



COURSE OUTLINE

1. **Course:** BIOL 315, Quantitative Biology I - Fall 2023

Lecture 01 : MWF 14:00 - 14:50 in CHC 119

Instructor	Email	Phone	Office	Hours
Dr Ariane Cantin	acantin@ucalgary.ca	403 220-7622	BI 446	TBA

Email policy: Instructor and TAs will do their best to answer emails within **24 hours** except on weekends and holidays.

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

In Person Delivery Details:

Lectures and lecture activities will be delivered in person and will not be recorded. **Labs will be in person**, following the registrar's schedule, and will not be recorded.

Participation in lecture and lab team activities is **mandatory**.

Course Site:

D2L: BIOL 315 L01-(Fall 2023)-Quantitative Biology I

Note: Students must use their U of C account for all course correspondence.

Equity Diversity & Inclusion:

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

The Biological Sciences Equity Committee acknowledges there are persistent barriers that prevent such accessibility and hinder our progress towards EDI. Our representatives (faculty, staff, postdocs, graduate and undergraduate students) are committed to addressing any concerns and work towards proactive solutions that enact necessary change within the department. To submit anonymous questions, comments or concerns regarding EDI related issues, please reach out to our Chair, Arshad Ayyaz (_arshad.ayyaz@ucalgary.ca), or a committee representative of your choice at <https://science.ucalgary.ca/biological-sciences/about/equity-diversity-and-inclusion>

Course Outcomes:

- Describe and calculate basic descriptive statistics for measures of central tendency, distribution shape, and spread
- Describe the process of hypothesis testing and given a statement of a research question, construct an appropriate null and alternative hypothesis to use for hypothesis testing
- List biological variables that follow a binomial and Poisson distribution and use the binomial and Poisson probability equations to determine the probability of certain 'events'
- Use the Poisson distribution to test a null hypothesis about the spatial distribution of rare, random 'events' and describe the properties of the Poisson distribution
- Describe and design experiments according to best practices for experimental design in terms of replication, balanced design, blinding, simultaneous control groups, blocking, random sampling, randomization of treatments
- Explain the approach of ANOVA for detecting differences between means by partitioning the total variation in

all observations into the variation between treatments/groups and variation within treatments/groups and using the F test to assess whether the variance among treatment means is larger than would be expected given H0

- Describe the 4 conceptual steps involved in conducting a permutation test and appropriately conduct, interpret and report permutation tests and create a bootstrap SE and CI
- Analyze relationships between two continuously scaled variables using linear regression or correlation depending on whether causality can be assumed
- Use R to conduct and interpret the following statistical tests: Linear Regression, ANOVA, Single sample t-test, Paired sample t-test, Permutation (randomization test) and Bootstrapping, G-test as Goodness of Fit or Contingency Analysis, Detect deviations from normality using visual checks (QQ Plots) and formal tests (Shapiro Wilk), Detect deviations from homoscedasticity using visual checks (QQ plots) and formal tests (Bartlett's test)

2. Requisites:

See section [3.5.C](#) in the Faculty of Science section of the online Calendar.

Prerequisite(s):

Biology 241 and 243.

3. Grading:

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the online University Calendar.

In determining the overall grade in the course the following weights will be used:

Course Component	Weight	Due Date (duration for exams)	Modality for exams	Location for exams
Quizzes ¹	30%	Ongoing		
Lab Assignments ²	25%	Ongoing		
Peer Evaluations (ITP Metrics) ³	2%	Ongoing		
Team Lecture Application Activities ⁴	2%	Ongoing		
Team Contract ⁵	1%	Ongoing		
Team Portfolio ⁶	10%	Dec 06 2023		
Registrar Scheduled Final Exam	30%	Will be available when the final exam schedule is released by the Registrar	in person	Will be available when the final exam schedule is released by the Registrar

¹ Five D2L quizzes throughout the semester (Sept 22, Oct 6 & 20, Nov 3, Dec 1), grade will be based on the best four quizzes out of five (7.5% per quiz).

