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Practical information

For NumEcol 2021 class (semester 109-2): make sure that you have the latest version of R and RStudio installed on your computers:

- R - version 4.0.3 or newer
- RStudio - version 1.4.1103 or newer
- install manually the following packages if not yet installed:
  ```
  install.packages (c('vegan', 'labdsv', 'ade4',
  'adespatial', 'cluster'))
  ```

Note that first you need to **install (or update) R** on your computer (this is where all commands are processed), **and then you install RStudio** (this is just editor, a wrapper around R). RStudio without R does not work. Please, follow instructions on [AnaDatR website](#) for installation.

Evaluation

Criteria for the final evaluation consist of these parts (details below):

Quick R Introduction mini-assignments (5, before the class starts, each 2%)	10%
Homework assignments (7-8 assignments)	25%
Midterm quiz (written test 10%, individual R exercise 10%)	20%
The last quiz (written test 10%, individual R exercise 10%)	20%
Independent project (written report 10%, presentation 10%, review of other projects 5%)	25%

Quick R Introduction mini-assignments (10%)

Before the class starts, there will be an online series of mini-assignments focused on examining your R skill to do basic R operations. These assignments will be pretty trivial for those of you who know R, but are important check to make sure that your R skill is sufficient for the class; if not, you have time to improve it before you come to the first class. Each successfully completed mini-assignment counts for 2%, so you can get up to 10% for them.

Homework assignments (25%)

Approx. 6-7 homework will be assigned during the semester, and you need to finish them and upload to CEIBA on time to get a credit.

Mid-term quiz (20%)

This will be a short written quiz overview of the knowledge you got so far (during the mid-term examination week). The main function is two-fold - for you, to push you to review the lecture once more (that time we will just finish ordination), and for me, to give me a feedback about what you have learned so far.

The midterm quiz is composed of two parts: a written quiz focused on theory (100 points), and the R-exercise (100 points). Midterm quiz represents 20% of your total semester evaluation. The quiz is open book - you can use whatever materials you bring for the class for the quiz, but you cannot ask your classmates for help (and you also cannot use any social media during the class).

The last quiz (20%)

The examination will take place after the presentation of the final report and will consist of two parts, written test (10%) and individual R-exercise (10%). The written test will be focused on theoretical questions from the whole class to make sure you understand the theory behind the methods we learned and you used. I don't expect you to memorize details or equations, but more focus on questions related to the general concept of individual methods, their application and interpretation of results.

For the written part focused on the theory you can bring your **own made cheat sheet of up to two A4 pages of HANDWRITTEN notes**; you cannot have anything else, i.e. no other handwritten materials, no printed materials, you cannot use a computer, nor mobile phone to search anything online. You will have up to 1h to complete the test, then you can use your computer to move on to R exercise (if you finish test earlier, you can give me the test and spend more time for R practice; but you cannot start to work in R before you finish written test). Additionally, you may bring PRINTED English-Chinese dictionary if you are afraid that some English terms may cause you a hassle (electronic dictionary without access to the internet is OK, but no smartphone and no computer).

Independent project (25%)

Note that independent project consists of three parts: **written final report (10%)**, **oral presentation (10%)** and **review of two other projects (5%)**.

Writing and presenting independent project is an important part of the evaluation. Independent project should have a structure of a very short scientific paper - I do not mean that it should have *the quality* of the scientific paper, but it should have the *formal structure of it*. You will need to upload the report one day before the presentation into CEIBA. The last two classes of the course will be allocated for your presentations. After the presentations, both your report, presentation slides, my review and two anonymous reviews will be made public online (only for class participants).

Dataset: use any type of vegetation, zoological, microbiological, sociological or other underlined multivariate data, which are available to you. The best would be a dataset close to the field of your interest, so as you know what you are talking about - you may have your own data, or some of your colleagues or classmates may have. Important is that the data must be multivariate - with several samples and several species, not only one sample or one species. If possible, additionally to the compositional

matrix (samples x species) you will need also a matrix of environmental variables (samples x env. variables) or species traits (traits x species). If you do not have any data available, try to search in some of the publicly available data sources. If you cannot find anything, let me know, I have some (mostly vegetation, but also some zoological) data I can share.

