Evolutionary Genetics – Biology 3466B
Course Outline

1. Course Information

Course Information

Evolutionary Genetics (Biology 3446B) consists of in-person lectures and tutorial labs. During the winter of 2025, the lectures will be held in on Mondays and Thursdays from 9:30-10:30 am. There will be two lab sessions on Tuesdays (1:30-4:30 pm) and Wednesdays (2:30-5:30 pm), with some weeks being lab-free, depending on the schedule.

List of Prerequisites

Prerequisite(s): One of Biology 2244A/B, Statistical Sciences 2244A/B, the former Psychology 2810; Biology 2581A/B; or permission of the Department.

Unless you have either the requisites for this course or written special permission from your Dean's Designate (Department/Program Counsellors and Science Academic Advisors) to enroll in it, you may be removed from this course, and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor and TA Information

Instructor	**Email**	**Office**	**Office Hours**	
MSc. Sarah Santos	sarah.santos@uwo.ca		By appointment only*	
Teaching Assistants	**Email**	**Section**	**Tutorial Location**	**Office Hours**
Tommy Galfano	tgalfano@uwo.ca	002		In tutorial
Zach Balzer	zbalzer@uwo.ca	003		In tutorial

Students must use their Western (@uwo.ca) email addresses when contacting the instructor and TAs. Emails originating from other email addresses will not be responded to.
*Office hours can be held in person or via Zoom.
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3. Course Syllabus, Schedule, Delivery Mode

Goals of the Course
BIO3466B provides an overview of evolutionary processes. It focuses on studying evolution in large and small random and non-random mating populations, showing discrete and quantitative inheritance. This course covers the roles and importance of mutation, inbreeding, genetic drift, selection, and linkage. The

emphasis here is to encourage a more fundamental understanding of the basic relationship between alleles, genotypes, phenotypes, and the environment in which populations are present. Practical examples are provided in the labs to explore the theory behind these concepts. These labs are simple take-home computer exercises that allow analyzing the data, testing predictions, interpreting results to answer assignment questions, and presenting these findings as a short lab report.

The lecture content is based on a textbook and the labs. The following topics will be covered in these lectures: the historical origin and development of evolutionary ideas; measures of genetic variation; the process of natural selection, including its organizational complexity and levels; the neutral theory of evolution; direct and indirect fitness; major evolutionary transitions; types of mutations; genetic load; migration and genetic drift; the coalescence theory; inbreeding and outbreeding; quantitative genetics; broad and narrow sense heritability; phylogeny and genomics.

Learning Outcomes

- Recognize and articulate key concepts and aspects of evolutionary genetics, such as general rules that govern population-level changes, measures of genetic variation, allele frequency changes and their effects, and fitness consequences at different levels, among others;
- Generate and analyze data using Microsoft Office Excel and statistical tests;
- Interpret and present results in writing format.

Lecture information: Lectures will be delivered in person on Mondays and Thursdays from 9:30-10:30 am (WIRB-1170). Slides will be posted to the OWL Brightspace prior to lectures.

Lab session schedule and details: Your assigned lab sessions are held on Tuesdays (1:30-4:30 pm) and Wednesdays (2:30-5:30 pm). Lab assignments are posted a week before the deadline and are due the following Friday via the OWL Brightspace Assignments tool.

Date	Lab details	Deadline
Jan 6-10	No lab	
Jan 13-17	No lab	
Jan 20-24	**Lab 1:** Getting acquainted with Excel and with the Hardy-Weinberg model	**Jan 24th at 2:30 pm**
Jan 27-31	**Lab 2:** Hardy-Weinberg Disequilibrium and the Wahlund effect	**Jan 31st at 2:30 pm**
Feb 3-7	No lab	
Feb 10-14	**Lab 3:** Testing HW equilibrium in finite populations	**Feb 14th at 2:30 pm**
Feb 17-21	Reading week	
Feb 24-28	**Lab 4:** Demonstration of Fisher's Theorem with asexual organisms	**Feb 28th at 2:30 pm**
Mar 3-7	No lab	
Mar 10-14	**Lab 5:** Multiple alleles, overdominance, adaptive landscapes, and mutation	**Mar 14th at 2:30 pm**
Mar 17-21	**Lab 6:** Random genetic drift; Non-random mating and inbreeding	**Mar 21st at 2:30 pm**
Mar 24-28	No lab	
Mar 31-Apr 4	No lab	

