



Department of Biology
BIOL 4259F Research Hypothesis Testing
Fall 2021

Draft 9/3/2021

This course overview has been created to communicate expectations for 2021/2022 courses offered by the Biology department to help you plan your semesters. Complete and final details will be reflected in the full syllabus beginning on the following page.

Instructor/coordinator: Yolanda Morbey

Email: ymorbey@uwo.ca

Course description

The official course description can be found in the [Academic Calendar](#). Instructors may or may not adhere to the Extra Information found in the Academic Calendar in terms of the number of lecture/tutorial/lab hours. See below for more information about course delivery mode and time estimates. These time estimates do not include assessments or independent study.

Required:



Stable internet connection



Laptop or computer



Working microphone

The following **interfaces** could be used for those assessments: Owl quizzes, Owl assignments, Turnitin

Delivery mode:

Mode	Dates	Min. Time	Frequency**	Attendance
Virtual asynchronous	N/A	2-3 h	per week	N/A
In person synchronous	MW 12:30-1:30 M 2:30-5:30	2-3 h	per week	Flexible

Assessments:

Examples of assessments that **could** be assigned in this course are **highlighted in yellow**; these examples are based on previous offerings of the course and the learning outcomes that have been set.

Weekly quizzes

Written assignments

Oral presentations

Participation

Discussion forums

Groupwork

Take home tests/exams

Timed tests/exams

Proctored tests/exams



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1. General Course Information

Course Information

Lecture & lab content: blended
 Lecture hours: MW 12:30-1:30 pm, PAB 117
 Lab hours: M 2:30-5:50 pm, PAB 150

Instructor

Prof. Yolanda Morbey

TA

Scott Walters

Pre-requisites

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 you have either the requisites for this course or written special permission from your Dean 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.

Mode of delivery

Blended. All course material will be posted to OWL: <http://owl.uwo.ca>.

All course content is available online; in person demos, tutorials, and office hours will take place during class times. In person activities will change week to week, and will involve attendance by different cohorts or groups.

If students need assistance, they can seek support on the [OWL Help page](#). Alternatively, they can contact the [Western Technology Services Helpdesk](#). They can be contacted by phone at 519-661-3800 or ext. 83800.

[Google Chrome](#) or [Mozilla Firefox](#) are the preferred browsers to optimally use OWL; update your browsers frequently. Students interested in evaluating their internet speed, please click [here](#).

Online Participation and Engagement

- Students are expected to participate and engage with content as much as possible
- Students must participate by doing weekly quizzes and contributing to the Forum.

2. Instructor Information

Prof. Yolanda Morbey, ymorbey@uwo.ca

Office: BGS 2074

During the semester, all electronic correspondence about Bio 4259F should be done using the Message tool in Owl. If using an email client, students emailing their instructors directly must use their Western (@uwo.ca) email addresses.

Office hours by appointment during class hours, in person or via Zoom.

To contact the TA, please use the Message tool in Owl.

3. Course Description/Syllabus

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. Explain the assumptions of the methods studied in class.
2. Decide whether a specified method is appropriate to analyze data from a given study.
3. Implement the methods studied in class in R and interpret the results.
4. Report the results of your analysis in language appropriate for a publication in biology.

Class structure

Topics are organized by week on Owl. Each week will have a variety of study materials, including content slides, R activities, quizzes, and Forum participation:

- Data awareness & data management
- Study design
- Intro statistics
- Linear models
- Multi-way linear models
- Model selection

- GLM
- Poisson regression
- Logistic regression
- Linear mixed models

Classes begin: September 8

Reading Week: November 1-7

Classes end: December 8

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Required

Laptop: Bring your own to lectures and labs.

Software (free):

R version 4.1.0 (May 2021) (<https://cran.r-project.org/>)

RStudio Desktop 1.4 (<https://www.rstudio.com/products/rstudio/download/>)

*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:

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 (2015 edition) or available for purchase at the bookstore.

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 library or available for purchase at the bookstore.

Book store: https://bookstore.uwo.ca/textbook-search?campus=WUO&term=W2021A&courses%5B0%5D=200_UW/BIO4259F

Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news, updates, and in-person schedules. 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.

Technical Requirements

Stable internet connection, computer with working microphone (for Zoom office hours).

5. Methods of Evaluation

Assessment

25% Engagement, professionalism, and participation. The majority of this mark will come from participation in weekly quizzes, in-person activities, group work, forum activities (2% per week x 11 weeks = 22%). For each weekly quiz, you will receive 1% if you correctly answer $\geq 60\%$ of the questions on your first attempt. For each weekly forum question, you will receive 1% for participation. The remaining 3% will be assigned at the end of term by the instructor and TA, and is based on characteristics including, but not limited to, professionalism, integrity, attitude, independence, cooperation, improvement, and contribution.

40% Independent project: complete instructions are available in Week 8.

Bio 4259F: Research Proposal & Presentation (you must pass this assignment to pass the course).

Deadline: See Owl for deadlines for the draft and final versions.

35% Final Exam. Open book, laptop with R Studio required. Date TBA.

- Written assignments will be submitted to Turnitin (statement in policies below)
- Students will have 1 submission to Turnitin
- Rubrics will be used to evaluate assessments and will be posted with the instructions
- After an assessment is returned, students should wait 24 hours to digest feedback before contacting their evaluator

Click [here](#) for a detailed and comprehensive set of policies and regulations concerning examinations and grading. The table below outlines the University-wide grade descriptors.