² Five assignments throughout the semester (5% per assignment)

³ Mid-semester and End-of-semester peer evaluation surveys done through ITP Metrics / Grade based on participation.

⁴ Seven in-class lecture team activities (0.29% per activity - Activities on Sept. 15, 18, 29, Oct. 16, 30, Nov. 10, 27) / Grade weighted by final ITP Metrics peer score

⁵ Grade weighted by final ITP Metrics peer score

⁶ Grade weighted by final ITP Metrics peer score

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

	A+	A	A-	B+	B	B-	C+	C	C-	D+	D
Minimum % Required	95 %	88 %	84 %	80%	76%	72 %	68 %	64%	60%	55 %	50 %

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. [The Final Examination Schedule](#) will be published by the Registrar's Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

At the end of the term, each student will evaluate the contributions of the other members of their team (using the ITP Metrics Peer Evaluation tool). All team members will get a peer score based on their final peer evaluation. A student's peer score is the average rating of the student divided by overall the average rating for all members of the team. This provides a way to evaluate the relative contributions of each team member to the team's work. Each student's total teamwork mark will be multiplied by their individual peer score to determine their final mark for the teamwork component of the course (13% of final grade).

The University of Calgary offers a [flexible grade option](https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade), Credit Granted (CG) to support student's breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: <https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade>

4. **Missed Components Of Term Work:**

In the event that a student legitimately fails to submit any online or in-person assessment on time (e.g. due to illness, domestic affliction, etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date, or possible exemption and reweighing of components. Absences not reported within 48 hours will not be accommodated. Students may be asked to provide supporting documentation ([Section M.1](#)) for an excused absence, See [FAQ](#).

If an excused absence is approved, options for how the missed assessment is dealt with is at the discretion of the coordinator or course instructor. Some options such as an exemption and pro-rating among the components of the course may not be a viable option based on the design of this course.

Students will be assigned a team at the beginning of the semester. Each team will write and sign a contract detailing how they plan to communicate and organize themselves. If a student is unable to attend a lecture or lab team activity they should contact their team, TA, and instructor right away (if possible, before the activity) to discuss how they can make up for the missed component. A student can only miss a maximum of two team activities (two is a total for lecture and lab combined) as the group work builds each week and their absence directly impacts the progression of other members of the team. Should a student miss more than two activities without appropriate justification:

- a. they need to reach out immediately to the instructor. The student will then be removed from the group and be required to complete assignments on their own should they wish to progress in the course.
- b. the student will receive a maximum grade of B in the course.

Each student will have two 48hrs free pass extensions they can use without justification during the term for their lab assignments. Lab assignments that are turned in up to 24 hours (1 day late) after the due date or free pass extension will receive 80% of the marks earned, assignments submitted 2 days late will receive 50% of the marks earned, and assignments turned in 3 days late or more after the due date will receive feedback but no marks (0 points).

5. **Scheduled Out-of-Class Activities:**

There are no scheduled out of class activities for this course.

6. **Course Materials:**

Required Textbook(s):

Michael Whitlock and Dolph Schluter, *The Analysis of Biological Data, 2nd or 3rd edition* Macmillan Learning.

Some teamwork resources are provided by ITP Metrics, a University of Calgary-based system of secure web-based tools for forming teams and doing peer evaluations. These tools are free to all students and are not dependent on prior access.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC [ELearning](#) online website.

7. Examination Policy:

Students' quiz grade will be based on their best 4 out of 5 quizzes (Quizzes: Modules 1&2, Module 3, Module 4, Module 5, Modules 6&7, see dates in the Grading section).

Quizzes will be done on D2L, for each quiz students will have 24hrs to complete the quiz. There will be no lecture on quiz days. The quizzes are open book and students can use a calculator, but students are prohibited from working with or contacting any other individuals while completing the quizzes.

