

## Target Group

This is the sixth in a series of annual Summer schools which target people interested in planning and analyzing, e.g. clinical studies. Basic knowledge in statistical methodology and working skills in using R are assumed and required.

## Time and Date

Tuesday 6 July until Friday 9 July 2021

- Please arrive on Tuesday by 14:30
- Course finishes Friday by 12:30

## Location

Bundesinstitut für Erwachsenenbildung (bifeb)  
Bürglstein 1-7  
5360 Strobl, Austria

## Registration / Waiting List

Please submit your **request for registration by 31 March 2021** via email to:

Andrea Baumgartner, [Andrea.Baumgartner@sbg.ac.at](mailto:Andrea.Baumgartner@sbg.ac.at)

Please also indicate if you had tried to register for one of the previous Summer Schools in Strobl but could not be admitted because it was booked out.

## Registration Fees

**Membership in one of the sponsoring societies is mandatory. Please note that some of the societies offer free student membership.**

Academic / Government: 410 Euro  
Business / Industry: 570 Euro  
Student: 280 Euro

## Accommodation

Accommodation and food are included in the registration fees.

## How to Get There

Please see the description (in German) at <http://www.bifeb.at/ihr-aufenthalt/anreise/>

## Contact & Information

For questions, please ask

Andrea Baumgartner or Arne Bathke  
Universität Salzburg  
Hellbrunner Str. 34  
5020 Salzburg, Austria  
Tel. +43 (0)662 8044 5302

[Andrea.Baumgartner@sbg.ac.at](mailto:Andrea.Baumgartner@sbg.ac.at)



## Cancellation

Due to the unpredictable Covid situation, we are offering a more generous cancellation policy this year: Your registration will only become binding on **31 May 2021**.

If you have to cancel, we will try to admit someone from the waiting list. However, if this is not possible and your cancellation is on 1 June 2021 or later, your registration fees cannot be returned.



Universität Salzburg  
Deutsche und Österreich-Schweizer Region der  
Internationalen Biometrischen Gesellschaft  
(IBS-DR, ROeS)  
Österreichische Statistische Gesellschaft (ÖSG)



Summer School 2021

Multiple Testing

6 – 9 July, 2021  
Strobl am Wolfgangsee, Austria

## Instructors

Werner Brannath (Bremen)  
Thorsten Dickhaus (Bremen)  
Ludwig Hothorn (Hannover)  
Robin Ristl (Wien)

Whenever more than one particular question is targeted simultaneously using statistical inference procedures, we are in the realm of multiple testing, or multiple comparisons. And, since looking at different things simultaneously is rather the rule than the exception, profound knowledge on how to correctly and validly adjust for multiplicity in inference is paramount for good statistical practice and research reproducibility.

The 2021 Summer School in Strobl revisits the basics of multiple testing and then focuses on different particular aspects and methods such as graphical test procedures, high-dimensional multiple testing, and other approaches to tackle complex multiplicity challenges. The topics will range from practice-oriented to methodological.

The presenters are well-known authorities on multiple testing, and there will be plenty of room for informal discussions with the experts.

The optional social program includes a visit to a local award-winning Edelbrand distillery (if the Covid situation allows) and a barbecue evening.

On the conference site, there are options for various outdoor activities (jogging, football, swimming,...), and participants regularly bring their portable music instruments along for impromptu performance sessions.

## Introduction

**Robin Ristl, Wien**

In this part, we will introduce basic terminology, concepts, and methods associated with multiple testing, such as type-I-error inflation and family wise error rate, the closed-testing principle, as well as different single-step and multi-step p-value adjustments.

## Graphical Test Procedures and Simultaneous Confidence Intervals

**Werner Brannath, Bremen**

To enable confirmatory claims for several primary and secondary endpoints, rather complex multiple testing approaches have been suggested for clinical trials. Starting with hierarchical testing, we will give an introduction to serial and parallel gatekeeping, graphical test procedures and related testing approaches using clinical trial examples. Simultaneous confidence Intervals for these complex test procedures will also be addressed.

## High-Dimensional Multiple Testing

**Thorsten Dickhaus, Bremen**

We will present methods for high-dimensional multiple testing problems. Special focus will be laid on multiple tests controlling the false discovery rate (FDR). Applications in genetics and other life sciences will be discussed.

## Applying the max-T-Test and Multiple Marginal Models in Preclinic, Clinic, and Epidemiology

**Ludwig Hothorn, Hannover**

Combining two approaches, the maxT test and multiple marginal methods (both available in the R-package multcomp), allows the solution of complex multiple issues: analysis of multiple correlated, differently-scaled endpoints, multiple times (for inference), multiple test statistics, multiple effect sizes and trend tests considering 'dose' both quantitatively (as covariate) and qualitatively (as factor).

## Lab Exercises

Some sessions involve hands-on examples using R. Please bring your own laptop, with R / Rstudio installed. We will inform you ahead of time regarding the installation of certain packages.