A+	90-100	One could scarcely expect better from a student at this level
A	80-89	Superior work which is clearly above average
B	70-79	Good work, meeting all requirements, and eminently satisfactory
C	60-69	Competent work, meeting requirements
D	50-59	Fair work, minimally acceptable
F	below 50	Fail

6. Accommodated Evaluations

Deadlines to participate in online quizzes and forum discussions will be subject to a one week grace period when late penalties will not be deducted. After this grace period, participation marks will not be granted unless accommodation is granted for the entire one week grace period + the period since the deadline. An SRA cannot be used to extend due dates for online quizzes and forum discussions, as these are only 48 h in duration.

A similar one-week grace period will apply to the draft version of the independent project. An SRA cannot be used to extend the due dates for the draft version of the independent project, as these are only 48 h in duration.

No grace period will apply to the final version of the research proposal and presentation, as these due dates are already as late as they can be in the semester.

Academic Consideration for Student Absences

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes (NOT through their course instructors):

(i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:

- an absence must be no more than 48 hours
- the assessments must be worth no more than 30% of the student's final grade
- no more than two SRAs may be submitted during the Fall/Winter term

(ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.

(iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the absence.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.

Formal accommodations for absences will apply only to missed requirements during the period of absence. **Due dates will be extended by the number of days absent using this formula:**

New due date = last day of absence + # days absent prior to original due date

Example:

Original due date = Nov 10, 11:55 pm

Absence = Nov 8, 12:00 am – Nov 12, 11:59 pm

Last date of absence = Nov 12

days absent prior to original due date = Nov 10 - Nov 8 + 1 = 3 days

New due date = Nov 12 + 3 = Nov 15, 11:55 pm

Upon return from an absence, all remaining due dates will remain in effect.

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

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

and for the Student Medical Certificate (SMC), see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Religious Accommodation

When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

7. EDI statement

The pronouns used by:

- Yolanda Morbey: she/her
- Scott Walters: he/him/his

8. Land Acknowledgment

We acknowledge that Western University is located on the traditional lands of the Anishinaabek, Haudenosaunee, Lūnaapéewak and Attawandaron peoples, on lands connected with the London Township and Sombra Treaties of 1796 and the Dish with One Spoon Covenant Wampum. This land continues to be home to diverse Indigenous peoples (e.g. First Nations, Métis and Inuit) whom we recognize as contemporary stewards of the land and vital contributors of our society.

More information about Indigenous Services (<https://indigenous.uwo.ca/>) and this Land Acknowledgment (<https://communications.uwo.ca/comms/land-acknowledgement/>) are available.

9. Accommodation and Accessibility

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf

10. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, 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 his/her official university address is attended to in a timely manner.

Participants in this course are not permitted to record Zoom help sessions, except where recording is an approved accommodation, or the participant has the prior written permission of the instructor.

The use of a laptop with R Studio will be allowed on the 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: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf. Students are expected to know what plagiarism is at this stage of their programme.

Turnitin ***aids*** in identifying plagiarism. 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>).

Any accusation of academic misconduct will be made on a case-by-case basis and will be based on all evidence that can be gathered (including incriminating activity on non-sanctioned apps). **All cases of academic misconduct will be reported to the Associate Chair Undergraduate, Department of Biology.** The penalty for an academic offence will be determined on a case-by-case basis. Academic offences come with the maximum penalty of failing the course and a permanent record in your transcript.

Appeals

Grades are earned and, in the interest of fairness, additional points will not be granted because you need a certain GPA or because you expected better performance from yourself. Grades will be rounded to the nearest 0.1 then to the nearest integer (79.45% will become 80%; 79.44% will become 79%).

Professionalism & Privacy:

Western students are expected to follow the [Student Code of Conduct](#). Additionally, the following expectations and professional conduct apply to this course:

- Students are expected to follow online etiquette expectations provided on OWL
- All course materials created by the instructor(s) are copyrighted and cannot be sold/shared
- Recordings are not permitted (audio or video) without explicit permission
- Permitted recordings are not to be distributed
- Students may be expected to take an academic integrity pledge before some assessments

Online Etiquette:

Some components of this course will involve online interactions. To ensure the best experience for both you and your classmates, please honour the following rules of etiquette:

- “arrive” to class on time
- use your computer and/or laptop if possible (as opposed to a cell phone or tablet)
- ensure that you are in a private location to protect the confidentiality of discussions in the event that a class discussion deals with sensitive or personal material
- to minimize background noise, mute your microphone for the entire class until you are invited to speak, unless directed otherwise
- In order to give us optimum bandwidth and web quality, turn off your video camera for the entire class unless you are invited to speak
- please be prepared to turn your video camera off at the instructor’s request if the internet connection becomes unstable
- unless invited by your instructor, do not share your screen in the meeting

The course instructor will act as moderator for the class and will deal with any questions from participants. To participate please consider the following:

- If you wish to speak, use the “raise hand” function and wait for the instructor to acknowledge you before beginning your comment or question.
- Please remember to unmute your microphone and turn on your video camera before speaking.
- Please remember to mute your mic and turn off your video camera after speaking (unless directed otherwise).

General considerations of “netiquette”:

- Keep in mind the different cultural and linguistic backgrounds of the students in the course.
- Be courteous toward the instructor and peers.
- Be professional and scholarly in all online postings. Use proper grammar and spelling. Cite the ideas of others appropriately.

Note that disruptive behaviour of any type during online classes, including inappropriate use of the chat function, is unacceptable. Students found guilty of Zoom-bombing a class or of other serious online offenses may be subject to disciplinary measures under the Code of Student Conduct.

11. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>

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 Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.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.

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

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.

The following links provide information about support services at Western University:

[Academic Counselling \(Science and Basic Medical Sciences\)](#)

[Appeal Procedures](#)

[Registrarial Services](#)

[Student Development Services](#)

[Student Health Services](#)