Virtual course: Applied Statistics in Biomedical Research

General Information

Course Name:	Applied Statistics in Biomedical Research
Modality:	Remote with hands-on synchronous sessions
Duration:	16 sessions
Total Hours:	96 hours
Certificate:	Yes
Target Audience:	Professionals, young researchers, undergraduate and graduate students, and personnel within the biomedical area.

Course Objectives

The main objective of the course is to provide a practical and comprehensive overview of the most commonly used statistical tools and techniques in biomedical research, **with a focus on the use of R for data analysis**. The course enables participants to develop skills and understanding in the analysis and interpretation of results. Participants will gain experience in interpreting:

1) Statistical results published in scientific articles; and
2) Conduct basic and intermediate statistical analyses using R.

Target Population

This course is designed for researchers, faculty members, young researchers, undergraduate and graduate students, and health professionals (Medicine, Clinical Laboratory, Nursing, Biology, and related biomedical fields) interested in strengthening their knowledge of statistics and data analysis using R.

Participants are expected to have a basic understanding of statistics and should be able to commit up to7 hours per week, distributed as follows:

- Reading study materials (2 hours)
- Solving weekly workshops (2 hours)
- Reviewing scientific articles (1 hour)
- Attending live R practice sessions (up to 2 hours)

Methodology

The course is conducted over four months and consists of 16 sessions organized in 3 modules, with a total duration of 96 hours. The language of the course is English; the contents will be hosted on CIDEIM's Moodle platform.

The course applies a flipped classroom model, offering pre-recorded lectures and downloadable materials to support self-paced learning. To complement this, participants will join live synchronous sessions focused on practical coding and statistical analysis in R, held via Zoom every Wednesday at 11:00 a.m. (Colombian time) starting August 6th, 2025. Recordings of each session will be available in Moodle for later review.

Participants will apply statistical concepts through guided workshops and readings, allowing for continuous self-assessment. Evaluation will be based on weekly assignments and individual assessments. A minimum final grade of 3.5 out of 5 is required to receive a certificate of completion issued by CIDEIM.

To participate fully, participants must have access to a computer with a stable Internet connection, audio output and microphone.

Learning Outcomes

By the end of the course, participants will be able to:

- Identify and apply appropriate statistical techniques in biomedical research.
- Conduct data analysis using R.
- Interpret the results of statistical tests and models.
- Critically evaluate the use of statistics in scientific literature.

Course Content

The course covers essential topics in statistics with a focus on biomedical research. It includes both descriptive and inferential statistics concepts, such as creating tables and graphs, data summary indicators, outlier detection, normality tests and equality of variances, confidence intervals, hypothesis testing, parametric and non-parametric tests, Chi-square test, correlation coefficients, linear regression, multivariable logistic regression, survival analysis, epidemiological measures of frequency and association, probability in biomedical research, overview of epidemiological study designs, sampling methods and Sample size calculations

Session Planning

Module	Session	Topics	Date of Live session
		Welcome and Introduction	August 6, 2025
Module A	1	Basic Concepts in Biostatistics	August 13, 2025
	2	Part 1: Exploratory Data analysis	August 20, 2025
	3	Part 2: Exploratory Data analysis	August 27, 2025
	4	Sampling Design	September 3, 2025
	5	Probabilities	September 10, 2025
	6	Random Variables and Normal Distribution	September 17, 2025
	7	Estimation of Confidence Intervals	September 24, 2025
	8	Hypothesis testing	October 1, 2025
	9	Sample Size Calculations	October 8, 2025
Module B	10	Comparison of two groups/samples	October 15, 2025
	11	k Independent Samples ANOVA	October 22, 2025
	12	Association Between Two Categorical Variables	October 29, 2025
	13	Correlation Between Two Quantitative Variables	November 5, 2025
Module C	14	Linear Regression	November 12, 2025
	15	Logistic Regression	November 19, 2025
	16	Survival Analysis	November 26, 2025

Evaluation

Assessment will be distributed as follows:

- 16 session-specific assessments: 45%
- Attendance: 5%
- Final analysis report: 50%

Total: 100%

A certificate of completion will only be issued to participants who achieve a minimum final grade of 3.5 out of 5.0.

Course Tutors

Jairo Enrique Palomares, PhD. Dr. Palomares holds a master's and a doctoral degree from Colorado State University, where he received high-level training and gained expertise in advanced data analysis methods for clinical science and epidemiological research. His research interests primarily involve social and behavioral determinants of infections and implementation research in health. He has teaching experience at the postgraduate level in Biostatistics, Epidemiological Methods, Epidemiological Surveillance, Social and Behavioral Determinants of Health, development and validation of research instruments, and simulation models of infectious diseases.

Neal Alexander, PhD. Researcher in the Epidemiology and Biostatistics Research Unit at CIDEIM, Professor of Medical Statistics and Epidemiology at London School of Hygiene and Tropical Medicine, U. of London. His first degree is in mathematics and his PhD on the epidemiology of lymphatic filariasis. He has worked on the epidemiology and control of vector borne diseases for more than 30 years, co-authoring more than 250 peer-reviewed articles, in both subject-specific and methodological journals.