

2023

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## Markup languages and reproducible programming in statistics (202000010)

### General information

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Course ID  
202000010

Course type  
Course

Credits  
2.5 EC

Category / Level  
M (Master)

Instruction language  
English

Offered by  
Utrecht University - Faculty of Social Sciences

Is mandatory for

- M&S for the Behavioural, Biomedical and Social Sciences (MBBM)

### Course enrolment

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Enrolment periods

- Semester I  
Timeslots  
Timeslot not applicable

Enrolment period

Start courses  
4 September 2023

### Course description

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Course goals

#### TESTING AND COURSE AIMS

1. Developing and publishing a reproducible research archive that contains reproducible code, data and a typeset manuscript following a markup language;
2. Developing and publishing a personal repository page;

- a. Students develop fundamental knowledge and understanding in the state of the art in statistical markup languages and reproducible programming (Knowledge and Understanding)
- b. They can determine the most effective markup strategies to address a typesetting problem (Applying)
- c. They can efficiently organize a reproducible programming process (Applying)
- d. They can produce repositories up to the standards of international programming and coding conventions and initiatives (Communication)
- e. They can produce publications up to the typesetting standards of international peer-reviewed journals (Communication)

### **Assignment**

Students will individually choose one statistical topic and work on a Markup manuscript about this topic. Students will need to perform calculations and program code for this script. All work for the student needs to be combined in an easy understandable and insightful data archive and materials portfolio and will need to be posted on a personal GitHub repository. This portfolio will be graded on 1) Quality of the markup language and coding skills, 2) Quality of the data archive and 3) Quality of the online repository.

Details about the exact grading of the portfolio can be found in the course manual.

In order to pass the course, the final grade must be 5.5 or higher, your contribution to the course should be sufficient and all assignments and practical assignments should be handed in and/or passed. Otherwise, additional work is required concerning the assignments and/or exercises you have failed.

After taking this course students can understand innovations in statistical markup, statistical simulation and reproducible research. Students are also able to approach challenges from different professional viewpoints. They have gained experience in marking up a professional manuscript and designing a state-of-the-art statistical archive in an open source repository.

### **Content**

This course gives an overview of the state-of-the-art in statistical markup, reproducible programming and scientific digital representation. Students will get to know the professional field of statistical markup and its innovations and challenges. It consists of meetings in which students will learn about markup languages (LaTeX and Markdown), learn efficient programming with R Markdown, experience developing Shiny web apps, get to know version control with Git and will create and maintain their own data archive repository and personal (business card) page through GitHub. Combining these lectures, the students get acquainted with different viewpoints on marking up statistical manuscripts, areas of innovation, and challenges that people face when working with, analyzing and reporting (simulated) data. Knowledge obtained from this course will help students face multidimensional problems during their professional career.

Note that for external parties, costs for participation may be involved.

Students will need their own laptop computer. Students should have experience in programming with R and should be familiar with the IDE RStudio.

## Prerequisites and entry requirements

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Assumed previous knowledge

Statistical programming with R

Entrance requirements course enrolment

You must meet the following requirements

- Enrolled for a degree programme of faculty Faculty of Social Sciences
- Completed all course modules listed below
  - MSBBSS04 Computational inference with R (201300004)

## Materials

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Required material

- Internet pages  
The course page <https://www.gerkovink.com/markup> holds, at the start of each iteration of the course, all relevant information and the course materials. Exercises, issues and questions are submitted through the course GitHub page. No other channels of dissemination (like e.g. blackboard) are used.

## Instructional modes

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Instructional modes

- Lecture/seminar  
Attendance requirement  
Yes

## Tests

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Tests

- Portfolio  
Test weight  
100  
  
Minimum grade  
5.5  
  
Knowledge and skills development

## Lecturers

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Course contact

- dr. G. Vink

Lecturer

- dr. G. Vink