Key Sessional Dates are listed below for the winter term:

- Classes begin: January 6, 2025;
- Spring Reading Week: February 15-23, 2025;
- Classes end: April 4, 2025;
- Exam period: April 7-30, 2025;

4. Course Materials

Required textbook: Molecular Population Genetics, Matthew W. Hahn (2019 edition; Oxford University Press). Hardcopy textbooks ($163.20) and eBooks ($73.00) will be available through the Book Store website:

- https://bookstore.uwo.ca/textbook-search?campus=UWO&term=W2024B&courses%5B0%5D=001_UW/BIO3466B;
- Students are welcome to purchase second-hand editions of this textbook.

All other course material will be posted to OWL: https://westernu.brightspace.com/

- **Course Policies:** All course materials, assignments, and exams posted on Brightspace or presented are the intellectual property of your instructor and course and for your personal use only. Audio and/or visual recording is not permitted (unless otherwise allowed by the instructor) and should not be shared.

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Technical Requirements:
This course requires the following:

- Laptop or computer
- Microsoft Office Excel and Word

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Assignments (6)	24% (Lab reports are 4% each)
Midterm Test	32% (2 hours – date to be determined)
Final Exam	44% (3 hours – date to be determined)

Essential Learning Requirements

Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade.

- At least four lab assignments (out of six) must be completed;
- The final exam must be completed. A makeup exam shall be arranged upon formal academic consideration being granted;
- Students must obtain a minimum of 50% or higher on the final exam to demonstrate mastery of the contents and pass the course.

Lab Assignments (due dates and submission)

Lab assignments must be submitted electronically using Brightspace's designed space on the following dates:

- Lab 1 (4%): January 24th at 2:30 pm;
- Lab 2 (4%): January 31st at 2:30 pm;
- Lab 3 (4%): February 14th at 2:30 pm;
- Lab 4 (4%): February 28th at 2:30 pm;
- Lab 5 (4%): March 14th at 2:30 pm;
- Lab 6 (4%): March 21st at 2:30 pm.

Evaluation Scheme for Late Lab Assignments

Late assignments (without accommodation) will be accepted for **one week** following the due date. The late assignment will be deducted 5% in the first 24 hours. A penalty of 10% will be deducted per day thereafter. Late assignments with approved academic consideration will not be penalized during the period approved.

General information about missed coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests normally must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Examinations scheduled during official examination periods (Defined by policy)

- Midterm (Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration)

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Evaluation Scheme for Missed Assessments

- All **Lab Assignments** are due by the deadline established and indicated on Brightspace. Late penalties are applied as explained above (see "Evaluation Scheme for Late Lab Assignments"). If one assignment is missed, this shall be counted towards another assignment with the highest mark (see "Coursework with Assessment Flexibility"). Students that miss more than one assignment and obtain Academic Considerations will be able to submit the assignment at a later date.
- If a student misses the **Midterm Exam** and has academic accommodation, a makeup exam will be held on another date. If the student cannot attend the makeup exam before the release of answers, their final exam will be reweighted to include the missed Midterm.
- When a student misses the **Final Exam** and their Academic Consideration has been granted, they will be allowed to write the Special Examination (the name given by the University to a makeup Final Exam). See the Academic Calendar for details (under Special Examinations), especially for those who miss multiple final exams within one examination period.

Coursework with Assessment Flexibility
By policy, instructors may deny Academic Consideration requests for the following assessments with built-in flexibility:

Flexible Completion
Lab Assignments. This course has **six** assignments, all counted towards your final grade. Should extenuating circumstances arise, students do not need to request Academic Consideration for the **first one** missed assignment. This missed assignment (4%) will be reweighted to your highest lab assignment mark (making it worth 8% instead). Academic consideration requests will be denied for the first one missed assignment. Academic Consideration requests (with documentation) may be granted when students miss more than one assignment, and these additional (2^{nd}, 3^{rd}, etc) missed assignments will be allowed to be submitted at a later date.

6. Additional Statements

Religious Accommodation
When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

Accommodation Policies
Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

Academic Policies
The website for Registrar Services is https://www.registrar.uwo.ca/.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

You may use a non-programmable calculator for the midterm and final exam.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (http://www.turnitin.com).

Support Services
Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (https://learning.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.