

Course Agenda

Fundamental concepts in medical statistics

Maharajgunj Medical Campus, Institute of Medicine, Tribhuvan University

Kathmandu, Nepal

In collaboration with

**Centre for Fertility and Health, Norwegian Institute of Public Health and
Bergen Centre for Ethics and Priority Setting in Health, University of Bergen, Norway**

This intermediate level course aims to strengthen the basic understanding of fundamental concepts in medical statistics. The course is designed to stimulate participants to develop intuitive understanding of core statistical concepts through a combination of lectures, interactive sessions and hands-on exercises. The course is designed to provide broad general overview. The course will recap some basic topics such as significance testing, confidence intervals, linear regression and correlation, and introduce several important and useful techniques for analyzing clinical and epidemiological research data. The course is aimed at participants with some prior knowledge and experience of medical statistics and use of statistical tools.

Participants are expected to have carefully studied the course text ["Medical Statistics: A Textbook for the Health Sciences", 5th Edition, by Walter, Campbell, and Machin \(2021\)](#) before coming to the course physically. The course will be primarily based on R and R studio. A pre-course introductory day on R and R studio will be held on the 30th September.

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

Faculty

Håkon K. Gjessing, PhD (<https://scholar.google.com/citations?user=H9TbeTIAAAAJ&hl=en>) is a 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. Håkon is the lead faculty for the course and will share sessions with co-facilitators.

Co-facilitators: Dagrund Slettebø Daltveit, Ayushi and Devashish Tripathi.

Pre course Day: Wednesday, September 30, 2026

Introduction to R program and R studio

FOCUS OF THE DAY: Introduction to R and R studio			
	Timing	Planned activity	Moderator
	9:00- 10:00	R and R Studio Orientation Navigating the interface, managing projects, and setting up the environment	Ayushi and Devashish Tripathi
	10:00- 11:00	R Fundamentals Understanding variables, data types, and vectors.	Ayushi and Devashish Tripathi
	11:00- 12:00	Data Structures Working with data frames and reading data into R (e.g., CSV, Excel)	Ayushi and Devashish Tripathi
	12:00- 13:00	Lunch	
	13:00- 14:00	Data Manipulation & Cleaning Using packages like tidyverse::dplyr to select, filter, and summarize data.	Ayushi and Devashish Tripathi
	14:00- 15:00	Data Visualization Creating plots (e.g., scatter plots, histograms) using ggplot2.	Ayushi and Devashish Tripathi
	15:00- 15:15	Tea	
	15:15- 16:15	Basic Statistics with R/R studio Running introductory statistical tests (e.g., t-tests, ANOVA).	Ayushi and Devashish Tripathi

Course day 1: Thursday, October 1, 2026

FOCUS OF THE DAY: Overview, and fundamental concepts			
	Timing	Planned activity	Moderator
	09:00- 10:00	Welcome and startup - Welcome/introduction - Quick overview of course and practical info - Quick overview of basic concepts (Participants are expected to have basic understanding of/experience with basic statistical concepts)	Håkon K. Gjessing
	10:00- 12:00	Fundamentals - Central limit theorem (most importantly, why it's useful) - General background on Confidence Intervals - Testing, p-values, one-sided vs. two-sided - Confidence intervals vs. testing - Transformation of data, the log-transform.	Håkon K. Gjessing
	12:00- 13:00	Lunch	
	13:00- 14:00	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi
	14:00- 15:00	Sample size and statistical power / statistical precision - What it means - How to restrict the probability of Type I/Type II errors - How to compute sample size needed for sufficient precision of effect estimate - How to compute sample size for study planning, simple	Håkon K. Gjessing

		situations	
	15:00- 15:15	Tea break	
	15:15- 16:30	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi

Course day 2: Friday, October 2, 2026

FOCUS OF THE DAY: Generalized linear models (GLMs)			
	Timing	Planned activity	Moderator
	09:00- 11:00	Linear regression - Standard linear regression - Multiple linear regression, confounding, interpretation - Basic regression diagnostics	Håkon K. Gjessing
	11:00- 12:00	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi
	12:00- 13:00	Lunch	
	13:00- 15:00	Binomial regression - Binomial regression (including logistic regression) - Different link functions: logit, log, and identity - Corresponding interpretations: logistic, log, and additive - Odds Ratio (OR), Relative Risk (RR), and Risk Difference (RD) - Basic regression diagnostics - Poisson regression	Håkon K. Gjessing
	15:00- 15:15	Tea break	
	15:15- 16:30	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi

October 3, 2026 and October 4, 2026: Saturday and Sunday: Self-study

Course day 3: Monday, October 5, 2026

FOCUS OF THE DAY: Mixed bag with focus on RCTs, other experimental designs			
	Timing	Planned activity	Moderator
	09:00- 10:00	More on Binomial Regression - Link functions - How to choose suitable effect measures, such as RD, RR, OR - What are the implications of these choices?	Håkon K. Gjessing
	10:00- 11:00	Interaction / effect measure modification - Basic concepts - Scale dependence - Examples How to estimate, variable coding, and dummy variables - Testing / estimating differences in effects across subgroups	Håkon K. Gjessing

	11:00- 12:00	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi
	12:00- 13:00	Lunch	
	13:00- 14:00	Some fundamental ideas behind RCTs • The causal reasoning behind randomization • Adjustment for baseline variables? Other adaptations • Regression to the mean, need for trial comparator arm, etc. • Dropouts, intention to treat	Håkon K. Gjessing
	14:00- 14:15	Tea break	
	14:15- 15:00	A “Modeling Case study” using binomial, Poisson, and time-to-event in COVID-19 modeling	Håkon K. Gjessing
	15.15- 15:45	Weighted analyses • Frequency weights • Sampling weights • Importance weights	Håkon K. Gjessing
	15:45- 16:30	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi

Course day 4: Tuesday, October 6, 2026

FOCUS OF THE DAY: Count data, standardization			
	Timing	Planned activity	Moderator
	09:00- 11:00	Poisson regression • How and when to use • How to handle varying exposure time, use of offset • Examples from Covid-19 pandemic analyses	Håkon K. Gjessing
	11:00- 12:00	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi
	12:00- 13:00	Lunch	
	13:00- 15:00	Standardization methods • Standardized averages for continuous data • Standardized risks and rates • Standardized Mortality Ratios (SMRs) • Model-based standardization, examples of how to present results	Håkon K. Gjessing
	15:00- 15:15	Tea break	
	15:15- 16:30	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi

Course day 5: Wednesday, October 7, 2026

FOCUS OF THE DAY: Survival and event history analysis			
	Timing	Planned activity	Moderator
	09:00- 11:00	Survival Analysis / Event History Analysis • Introduction to survival/event history analysis • Kaplan-Meier • Cox regression	Håkon K. Gjessing
	11:00- 12:00	Exercises	Dagrun Slettebø Daltveit, Ayushi and Devashish Tripathi
	12:00- 13:00	Lunch	
	13:00- 14:00	Additional topics in survival analysis • Alternative models, such as additive hazards model	Håkon K. Gjessing
	14:00- 15:15	Summary discussion and evaluation	All
	15:15- 15:30	Tea	

Teaching language: English

Course fee: None

Registration

For registration requests, 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. You will receive an email confirmation of registration if a slot is available.