# **Principles of Biostatistics**

# **Section I: Fundamentals of Biostatistics**

# **PROGRAM OVERVIEW**

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| **Date** | May 8-19, 2023 |
| **Time** | 1:00-4:00 pm (Mountain Time) |
| **Hours** | 30 hours, **Non-credit** (15 hours lecture + 15 hours lab) |
| **Max No. of attendees** | 25 |
| **Location** | Zoom and Slack |
| **Format** | Hybrid of lecture, and hands-on component (lab) |
| **Audience** | All kinds of learners from domestic to international students (undergrad, grad, and post-doc), as well as professionals and adult learners |
| **Certificate** | Students must attend 70% of the sessions (7/10 sessions) in order to receive an electronic certificate of participation. |
| **Course fee** | $300 CAD (per section) |

# **PROGRAM DETAILS**

* **Description:**

**The Principles of Biostatistics, Section I: Fundamentals of Biostatistics** is offered by [One Health at UCalgary](https://research.ucalgary.ca/one-health) in collaboration with the [University of Calgary Biostatistics Center](https://obrieniph.ucalgary.ca/groups/university-calgary-biostatistics-centre)**.**

This course will serve as a fundamental foundation for participants to understand the basic concepts of Biostatistics and further focus on statistical testing and introduce modelling used in statistical research studies.

* **Learning Outcomes: At the end of the course, participants will be able to**

1. Apply the basic principles of Biostatistics to summarize and draw conclusions from data.
2. Formulate testable research questions, evaluate the suitability of different research designs, plan a well-designed experiment or clinical trial, choose an appropriate statistical test and present results in a scientific and comprehensible manner.
3. Implement **R-software** and analyze statistical results for biomedical and veterinary data.

* **Instructors:**
* **Katie Burak** ([kburak@ualberta.ca](mailto:kburak@ualberta.ca))
* **Communication**
* You must have an audio and video-enabled laptop, desktop, or mobile device with reliable internet access.
* [Slack](https://slack.com/) is a communication platform, and we will be using it as the main tool for course communications, discussions, announcement, and sharing documents.
* In order to access Slack, you must click[**here**](https://join.slack.com/share/enQtMzI1MTg1MjQ3NzAyNy01NDlmMjFjZWU5ZTA4NDc5NzkxYmExODk3ZGY0ZmM1OWQ0NDU0MjQyODc1YTU0ZTBjN2VjMzVhOTJjNDY2ZWVk)NOW, and join the Biostatistics Course Channel (by providing your email address and full name). This link will expire in 14 days.
* You can use Slack as a desktop app, phone app, or web browser. However, the desktop app is more recommended.
* To join the sessions, please click on the ZOOM LINK below, and enter the passcode. The link is the same for all 10 sessions, and please do NOT share this link with anyone else.

**[ZOOM LINK](https://ualberta-ca.zoom.us/j/94318536877?pwd=TkFUYjdmOUJtdnU5TmJQSWVldnZ3Zz09) | Passcode: biostat23**

* **Assessment:**

Assignments will be posted on Slack (our communication tool with students).

Students must attend 70% of the sessions in order to receive the certificate and are encouraged to work on the assignments progressively throughout the course as the relevant material is covered.

* **Lecture Delivery and Hands-on Component:** Course materials will be delivered synchronously through online lectures via Zoom. There will also be a hands-on component in which students will work in **R studio** to gain practical skills in implementing the concepts covered during the lecture. The instructor will spend a portion of the class demonstrating the necessary skills and then will be available to assist students solving a variety of problems with the software. The hands-on component will primarily cover the application of the material outlined in the tentative lecture schedule below.
* **Required Software:** R and RStudio software (free to download).
* **Topics for Biostatistics:** Material will be catered to a general audience with a large degree of focus on concepts, implementation in R and interpretation of results.
* **Module 1: Introduction to Statistics** 
  + Data collection and sampling methods
  + Data classification and presentation
  + Measure of central tendency and variability
* **Module 2: Statistical Inference**
  + Tests/confidence intervals for one group
  + Tests/confidence intervals for two group comparisons
  + Test for multiple group comparisons (ANOVA) and post-hoc tests
  + Chi-square tests
* **Module 3: Introduction to Statistical Modelling with R**
  + Simple linear regression
* **Schedule** *(This schedule is subject to change upon the instructors’ assessment of the sessions):*

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| **#** | **DAY** | **DATE** | **TOPIC** | **Time** |
| 1 | Monday | May 8 | Course introduction  Data collection/Sampling methods  Data classification/Data presentation | 1:00-4:00 pm |
| 2 | Tuesday | May 9 | Measures of central tendency and variability | 1:00-4:00 pm |
| 3 | Wednesday | May 10 | Introduction to inferential statistics (hypothesis testing and confidence intervals) | 1:00-4:00 pm |
| 4 | Thursday | May 11 | Hypothesis test for one mean  Confidence interval for one mean | 1:00-4:00 pm |
| 5 | Friday | May 12 | Hypothesis test for two means (independent samples t-test, paired t-test)  Confidence intervals for two means | 1:00-4:00 pm |
| 6 | Monday | May 15 | One-way ANOVA  Post-hoc tests | 1:00-4:00 pm |
| 7 | Tuesday | May 16 | Two-way ANOVA  Randomized block design | 1:00-4:00 pm |
| 8 | Wednesday | May 17 | Hypothesis test for one proportion  Confidence interval for one proportion  Hypothesis test for two proportions  Confidence interval for two proportions | 1:00-4:00 pm |
| 9 | Thursday | May 18 | Chi-square tests | 1:00-4:00 pm |
| 10 | Friday | May 19 | Simple linear regression | 1:00-4:00 pm |