



Department of Biology

BIOL 4259A Biostatistics

Fall 2026

Course Information

Lecture & lab content: in person

Lecture hours: 2 h per week

Lab hours: 3 h per week

BIOL 4259A is taught jointly with BIOL 9915A; however, the undergraduate and graduate courses are assessed separately and have distinct requirements.

List of prerequisites

Biology/Statistics 2244A/B and completion of at least 1.5 Biology courses at the 3000 level or above.

Essential concepts you should be knowledgeable about from Bio2244: sample, probability distribution, p-value, t-test, null vs. alternative hypothesis.

Unless students have either the prerequisites for this course or written special permission from the Department of Biology to enroll in it, they may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on their academic record. This decision may not be appealed.

2. Instructor Information

Professor XXX

In-person or Zoom office hours by appointment during scheduled lab times.

TA information will be posted on OWL.

Students emailing their instructors and TA directly must use their Western (@uwo.ca) email addresses.

Mode of delivery

In person. Supplementary course material will be posted on OWL Brightspace:

<https://westernu.brightspace.com/>.

For each 1 hour of lecture time, expect to spend 2 hours of out-of-class study time.

3. Course Syllabus, Schedule, Delivery Mode

Statistical methods are tools that allow us to answer questions and learn about the world around us from samples of data, because we can never have complete information about a problem. As a biologist you might apply analysis of variance to learn about the effects that different diseases have on plant growth, linear regression to explore the impacts of climate change on species diversity, or logistic regression to understand the factors affecting an animal's presence on the landscape. This course aims to help students understand, conduct, and present biological research using statistics. The emphasis will be on basic theory and practical application, and will focus on the following topics: data preparation, experimental design, exploratory data analysis, general linear models, generalized linear models, and mixed models. Students will gain experience using R statistical software for effective data filtering, visualization, and analysis.

My role in this course is to guide you as you develop practical skills for the application and interpretation of statistics. The intent is not for you to learn every single statistical method. Rather, it is for you to gain confidence and skill in the use of statistics in biology.

Learning outcomes

By the end of this course you should be able to:

1. Understand, explain, and evaluate the assumptions of a statistical model.
2. Decide whether a specified statistical method is appropriate to analyze data from a given study.
3. Implement data management, visualization, and statistical analyses in R and R Studio and interpret the results.
4. Report the results of statistical analyses in language appropriate for a publication in biology.
5. Recognize the importance of ethical data practices and use of generative AI.

Class structure

This course will be taught *in person* and jointly with Bio 9915A. Topics will include:

- Learning R and R Studio
- Data awareness & data management
- Study design
- Intro statistics
- Linear models
- Multi-way linear models
- Model selection
- GLM
- Linear mixed models

First class: September 9

First lab: September 16

Reading Week: October 10–18

Last class: December 9

4. Course Materials

Required

Laptop with stable internet connection: Bring your own to lectures and labs.

Software (free):

R version 4.6.1 (<https://cran.r-project.org/>)

RStudio Desktop v2026.08.1 (<https://posit.co/download/rstudio-desktop/>)

*If you have an earlier version of R and RStudio on your laptop, I would recommend that you uninstall R, RStudio, and all libraries, and then install the most recent versions.

*You may also use R Studio Cloud, which is hosted online.

Books:

Beckerman, A.P., D.Z. Childs, O.L. Petchey. 2017. Getting Started with R: An Introduction for Biologists. 2nd edition. Oxford University Press, Oxford, UK. You must use this edition. Electronic access via the university library, ebook for rental from the bookstore (\$39.00), or textbook for purchase from the bookstore (\$79.60).

Hector, A. 2021. The New Statistics with R: An Introduction for Biologists. 2nd edition. Oxford University Press, Oxford, UK. Use of the first edition (2015) will be fine. Electronic access via the library.

Students should check OWL Brightspace (<https://westernu.brightspace.com/>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

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.

5. Methods of Evaluation

Grading scheme and assessment dates

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| 4% | Engagement, professionalism, and participation. This will be based on characteristics including, but not limited to, professionalism, integrity, attitude, independence, cooperation, improvement, and contribution during class time. |
| 21% | Quizzes (best 7 of 10 x 3% per quiz = 21%). Each quiz will be done in three phases: individually (closed book), by group, and online. For each quiz, you will receive 1% if you participate in the individual phase, 2% if you correctly answer $\geq 80\%$ of the questions on the online quiz, 1.5% if you correctly answer 70–80% of the questions, 1% if you correctly answer 60–70% of the questions, and 0% otherwise. Quizzes will normally happen weekly at the beginning of the laboratory session. |

- 40% R markdown take-home assignments (best 4 of 5 x 10% per assignment = 40%). Due dates: 25 September, 23 October, 8 November, 20 November, 4 December.
- 35% Final Exam. In person, closed book. Date TBA. Up to 20% of the final exam will differ from the Bio 9915 exam. If a student's final exam mark is higher than the combined mark for quizzes (out of 21%) or take-home assignments (40%), the weight of those components automatically shifts to the final exam.

Essential learning requirements

The following are essential to earn a passing grade in this course: a minimum of 3 take-home assignments and the final exam must be completed.

