Statistics in Climate Sciences 2023/2024

Information concerning the report, exam and grading of the course

The final grade of the course will be the sum of two parts:

- Part 1: written report 50 %: See the following page for further details.
- Part 2: oral exam (15 minutes) 50 %: Questions about all the topics you have studied during the year.

The oral exam will take place on June 7th and 10th 2024 at the University (no online exam). The grade of Part 1 will not be announced before the oral exam. You can bring your own paper copy of the report for the exam (notes in this paper copy are allowed). The oral exam will be completed individually, whereas the report will be written in groups of three.

Important: please remember to register for the exam using KSL.

☐	Angekündigt	25850	FS2023	0	Leistungskontrolle	Statistik	Statistical Methods for Climate Sciences I+II	10	Dr. Michel Piot	Freitag 09.06.2023 08:15-18:00

Only those who have achieved more than 50% in the weekly homework exercises (per semester) will be eligible to partake in the oral exam.

Report

Data

There is one data set containing several meteorological variables measured on a monthly basis at weather stations across Switzerland. The data set has been provided by MeteoSchweiz and is in the txt-format. For further information about the data, consider the inventory-file that is distributed together with the data.

If you want to integrate the data with additional external information, you are free to do that, but be clear about the source(s) of this additional information.

Criteria for grading the report

Content-related criteria

- Write a report containing the description of your question(s), the methodology you have chosen (with motivation), your results and their interpretation.

- You need to apply at least three methods (multivariate statistical methods Chapter 5 to Chapter 11 or time series) to study your problem – the methods can freely be chosen and they can be applied independently of each other.
    - Descriptive statistics is part of the report but not a stand-alone method; this includes:
        - Calculating correlations to help understand the dataset;
        - Checking for multivariate normality, which – depending on the methods that you choose – is an assumption that must be fulfilled and therefore part of the method;
    - For each method, give a short introduction on the aim of your analysis (what question would you like to answer?);
    - For each method, mention the assumptions that must be fulfilled and check them;
    - If you do any tests, the hypothesis must be formulated, and the conclusion of the test result must be mentioned (What is your result? What is the conclusion?)

A suggested but not compulsory framework is the following:

1) Look at the data and perform some descriptive analysis to understand them;
2) Choose a problem. Some examples include:
    a. evolution of yearly temperatures in A and B
    b. comparison of the monthly precipitation levels among different stations
    c. cluster analysis of pressure data in B and comparison with A
    d. Are temperatures in A more similar to those in B or those in C?
    e. etc.

    Please note that these are just examples. You are free to choose your problems, selecting a subset of variables, stations, time periods, granularity and so on;
3) Choose the appropriate statistical methodology to study your problem.
    For your analysis you can use R. If wanted, you can add the code/functions.

cluster analysis with different timespans?? Does the clustering change with climate change?

Formal criteria

The report should be between **35 000–50 000 characters** (graphs excluded) and must be written in English.

We look for clearly written reports, where the analysed problems are well described. (Do not try to impress us with some new fantastic complex techniques. Just be honest and write a report that is methodologically simple (not too much however), but teeming with ideas and suggestions.)

Regarding graphs, please provide only the most interesting ones (not all the plots you may have produced)!

Important: every group member is responsible for the entire report. Justifications such as "I do not know, I only worked on part 2" are not acceptable.

Deadline

The mandatory deadline to hand in your reports is **May 31st 2024** at **23:59**.
You should send an electronic copy in the form of a pdf to oliver.warth@unibe.ch and michel.piot@faculty.unibe.ch.