Description:

BIOL 301 (3 Credits) (Evolutionary Principles and Methods)

An exploration of the field of Evolutionary Biology as an ongoing scientific endeavour. Current research methodology and development of concepts relating to the study of evolutionary change, adaptation, and the history of life will be examined. Credit will not be granted for both BIOL 301 and BIOL 250.

Prerequisite: BIOL 201

Corequisite: none

Course Overview:

This course will explore the fundamental concepts of evolution and phylogenetics. We will discuss the foundation of the modern evolutionary synthesis as well as the ways in which phylogenies are reconstructed. Throughout the course we will also illustrate advances in modern scientific techniques relevant to studies of phylogeny and evolution.

Course Objectives:

It is the goal of this course to expose students to a deeper level of knowledge of evolutionary processes. Understanding basic evolutionary processes is of key importance. In addition, students should gain an understanding of the ways in which evolutionary processes are studied and phylogenies are reconstructed.

Learning outcomes:

By the end of this course, students should understand and be able to discuss:

- basic evolutionary processes
- origins of genetic variation
- natural selection, gene flow, genetic drift, and population structure
- processes associated with sexual selection
- species concepts and speciation
- phylogenetics/systematics



Course Format:

This course is a standard lecture course. You will also have some “in-class” assignments on the textbook companion website to complete. Exams will be given in person, and will be closed book, of course.

Canvas modules will help guide you through the course material. From time to time I may post supplementary material on **natureboy.com (this will all be linked to from Canvas)**. **Canvas** will be used to post announcements and to provide course-related material. It is your responsibility to check the Canvas site at least once a week.

Required Materials:

Futuyma 2017. *Evolution*. Fourth Edition. Sinauer. This text is **NOT REQUIRED**, but the tentative schedule (p. 2) does indicate supplementary readings from the text associated with each lecture topic. We will also use free online resources associated with the text as a part of in-class assignments.

EvoBeaker software package, SimBiotic Software (**REQUIRED**). We will use *EvoBeaker* computer simulation exercises in this course to deepen your understanding of evolutionary concepts. These exercises were developed with funding from the US National Science Foundation to help introduce evolutionary thinking and provide opportunities to develop your skills in hypothesis generation and testing.

Course Evaluation:

in class assignments	15%	
EvoBeaker exercises	25%	
Midterm	25%	
Final	35%	TBA
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Total	100%	

Final grades will be based on the evaluations listed above and the final grade will be assigned according to the standardized grading system outlined in the UBC Okanagan Calendar.

Note: Any requests for changes to final exams must be sent to the office of the Associate Dean of Students (bsasdeansoffice.ubco@ubc.ca).

Final Examination:

Students are expected to make themselves available to write final exams at the scheduled times. In the event of an exam clash (i.e., two exams schedule at the exact same date and time) students must inform the instructors as soon as possible, so that alternate arrangements can be made. In the event of an exam hardship (i.e., 3 or more exams that start and end in a 27-hour period, must notify the instructor of the second formal examination no later than one month prior to the examination date for courses in the Winter Session (whether in December for Term 1 or April for Term 2), and no later than two weeks prior to the



examination date for courses in the Summer Session. For more information, please see the BC Okanagan Academic calendar, regarding exam clashes and hardships.

Note: Any requests for changes to final exams must be sent to the office of the Associate Dean of Students (bsasdeansoffice.ubco@ubc.ca).

Missed Assignments and Exams:

From UBC Okanagan Academic Calendar/Policies and Regulations/Academic Concession:

“Students who, because of unforeseen events, are absent during the term and are unable to complete tests or other graded work, should normally discuss with their instructors how they can make up for missed work, according to **written guidelines given to them at the start of the course**. Instructors are not required to make allowance for any missed test or incomplete work that is not satisfactorily accounted for. If ill health is an issue, students are encouraged to seek attention from a health professional. Campus Health and Counselling will normally provide documentation only to students who have been seen previously at these offices for treatment or counselling specific to conditions associated with their academic difficulties. Students who feel that requests for consideration have not been dealt with fairly by their instructors may take their concerns first to the Head of the discipline, and if not resolved, to the Office of the Dean. Further information can be found at:

<http://www.calendar.ubc.ca/okanagan/index.cfm?tree=3,48,0,0>.

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Tentative Lecture Schedule:

TARGET DATE	TOPIC / In-class Assignment	READINGS	EVOBEAKER Assignments
JAN 8	SYLLABUS		
JAN 11	history and intro to evolutionary biology	CH 1	
JAN 15	tree of life	CH 2	
JAN 18	natural selection and adaptation	CH 3	
JAN 22	mutation and variation	CH 4	
JAN 25	<i>practice problems</i>		
JAN 29	<i>NO CLASS - at home assignment 4.1</i>		
FEB 1	genetics and natural selection	CH 5	
FEB 5	effects of natural selection on variation	CH 5	
FEB 8	<i>in class assignment 5.1</i>		
FEB 12	phenotypic evolution	CH 6	
FEB 15	genetic drift	Ch 7	
FEB 19-23	<i>midterm break</i>		
FEB 26	<i>in class assignment 7.1</i>		EvoBeaker: SNAILS workbook due
FEB 29	MIDTERM EXAM		
MAR 4	spatial evolution/speciation	CH 8-9	
MAR 7	<i>in class assignment 9.3</i>		
MAR 11	sexual selection	CH 10	
MAR 14	<i>in class assignment 10.2</i>		
MAR 18	fitness and life history	CH 11	
MAR 21	<i>in class assignment 11.1</i>		
MAR 25	cooperation and conflict	CH 12	
MAR 28	species interactions	CH 13	
APR 1	inferring phylogenies	CH 16	
APR 4	<i>in class assignment 16.1</i>		
APR 8	macroevolution	CH 20	EvoBeaker: HIV CLOCK workbook due
APR 11			
TBA	FINAL EXAM		



