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Corresponding web presences:

- TISS: https://tiss.tuwien.ac.at/course/courseDetails.xhtml?dswid=8319&dsrid=870&courseNr=105693&semester=2021S

- TUWEL: https://tuwel.tuwien.ac.at/course/view.php?idnumber=105693-2021S

Date and time: Exercises are on Tuesdays via zoom at the following times

Group	Hours
A	14:00 – 15:00
B	15:30 – 16:30
C	17:00 – 18:00
D	18:00 – 19:00

Access to zoom (meeting ID and password) will be posted in TUWEL prior to the meeting.

First zoom session: March 16, 2021

Accompanying lecture: LVA-Nr.: 105.692 (weekly)

Description: Main concepts of the course will be presented in the corresponding lectures and then will be practiced and deepened in the exercise sessions. Exercise sessions will involve solving problems and the use of R for computation, simulation and visualization.

The focus is on basic statistical theory such as distribution theory, point estimation, hypothesis testing, asymptotic theory and their applications.

- Probability theory: probability spaces, calculating probabilities, Bayes theorem, discrete and continuous random variables, distributions (Bernoulli, binomial, geometric, Poisson, uniform, normal and exponential distributions), quantiles, moments, mean and variance, independence, conditional probability, covariance, correlation, independence, multiple random variables, convergence concepts, law of large numbers, central limit theorem.

- Descriptive statistics: elementary statistics, empirical distribution, graphical representations (frequency tables, diagrams, histograms, scatterplots).

- Inferential statistics: Significance tests and confidence intervals (one- and two-sample z-tests and t-tests), p-value, significance level, α- and β- errors, nonparametric tests (goodness-of-fit tests, chi-square tests for homogeneity and independence), classical point estimation (parametric and non-parametric methods), analysis of variance, linear models.

- Applied aspects (calculations, simulations, visualizations, analyses) are implemented in the statistical software `R`.

Particular attention is paid to the use of statistical software R to implement the statistical analysis methods covered in the course.

Requirements:

- Registration in the exercises via the corresponding TISS page within the registration period. Registration starts on 22.02.2021 and ends on 08.03.2021. Deregistration is possible until 26.03.2021.

- Basic knowledge of probability theory, linear algebra and calculus.

- Access to a computer where the statistic software `R` (`https://cran.r-project.org`) and the Interface RStudio (`https://www.rstudio.com/`) are installed.

- Registration in zoom (`https://zoom.us/`) with the TU account (`*.tuwien.ac.at` or `*.student.tuwien.ac.at`).

Procedure – please read carefully!:

(1) **Ticking Problems and uploading solution paths:** Problem sheets are posted online weekly on Tuesday in TUWEL. Each homework assigment will have **five** problems. Up until Monday 23:59h of the following week students are expected to **tick problems** and **upload the solution paths** of those problems in TUWEL that they solved, i.e., there are 6 days from when the problems are posted until they are to be ticked and solutions to be submitted.

There will be 14 sheets, resulting in 70 problems to be ticked in total. The first set of problems is posted on Tuesday, March 9, 2021 (i.e., they are to be ticked and solution paths uploaded in TUWEL until 20:00h on Monday, March 15, 2021) and are to be presented on Tuesday March 16, 2021.

(2) **Weekly submissions:** Weekly submission of solution paths is mandatory. Up to **two** missing submissions are allowed. For an exercise sheet at least **three** problems need to be ticked, and otherwise the submission is marked as missing. If problems are ticked but not all associated solution paths uploaded, then all ticks for the corresponding sheet will be deleted (and the sheet is marked as missing). Delayed submissions are not accepted (no ticks, and thus a missing submission). Instructions for file preparation are available in TUWEL.

(3) **Exerise sessions:** Exercises are on Tuesdays via zoom. For the zoom sessions, please prepare your homework for presentation. Students are randomly picked and asked to present a solution for a problem that they checked. Presentations will be graded. The performance is assessed as a percentage (0-100%). This substitutes blackboard presentations. Please note that the checks of the current homework are lost, when a student is not attending or is not able to present when asked. The first zoom session is on Tuesday, March 16, 2021, where homework 1 is to be presented.

Grading: A student is marked as failed (grade 5) if her/his number of missing submissions is above two. Otherwise the final grade is obtained from the score which is defined as the **mean** of the two percentages:

(1) the percentage of ticked problems and

(2) the average score of graded presentations.

The final grade is derived from the score according to the following key

grade	score (%)
5	[0%, 50%)
4	[50%, 62,5%]
3	(62,5%, 75%]
2	(75%, 87,5%]
1	(87,5%, 100%]

Example: There are 70 problems in total. Consider that a student obtained 56 ticks. This will result in a percentage of $56/70 = 80\%$ for part (1). If two submitted problems were corrected and marked with 70% and 85%, then this leads to a percentage of

$$\frac{70\% + 85\%}{2} = 77.5\%$$

for the part (2). The mean of (1) and (2) calculates as

$$\text{score} = \frac{80\% + 77.5\%}{2} \approx 78.75\%.$$

As score $\in (75\%, 87.5\%]$, we obtain a final grade 2.

Help: If you have any questions concerning the exercises, please contact your supervisor by e-mail.