For the final examination, students may bring one double-sided page of notes (8.5x11 sheet), but are prohibited from working with or contacting any other individuals while completing the quizzes and the final exam.

Non-programmable calculators will be allowed for the final exam.

Violation of these rules is considered academic misconduct with penalties as described in the University Calendar section K.

Students should also read the Calendar, [Section G](#), on Examinations.

8. Approved Mandatory And Optional Course Supplemental Fees:

There are no mandatory or optional course supplemental fees for this course.

9. Writing Across The Curriculum Statement:

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section [E.2](#) of the University Calendar.

10. Human & Living Organism Studies Statements:

Students will not participate as subjects or researchers in human studies.

See also [Section E.5](#) of the University Calendar.

STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS. Students taking laboratory and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director of the Department.

Students are expected to be familiar with [Section SC.4.1](#) of the University Calendar.

11. Reappraisal Of Grades:

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See [Section I.3](#) of the University Calendar.

- a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within **ten business days** of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work [form](#) to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections [I.1](#) and [I.2](#) of the University Calendar

- b. **Final Exam:** The student shall submit the request to Enrolment Services. See [Section I.3](#) of the University Calendar.

12. Other Important Information For Students:

- a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, [Mental Health Services Website](#)) and the Campus Mental Health Strategy website ([Mental Health](#)).
- b. **SU Wellness Services:** For more information, see their [website](#) or call [403-210-9355](#).
- c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at [403-220-2208](#). The complete University of Calgary policy on sexual violence can be viewed [here](#).
- d. **Student Ombuds Office:** A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.
- e. **Student Union Information:** [SU contact](#), Email your SU Science Reps: science1@su.ucalgary.ca, science2@su.ucalgary.ca, science3@su.ucalgary.ca,
- f. **Academic Accommodation Policy:**

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Student-Accommodation-Policy.pdf>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>.

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, by filling out the [Request for Academic Accommodation Form](#) and sending it to Lisa Gieg by email imgieg@ucalgary.ca preferably 10 business days before the due date of an assessment or scheduled absence.

- g. **Misconduct:** Academic integrity is the foundation of the development and acquisition of knowledge and is based on values of honesty, trust, responsibility, and respect. We expect members of our community to act with integrity. Research integrity, ethics, and principles of conduct are key to academic integrity. Members of our campus community are required to abide by our institutional [Code of Conduct](#) and promote academic integrity in upholding the University of Calgary's reputation of excellence. Some examples of academic misconduct include but are not limited to: posting course material to online platforms or file sharing without the course instructor's consent; submitting or presenting work as if it were the student's own work; submitting or presenting work in one course which has also been submitted in another course without the instructor's permission; borrowing experimental values from others without the instructor's approval; falsification/fabrication of experimental values in a report. Please read the following to inform yourself more on academic integrity:

[Student Handbook on Academic Integrity](#)
[Student Academic Misconduct Policy](#) and [Procedure](#)
[Faculty of Science Academic Misconduct Process](#)
[Research Integrity Policy](#)

Additional information is available on the [Student Success Centre Academic Integrity page](#)

- h. **Copyright of Course Materials:** All course materials (including those posted on the course D2L site, a course website, or used in any teaching activity such as (but not limited to) examinations, quizzes, assignments, laboratory manuals, lecture slides or lecture materials and other course notes) are protected by law. These materials are for the sole use of students registered in this course and must not be redistributed. Sharing these materials with anyone else would be a breach of the terms and conditions governing student access to D2L, as well as a violation of the copyright in these materials, and may be pursued as a case of student academic or [non-academic misconduct](#), in addition to any other remedies available at law.
- i. **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIP). Students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information, see [Legal Services](#) website.

- j. **Surveys:** At the University of Calgary, feedback through the Universal Student Ratings of Instruction ([USRI](#)) survey and the Faculty of Science Teaching Feedback form provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses. Your responses make a difference - please participate in these surveys.

Electronically Approved - Aug 24 2023 15:10

Department Approval