

Course Introduction

Fundamental concepts in medical statistics

Fundamental concepts in medical statistics is an intermediate level medical statistics course organized collaboratively by Maharajgunj Medical Campus, Institute of Medicine (IOM), Tribhuvan University (TU); Centre for Fertility and Health, Norwegian Institute of Public Health (<https://www.fhi.no/en/more/research-centres/Centre-for-fertility-and-health>); Bergen Centre for Ethics and Priority Setting in Health (<https://www.uib.no/bceps>), University of Bergen, Norway; and Research Department, IOM, TU.

Venue: The course will be hosted at Maharajgunj Medical Campus building, Multipurpose Seminar Hall, 5th Floor, Institute of Medicine, Tribhuvan University, Kathmandu.

Dates: 01/OCT/2026 – 07/OCT/2026

Course timings: 9:00 AM to 16:30 PM

Course coordinator: Arun K Sharma (arun.sharma@mmc.tu.edu.np), Department of Pediatrics

Lead Faculty

Håkon K. Gjessing, PhD (<https://scholar.google.com/citations?user=H9TbeTIAAAAJ&hl=en>) is Principal Investigator at the Centre for Fertility and Health, a Norwegian Research Council Center of Excellence located at the Norwegian Institute of Public Health, and an adjunct Professor of Biostatistics at the Department of Global Public Health and Primary Care, University of Bergen. He has also held positions at the University of Oslo and the University of Chicago.

Gjessing has a PhD in Probability Theory from the University of Bergen, and his research interests have centered on statistical methodology, with a particular focus on biostatistics, medical statistics, and genetic statistics. He has authored and co-authored more than 150 scientific research papers in a wide range of journals, including NEJM, JAMA, BMJ, Lancet, and Nature Communications, as well as written a graduate statistics textbook on survival analysis, published in 2008 by Springer. He has been Editor-in-Chief for a high-ranking Wiley international statistics journal. Gjessing has also been responsible for developing the official Norwegian system for ultrasound pregnancy dating, as well as other pregnancy care systems with national coverage.

Gjessing has decades of teaching experience in Medical Statistics at all levels, and loves communicating the principles and practicalities of statistical research methods to non-statisticians and statisticians alike, in an intuitive and accessible way.

Co-facilitators: Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi

Course Content

The course is intended for students and researchers who have some previous knowledge of - and experience with - statistical methods applied to clinical and epidemiological research. The course is designed with a broad scope to provide participants with an introduction to several important and useful techniques for analyzing clinical and epidemiological research data. The course will cover some basic topics such as significance testing, confidence intervals, linear regression and correlation, etc. and introduce some advanced statistical concepts including survival analysis.

The course will closely integrate lectures, where concepts will be introduced and explained in an intuitive fashion, with hands-on practical exercises on relevant data using the R and R studio software. We will cover four types of multiple regression analyses: linear regression, binomial regression, Poisson regression, and Cox regression. For the binomial regression, we will show how to obtain estimates of odds ratio, relative risk, and risk difference by choosing different “link” functions and discuss advantages and disadvantages with the different effect measures. For the Poisson regression, we will show how it can be used as a very effective modeling tool for count data, and how it relates to both binomial- and Cox regressions. We will also show how to obtain measures such as standardized mortality ratios (SMRs).

For survival and other time-to-event data we will introduce basic concepts, show the Kaplan Meier estimator and how to use Cox regression. We will also touch on more advanced topics such as the Additive Hazards model for more detailed analyses than what Cox regression provides.

The course will cover some basic methodology for analyzing randomized controlled trials (RCTs), including sample size calculations to obtain sufficient statistical precision and power, and handling of baseline covariate imbalances. Also, modeling and interpretation of interactions between exposure and other covariates will be discussed in detail, the effect measure modification being assessed on a multiplicative as well as on an additive scale.

In addition, we will briefly cover topics such as problems with multiple testing and p-hacking, the use of weight variables (frequency weights, sampling weights), and how to, use robust standard errors, handle simple correlated data situations from e.g. cluster randomization or family data and from repeated measurements in the same individuals.

At the end of the course participants will be able to:

- Understand the basic interface and functionality of R and R studio and their application in medical statistics
- Understand and interpret the concept of p value and confidence intervals in medical statistics
- Conduct sample size calculations to achieve sufficient statistical precision and power in a study.
- Recognize situations where linear, binomial, and Poisson regression models are appropriate.
- Interpret results and effect measures from each of these models.
- Conduct standard survival analysis of time-to-event data and demonstrate awareness regarding challenges related to censoring data.
- Explain basic principles behind RCTs and how to analyze such data, as well as avoiding common pitfalls.

- Conduct regression analyses in R

Who can attend and how?

PhD and postgraduate students, postdoctoral fellows, faculty members and researchers with a background in medicine, epidemiology, biology, dentistry, statistics, mathematics, social and health sciences are eligible to attend the course. Participants need to have some prior practical experience analyzing medical research data and using statistical software and a good command of English as pre-requisite for the course.

If you wish to participate, please send an email request to Ms Manisha Dangol at chrp@iom.edu.np Tel: +977-9841601553 with a brief resume including current area of work and institutional affiliation to register yourself to the course. You can also reach out to course coordinator Dr Arun K Sharma at arun.sharma@mmc.tu.edu.np if you have more specific questions that need to be addressed.

A maximum of 35 participants will be registered. If the course is overbooked, priority will be given to applicants who are affiliated with Tribhuvan University, the University of Bergen (esp. CISMACH, BCEPS (<https://www.uib.no/bceps>) or other units at the Department of Global Public Health and Primary Care (<https://www.uib.no/en/globpub>), the Norwegian Institute of Public health (<https://www.fhi.no>), Innlandet Hospital Trust (<https://sykehuset-innlandet.no/om-oss/jobb-i-sykehusetinnlandet/innlandet-hospital-trust>), and/or the Norwegian Research School of Global Health (<https://www.ntnu.edu/nrsg>).

The last date for accepting applications via email is 15th August, 2026.

Pre-course study material

Participants should have a basic familiarity with the topic covered in “Medical Statistics: A Textbook for the Health Sciences”, 5th Edition, by Walter, Campbell, and Machin (2021). (<https://amzn.eu/d/hqmMitt>) before attending the course.

Pre-course preparation

Please pre-install R (<https://cran.r-project.org/>) and R studio (<https://posit.co/download/rstudio-desktop>) in your laptop PC or Mac.

Teaching language: English

Course fee: None