When a student has not demonstrated proficiency in an essential learning requirement listed above, and when the shortfall results from a granted Academic Consideration, they will be withdrawn (WDN) from the course. The student may appeal to the Associate Dean (Academic) for reinstatement with an Incomplete (INC) standing. Where an appeal for INC is granted, their maximum course load may be reduced during the term in which they complete the outstanding course requirements.

Use of generative artificial intelligence (AI)

Guidance for the use of generative AI tools can be found here: <https://ai.uwo.ca/Guidance/index.html>. Generative AI tools (e.g., ChatGPT, Copilot, Gemini) may be used to support learning, but students must accept the risks and understand the ethical ramifications. Ultimately, courses are opportunities to learn, and shortcuts do not facilitate learning. Everything submitted for grading is the student's responsibility. Appropriate uses in this course:

- Tutor for reinforcing the learning of the specific skills taught in this course
- Definitions of unfamiliar terms
- Brainstorming
- Occasional grammar correction & spell-checking
- Occasional translation

Inappropriate uses:

- Plagiarism
- Infringement of copyright
- Presentation of fabricated or false information
- Submission of quiz questions to obtain answers
- Drafting and revision of R code (except ggplot arguments)
- Substantive editing of writing quality (i.e., polishing).

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://uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for essential **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.

Midterms and tests

This course has no midterm test. The final exam is cumulative.

Assignments and quizzes

This course follows flexible completion guidelines. If more than 3 quizzes are missed, those marks will be allocated to the final exam. If more than one take-home assignment is missed, those marks will be allocated to the final exam.

Deadlines: the 48-hour no-late-penalty period

All take-home assignments and quizzes a stated due date include an automatic 48-hour period after the deadline during which students may still submit without a late penalty. For example, if an assignment is due on November 5, they may submit it until November 7 without penalty. After this 48-hour period, no further submissions will be accepted, and students do not need to request Academic Consideration for a missed deadline; their grade for this component will be calculated as described above.

Special examination

Per university policy, Academic Consideration requests with supporting documentation are required for the final examinations scheduled during official examination periods by the Registrar's Office.

If the student has been approved by the Academic Advising Office to write a Special Examination (SPC) and the final exam is their only outstanding course component, an SPC will be assigned to them and scheduled by the instructor per university policy.

If the student misses their SPC exam and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty. If they experienced extenuating circumstances such as prolonged illness, they may appeal to the Associate Dean (Academic), on a case-by-case basis, for the opportunity to write the final exam the next time the course is offered. An outstanding SPC will

reduce their course load for the term in which the exam is deferred, as outlined in the Definitions of Types of Examinations policy.

If the student misses their SPC exam and Academic Consideration is not approved, or was not requested, they will receive a grade of zero on the exam.

6. Additional Statements

6.1 Religious Accommodation

When a recognized religious holiday either requires a student to be absent from the University, or requires or prohibits an activity that makes it impossible for them to complete an academic requirement scheduled that day, they are entitled to accommodation. No student will be penalized for an absence for religious reasons, and an alternative means of satisfying the requirement will be arranged. This accommodation is provided in accordance with the University's policy on Accommodation for Religious Holidays: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

The student should submit their requests through the Student Absence Portal (SAP), identifying the conflict and the specific course component(s) affected (e.g., test, midterm, exam).

Quizzes: If a religious observance conflicts with a quiz, they must submit their request no later than one week before the quiz. Their instructor will arrange an early sitting of the quiz. As set out above, no makeup quiz is offered for any other reason; this early sitting is available specifically for this accommodation.

Final Examinations: If a religious observance conflicts with the final exam, the student must submit their request no later than two weeks before the exam. Their instructor will arrange a Special Examination to take place no later than one month after the end of the examination period.

Students are responsible for finding out what was covered in any class they miss due to a religious observance, and for taking the appropriate steps to keep up with the course.

If a suitable arrangement cannot be reached between a student and their instructor, they should consult the Undergraduate Chair of the department offering the course, and if necessary, the Associate Dean (Academic) of the Faculty of Science.

For a list of recognized religious observances, please visit the calendars posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca> (About Us – Resources – Additional Resources – Calendars).

6.2 Academic 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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

6.3 General Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

Use of @uwo.ca email: 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 email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formally known as “appeals”)

Policy on Request for Relief from Academic Decision:

https://uwo.ca/univsec/pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

6.4 Scholastic Offences

Policy on Scholastic Offences:

https://uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the **possession** of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, hidden cameras and wireless earbuds.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at a student's desk, on their person, or within reach during an assessment will be treated as a scholastic offence, **even if the device is not in use**.

Effective September 2026, the typical penalty for this offence is a failing grade in the course AND a 12-month prohibition on retaking the course.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is their responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is not permitted in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a scholastic offence.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is

prohibited. It is the student's responsibility to seek clarification before using any AI tools in academic work.

Use of Software for Assessments

All required assignment 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>).

6.5 Support Services

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

Mental Health Support. 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.

Gender-Based and Sexual Violence. Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If a student has experienced GBSV (either recently or in the past), they can 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.

Accessibility for Coursework. A student may contact the course instructor if they require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to them. If they have any questions regarding accommodations, they may also contact Accessible Education at http://academicsupport.uwo.ca/accessible_education/index.html

Learning Development and Success. Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help students improve their learning skills. The facility offers 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.

Student Councils.

Student-run support services are offered by the University Students' Council (<https://westernusc.ca>) and the Science Students' Council (<https://www.westernssc.ca>).