

Target Group

This is the seventh 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

Thursday 1 September until Sunday 4 September 2022

- Please arrive on Thursday by 14:30
- Course finishes Sunday 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 2022** via email to:

Andrea Baumgartner, Andrea.Baumgartner@plus.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/das-bifeb/kontakt>

Contact & Information

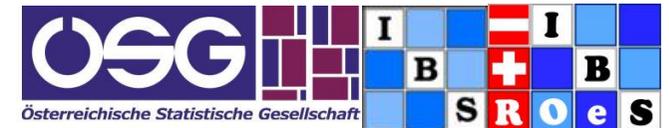
For questions, please ask

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Cancellation

Your registration will become binding on **31 May 2022**. 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 2022 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)



PARIS
LODRON
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SALZBURG

Summer School 2022

Resampling

1 – 4 September, 2022
Strobl am Wolfgangsee, Austria

Instructors

Ekkehard Glimm (Basel)
Frank Konietzschke (Berlin)
Tobias Mütze (Basel)
Markus Pauly (Dortmund)

The 2022 Summer School in Strobl revisits the basics of statistical inference and then covers different aspects and methods of resampling. The topics will range from practice-oriented to methodological.

The presenters are well-known authorities on resampling and its application, 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.

Frank Konietschke and Markus Pauly

Introduction and Review of Statistical Inference

In contrast to descriptive statistics, statistical inference provides tools to infer more from data. In this review session, we recall some basic concepts such as point estimation, confidence intervals, statistical hypothesis testing, and p-values, along with the most commonly used methods.

Resampling: Concepts, Theory, and Simulated Performance

Resampling techniques are used for a wide variety of statistical tasks. Examples concern the validation of models by cross-validation or subsampling, the improvement of variance estimates via bootstrapping, or the approximation of unknown distributions for the construction of confidence intervals or statistical tests. We give a brief overview of all these points before going into more detail regarding the theoretical foundations, as well as the implementation and performance in simulations and simple examples.

Specifically, we look at bootstrap methods (nonparametric bootstrap, Wild bootstrap, Efron's bootstrap), as well as permutation and other more sophisticated randomization methods.

Randomization Tests: Theory and Implementation

Permutation procedures have always been considered as very good inference methods for multi-sample problems. However, very often they are derived under the assumption of exchangeable data. For unpaired multi-sample or even factorial designs, exchangeability coincides with the null hypothesis of iid samples. This is often too stringent, e.g. if heteroscedasticity is present. In this part, we first explain why "classical" permutation and more general randomization tests are accurate in case of certain invariances, such as exchangeability. In a second step, we show how this invariance can be relaxed by working with studentized-type statistics. Again, the methods' implementation and performance in simulations and illustrative examples is shown.

Ekkehard Glimm and Tobias Mütze

Statistical Questions in Pharmaceutical Research

In this part, we will present examples of clinical trials where the estimand (typically the efficacy of an experimental treatment when compared with the standard-of-care in a defined patient population) can be assessed using resampling approaches. Regarding statistical tests, we will discuss situations in which resampling tests are useful for confirming treatment efficacy. Other important applications concern the derivation of confidence intervals by bootstrapping (for example for quantifying the effect of a treatment dose on an outcome measure) both quantitatively (as covariate) and qualitatively (as factor).

Resampling Methods in Pharmaceutical Research

Using the examples from the previous part, we will show how resampling based methods have been implemented in clinical trials, and will discuss results and interpretation.

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.