



## BIOL-251 – Introduction to Biostatistics

University Arts and Science

**Effective Term & Year:** Fall 2025

**Course Outline Review Date:** 2030-03-01

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**Program Area:** Math and Sciences

**Description:**

In this course, students discover the basic methods used by scientists (from foresters and ecologists to medical researchers, cell biologists, chemists etc.) to collect, summarize, analyze and present their data. Course topics include gathering samples, describing data and theoretical distributions, testing significance, and exploring spatial relationships. Real-world examples from biology as well as other related subject areas will provide a foundation for more advanced courses and applications. In the lab activities, students use statistical software and data collection to gather student-collected and Internet-provided datasets.

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**Program Information:**

This course can be used as either a required course or an elective in several University Arts and Sciences Programs, including programs that require a focus on Biology and Geography. Please refer to the College Program Guide for additional information.

**Delivery Methods:** On-campus (Face-to-Face)

**Credit Type:** College of the Rockies Credits

**Credits:** 3

**Course type/s:** Social Sciences, Sciences, Lab Sciences

**Instructional Activity and Hours:**

**Activity**

**Hours**

Classroom, Directed Studies or Online Instruction	45
Seminar/Tutorials	
Laboratory/Studio	45
Practicum/Field Experience	
Co-op/Work Experience	
Other	
Total	90

### Course Requisites:

- Completed or concurrently enrolled in at least 1 of the following:
  - [BIOL101](#) – Introduction to Biology 1 (3)
  - [ENSC101](#) – Introduction to Environmental Science (3)
  - [BIOL102](#) – Introduction to Biology 2 (3)

### Prior Learning and Recognition: Yes

Students are able to request formal recognition of their prior learning or experience outside the classroom. Challenge examination, portfolio-assisted assessment, work-based assessment or a combination of assessments that is appropriate to identify, assess, and recognize prior skills, competencies, and knowledge to achieve course credit. Tuition fees apply, refer to [Policy 2.5.5 Prior Learning Assessment and Recognition \(PLAR\)](#) or contact an education advisor for more information.

### Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see <https://www.bctransferguide.ca/> or <https://transferalberta.alberta.ca> . For more transfer credit information, please visit <https://www.cotr.bc.ca/Transfer>

All requests for course transfer credit from institutions in British Columbia or elsewhere should go to the College of the Rockies Enrolment Services office.

### Textbook Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

David, M. Diez, Mine Cetinkaya-Rundel, & Christopher D. Barr, *OpenIntro Statistics*, 4th Edition. Free ebook available at <http://www.openintro.org/book/os>

Whitlock, M. and Schluter, D. *The Analysis of Biological Data*. 3rd edition. 2020. Macmillan

Please see the instructor's syllabus or check COTR's online text calculator <https://textbook.cotr.bc.ca/> for a complete list of the currently required textbooks.

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## Learning Outcomes:

Upon the successful completion of this course, students will be able to:

- explain the role of quantitative information in biology research and applications;
  - demonstrate understanding of basic descriptive statistics and regression methods as applied to problem solving;
  - evaluate the roles of probability theory and sample distributions in drawing inferences about populations based on samples;
  - identify when and where statistical procedures are appropriate for real-world applications;
  - produce figures, tables, and maps to display data results;
  - design and implement quantitative analysis projects for problem solving;
  - demonstrate competence in using statistical software tools for data analysis (Excel, the R language and Python);
  - utilize remote sensing datasets provided by Google Earth Engine and other providers to obtain quantitative information utilized for spatial analysis;
  - utilize electronic sensors and measurement devices to obtain measurements for environmental characterization;
  - apply Machine Learning (Artificial Intelligence) to model phenomena that can include: human behavior and environmental conditions;
  - produce spatial sampling plans for data collection involving quadrats and areal sampling;
  - evaluate the dispersion and spread of pathogens utilizing wind direction, disease location datasets, and spatial models;
  - identify spatial directional differences in plant height and location;
  - explain how spatial interpolation and kriging can be utilized to obtain spatial models indicative of biological processes;
  - demonstrate how ocean datasets can be utilized for characterization of ocean acidification, water quality and changes in global temperatures;
  - utilize statistics to distinguish between experimental and control groups for applications involving pesticides, water quality, and invasive species control mechanisms; and
  - demonstrate how statistics can distinguish between groups of plants and animals in two or more different regions.
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## Course Topics:

- Defining Biostatistics
- Scientific research
- Types of data

- Descriptive statistics
- Distributions
- Probability
- Elements of sampling
- Inferential problem solving
- Inferential spatial statistics
- Non-parametric statistics
- Correlation and regression
- Basic figures, tables, and maps
- Machine Learning and Artificial Intelligence in Biology

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

## Evaluation and Assessments

### Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Lab Assignments	40%
Term Project	10%
Midterm(s)	20%
Final	30%
Total	100%

### Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

**Pass requirements:** A passing mark of 50% on lecture assessments and 50% on lab assessments is required.

**Evaluation Notes:** A grade of "D" grants credit, but may not be sufficient as a prerequisite for sequential courses.

### Evaluation Notes Comments:

Equivalent Course: Students who have received COTR credit for BIOL 251 may not receive additional credit for GEOG 251.

### Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior

approval will receive a “0” on the exam.

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### **Academic Policies:**

College of the Rockies policies related to courses can be found at <https://cotr.bc.ca/about-us/college-policies/> and include the following:

- Policy 2.1.4 Course Audit
  - Policy 2.4.1 Credential Framework
  - Policy 2.4.3 Students with Documented Disabilities
  - Policy 2.4.4 Student Rights, Responsibilities and Conduct
  - Policy 2.4.8 Academic Performance
  - Policy 2.4.9 Student Feedback and Concerns
  - Policy 2.4.11 Storage of Academic Works
  - Policy 2.5.3 Student Appeal
  - Policy 2.5.5 Prior Learning Assessment and Recognition (PLAR)
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### **Course Changes:**

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.