Analyses: learn more about the background of the data, and apply some of the methods we learned in the course. Please, **select at least two** from the following methods:

1. some method of unconstrained ordination;
2. some method of constrained ordination;
3. classification of the dataset using cluster analysis or TWINSPAN;
4. some of the diversity analysis;
5. relating species attributes to environmental variables.

Final report (10%)

English written text communicating your results. It should have a structure of standard (although very short) scientific paper, **up to 5 manuscript pages long** (including everything except an R code - R code should be added as an Appendix after the text). Definition of *manuscript page* is: size A4, with <u>double line spacing</u>, <u>size of text 12pt</u>, margins around 2.5 cm (it looks actually pretty sparse, but this is standard manuscript format if you submit a paper to a journal; the wide inter-line spaces are there for comments, notes and corrections). The text should be separated into traditional chapters (title and your name, Abstract, Introduction, Methods, Results, Discussion, References). In the Introduction, briefly introduce the theoretical background of the study and the question you are asking. In the Methods part, introduce the dataset and in detail describe the methods used for its analysis. In the Results, report all relevant results you got, and discuss them in the Discussion. Don't forget to cite relevant literature and cite them in the Reference section. Include all important figures (like a map of the study area, the schema of sampling design, ordination diagrams, cluster dendrograms etc.) and tables (if necessary). If some friend or colleague provided you with data or help, include her/him in the Acknowledgements. Let's make it like a scientific game - once (maybe soon) you may need to write a real paper, and this experience may come handy.

Additionally to the text above, **include also commented R code as an Appendix**. Best if you can format the R code using the font with equal length of characters (e.g. `Courier New font style`), and it's not necessary to use double spacing. The number of pages with R code is not limited, but try to keep it short. R code must be included but does not need to be reproducible (maybe you do not want or cannot include the dataset you used for the project).

Save the file as pdf and upload it into CEIBA on time. The (single) file should have max. 5 pages of text plus commented R code in Appendix (unlimited number of pages, but keep it as short as possible).

But: this is just a game of science, not real science. The real paper takes months to complete, but this report should not take you more than 1-3 days of work including analysis. Keep it short and simple. The main goal is to demonstrate that after taking this course you have the ability to correctly analyse studied dataset and clearly present the results of the study.

Presentation of the independent project (10%)

A short **(10 minutes)** presentation of your results, similar to conference presentation. Prepare few PowerPoint slides - start with introduction slide with title of your study and your name, continue with questions you asked, description of the dataset, used analyses, results and their interpretation. Include everything important, but keep it short and simple. Try to be creative and try to convince the audience (me and your classmates, including your reviewers - see below) that what you are saying is really supported by data and results of analyses you made. Don't forget to include slide number on the slides (so as we can point later which slide we want to discuss).

Note: **the presentation must not be longer than 10 minutes**. We will use a timer; after 9 minutes, I will indicate that you should start to conclude. After 10 minutes, I will cut you off, even if you are in the middle of the sentence. Insisting in longer presentation or inability to conclude may negatively influence your evaluation. Discussion is an important part of the presentation day, and we need to have enough time for it after the sequence of presentations is finished.

Review of the project (5%)

Each participant needs to conduct a review of two other projects. You will learn names of your classmates whom you should review in advance, and you will need to check their project online first (projects will be available online a few days ahead of the presentation day). Then, after the presentations, we will have time for one-to-one discussions; your job as a reviewer is to visit your assigned presenter, discuss the topic, ask questions, and evaluate whether the method is appropriate and the R code is functional. You can also suggest some changes to give the presenter feedback about her/his study. In the end, you will fill a simple evaluation form, which will be considered as a part of the final evaluation.