

# Master's Thesis (Statistics / Data Science)

Project: Evaluating and Implementing Methods for Covariate-Adjusted Multiple Testing

## Collaborating Institutes

- TU Dortmund University, Department of Statistics, Chair [Mathematical Statistics and Applications in Industry](#) (project lead)
- PMU Salzburg, [Core Facility Biostatistics](#) (data provider & biomedical collaboration)
- University of Augsburg, Chair of [Mathematical Statistics and AI in Medicine](#) (software expertise)

## Project Background

In modern biomedical and clinical research, multiple outcomes often need to be compared across different groups while adjusting for relevant baseline covariates. Multiple Contrast Tests (MCTs) offer a statistically powerful framework for such analyses – but current implementations are limited in flexibility. This project aims to analyse existing methods in their behaviour through a Monte-Carlo-simulation study. Furthermore, the aim is to extend the established R package [MANOVA.RM](#) by integrating covariate adjustment into its multivariate inference procedures. The work combines statistical methodology, computational implementation, and biomedical data application.

## Your Tasks

- Conduct a Monte-Carlo simulation study to analyse covariate-adjusted inference methods on multivariate multiple testing problems
- Extend the MANOVA.RM package to incorporate covariate-adjusted MCTs
- Validate and illustrate the methods using datasets provided by applied researchers from PMU
- Contribute to open-source software development and CRAN publication
- Co-author a tutorial article showcasing the new functionality in applied biomedical research

## What We Offer

- Joint supervision by experts from TU Dortmund and PMU Salzburg
- A project at the interface of statistics, programming, and biomedicine
- Opportunity to contribute to a widely used CRAN package
- Potential to publish your work in a methodological or applied statistics journal
- A collaborative and internationally visible research environment

## Your Profile

- Master's student in Statistics, Data Science, or a related field
- Strong programming skills in R
- Interest in statistical testing, resampling methods, and software development
- Motivation to work independently in a collaborative, interdisciplinary team

## Practical Details

- Start date: flexible (early 2026 preferred)
- Location: anywhere (remote collaboration possible)
- Supervision team: Konstantin Thiel (PMU Salzburg & TU Dortmund); Marlène Baumeister (TU Dortmund); Prof. Markus Pauly (TU Dortmund)

Please contact us if you are interested:

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