Academic Integrity:

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the break-down of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

A more detailed description of academic integrity, including the policies and procedures, may be found at: <http://okanagan.students.ubc.ca/calendar/index.cfm?tree=3,54,111,0>

If you have any questions about how academic integrity applies to this course, please consult with your professor.

Disability Resource Centre

The Disability Resource Centre (DRC) facilitates disability-related accommodations and programming initiatives that ameliorate barriers for students with disabilities and/or ongoing medical conditions. If you require academic accommodations to achieve the objectives of a course, please contact the DRC at:

UNC 215 250.807.8053

Email: drc.questions@ubc.ca

Web: <https://students.ok.ubc.ca/academic-success/disability-resources/>

Equity and Inclusion Office

Through leadership, vision, and collaborative action, the Equity & Inclusion Office (EIO) develops action strategies in support of efforts to embed equity and inclusion in the daily operations across the campus. The EIO provides education and training from cultivating respectful, inclusive spaces and communities to understanding unconscious/implicit bias and its operation within in campus environments. UBC Policy 3 prohibits discrimination and harassment on the basis of BC's Human Rights Code. If you require assistance related to an issue of equity, educational programs, discrimination or harassment please contact the EIO.

UNC 325H 250.807.9291

Email: equity.ubco@ubc.ca

Web: <https://equity.ok.ubc.ca/>

Resources for Indigenous Students:

Indigenous Programs & Services provides community and culturally appropriate services and support to First Nation, Métis, and Inuit Students. You belong here.



The Indigenous Centre, located on the second floor of the University Centre building (UNC 210), provides a sense of belonging and community to First Nations, Métis, and Inuit students. This home away from home is committed to enriching the quality of the student experience for Indigenous students by promoting access, providing capacity building opportunities, and celebrating success.

Website: <https://students.ok.ubc.ca/indigenous-students/>

Office of the Ombudsperson for Students

The Office of the Ombudsperson for Students is an independent, confidential and impartial resource to ensure students are treated fairly. The Ombuds Office helps students navigate campus-related fairness concerns. They work with UBC community members individually and at the systemic level to ensure students are treated fairly and can learn, work and live in a fair, equitable and respectful environment. Ombuds helps students gain clarity on UBC policies and procedures, explore options, identify next steps, recommend resources, plan strategies and receive objective feedback to promote constructive problem solving. If you require assistance, please feel free to reach out for more information or to arrange an appointment.

UNC 217 250.807.9818

Email: ombuds.office.ok@ubc.ca, Web: www.ombudsoffice.ubc.ca

Student Learning Hub

The Student Learning Hub is your go-to resource for free math, science, writing, and language learning support. The Hub welcomes undergraduate students from all disciplines and year levels to access a range of supports that include **tutoring in math, sciences, languages, and writing, as well as help with academic integrity, study skills and learning strategies**. Students are encouraged to visit often and early to build the skills, strategies and behaviours that are essential to being a confident and independent learner. For more information, please visit the Hub's website.

LIB 237 250.807.8491

Email: learning.hub@ubc.ca

Web: <https://students.ok.ubc.ca/academic-success/learning-hub/>

Student Wellness

At UBC Okanagan health services to students are provided by Student Wellness. Nurses, physicians and counsellors provide health care and counselling related to physical health, emotional/mental health and sexual/reproductive health concerns. As well, health promotion, education and research activities are provided to the campus community. If you require assistance with your health, please contact Student Wellness for more information or to book an appointment.

UNC 337 250.807.9270

Email: healthwellness.okanagan@ubc.ca

Web: <https://students.ok.ubc.ca/health-wellness/>



THE UNIVERSITY OF BRITISH COLUMBIA

Independent Investigations Office (IIO):

If you or someone you know has experienced sexual assault or some other form of sexual misconduct by a UBC community member and you want the Independent Investigations Office (IIO) at UBC to investigate, please contact the IIO. Investigations are conducted in a trauma informed, confidential and respectful manner in accordance with the principles of procedural fairness. You can report your experience directly to the IIO (investigationsoffice.ubc.ca):

Email: director.of.investigations@ubc.ca

Telephone: 604.827.2060

SAFEWALK

Don't want to walk alone at night? Not too sure how to get somewhere on campus? Call Safewalk at

250-807-8076.

For more information, see: <https://security.ok.ubc.ca/safewalk/>