Stockholm University

Department of Statistics
Fall 2025

R Programming
7.5 ECTS credits, ST4101/ST4102
Course description

Course contents

The course treats programming in the language R with focus on both basic as well as more advanced statistical analysis. Special emphasis is placed on data structures, functions and objects, strings, conditional statements, iterations, code optimization, debugging, numerical linear algebra and creation of R packages. Also included is an introduction to object–oriented programming and parallel programming.

Learning goals

After completing the course, the student should be able to:

- Write and organize R programs with different programming techniques such as handling different data structures, function creation, iteration, conditional statements, string management and numerical computations for the purpose of performing statistical analysis;
- Perform statistical computations and simulations using R packages;
- Improve R program code through optimization measures;
- Test and debugging R programs;
- Organize his/her own code in the form of an R package;
- Describe the principles of object-oriented programming in R;
- Describe how parallel programming can be implemented in R.

Examination and grading

Students will be assessed based on the course's learning goals. Knowledge control on the learning goals will be examined through two tests:

Test 1. (Exam code 11RT) Written Exam. (4.5 credits)

Test 2. (Exam code 12RI) Home Assignment. (3 credits)

The Home Assignment is divided into three parts. For each of the course's tests there will be two examination opportunities as shown in the following table:

Test	First occasion	Second occasion
Home Assignment, Part 1	October 12, 23.59	November 09, 23.59
Home Assignment, Part 2	October 19, 23.59	November 09, 23.59
Home Assignment, Part 3	October 26, 23.59	November 09, 23.59
Written Exam	October 30, 08–13	December 10, 14–19

- The Written Exam is an individual computer–based exam which is graded according to the following seven-point scale:

  A: Excellent,

  B: Very good,

  C: Good,

  D: Satisfactory,

  E: Sufficient,

  Fx: Fail, inadequate,

  F: Fail, totally inadequate.

- The Home Assignment is a group assignment that is graded according to a two-point scale where G is a passing grade and U is a failing grade.

- Each test is graded separately and independently. This means that if you pass a test, you are not required to re–take that test should you fail the another one. E.g. if you have passed the home assignment but fail to pass the exam, you will retain the corresponding credit points and will not be required to do the assignment again; you are only required to do the parts you have not yet passed.

- A minimum grade of E on the Written Exam and a grade of G on the Home Assignment is required for a passing grade on the course. Students who have not earned a passing grade on both tests will not receive a final grade.

- The grade for the entire course is equivalent with the grade of the Written Exam.

Rules for the Written Exam

Test 1 is an individual written and computer–based exam with a writing time of 5 hours. The following applies to it:

- During the examination no forms of collaboration or discussion are allowed. The examiner will indicate well in advance which aids are allowed.
- If necessary, special support can be allowed upon request to the department's student counsellor (studivagledare@stat.su.se) and after approval by the examiner. Contact student counsellor in good time before the exam, preferably no later than three weeks before the exam takes place.
- Students must register for the exam/re-exam via Ladok. Registration must normally be made no later than 10 days before the exam, but in some cases the deadline is earlier than that. Check in Ladok which deadline applies to the exam. Registration opens 30 days before the exam. If you have registered correctly, an anonymous code is generated directly on the screen. If you have problems with your registration, contact the Student Office (expedition@stat.su.se) before the registration deadline. If you fail to register, you cannot take the exam!
- Students who get at least grade E on the exam are not allowed to retake it for obtaining a higher grade.
- Both Fx and F on an exam are failing grades and require re–examination. Supplementary assignments in order to raise an Fx to a passing grade are not permissible for this course.
- Students who received a grade of Fx or F on the exam have the right to take at least four additional exams as long as the course is given to achieve a passing grade.
- Students who have received the grade Fx or F on an exam twice by the same examiner have the right to request that another examiner be appointed to determine the grade at the next exam. Such a request must be made to the head of the department in written form.

Rules for the Home Assignment

Test 2 is a Home Assignment that is to be solved in three parts and in groups of two students. The following applies to the assignment:

- The Home Assignment is graded as Pass if all three parts are approved. Otherwise, if one or more parts are not approved, it is graded as Fail. In that case, the students will have one chance to re–submit the parts of the assignment that have not been approved.
- Collaboration *within* the group is of course permitted and encouraged. Note, however, that grades are set individually and can vary between group members. It is the individual's performance in the group work that is examined. All group members are responsible for and must be able to answer for all parts of the work reported in the report. All team members must participate in all parts of the work. Collaboration *between* groups is permitted, but each group must submit its unique report.
- Any type of plagiarism is prohibited. This includes text generated by AI tools. The use of AI tools is permitted as an aid in terms of knowledge acquisition and study but not to produce material for any kind of examination. The use of AI tools for the improvement of an originally self-written text is not permitted. Text matching software and AI-generated text detectors are used by the institution. Read Guidelines for disciplinary matters at Stockholm University.

- If an assignment handed in by the first submission date fails, students have the opportunity to correct mistakes and hand in a revised assignment by the second deadline. The second deadline constitutes the second examination opportunity. If you do not submit your assignment before the first deadline, and submit your report for the first time by the second deadline, you will not have the opportunity to revise and correct your report.
- Feedback for the Home Assignment should be available around 5–7 working days after the deadline.
- All parts of the Home Assignment must be approved during the current semester in order for the entire test to be graded as "Pass". Partial results from assignments are not saved and cannot be transferred to future semesters.

Grading criteria for Test 1

A: (At least 90 points on the written exam.) Excellent. The student can, in an excellent way, construct R Programs and solve problems that have not necessarily been directly addressed in the course. The student provides exhaustive and clear explanations of the R language structure, its functions, properties, and performance.

B: (Between 80 and 89 points on the written exam.) Very good. The student can, in a very good way, construct R Programs and solve all types of problems that have been considered in the course. The student provides clear explanations of the R language, its functions, properties, and performance.

C: (Between 70 and 79 points on the written exam.) Good. The student can, in a well-structured way, construct R Programs and solve most types of problems that have been considered in the course. The student provides correct explanations of the R language, its functions, properties, and performance.

D: (Between 60 and 69 points on the written exam.) Satisfactory. The student can, in a satisfactory way, construct R Programs and solve most types of problems that have been considered in the course. The student provides satisfactory explanations of the R language, its functions, properties, and performance.

E: (Between 50 and 59 points on the written exam.) Sufficient. The student can, in an adequate way, construct R Programs and solve most types of problems that have been considered in the course. The student can, in an adequate way, explain the structure of the R language, its functions, properties, and performance.

Fx: (Between 40 and 49 points on the written exam.) Inadequate. The student's achievements are inadequate with respect to at least one of the criteria for the grade E. Re-examination is required.

F: (Less than 40 points on the written exam.) Totally inadequate. The student shows significant inadequacies in relation to the assessment criteria. Re-examination is required.

Grading criteria for Test 2

G: (Passed.) The student can write correct program code and create executable well–documented programs in accordance with the assignment instructions. The student can summarize his/her work in well–written reports using R Markdown.

U: (Fail.) The student's achievements are inadequate with respect to at least one of the criteria for the grade Pass.

Course literature

- Matloff, N., (2011) *The art of R programming.*. No Starch Press.

  Available as an e–book via Stockholm University Library.

- Wickham, H. and Cetinkaya–Rundel, M. and Grolemund, G., *R for Data Science*. Second edition. O'Reilly.

  Available here.

- Sanchez, G. (2013) *Handling and Processing Strings in R*. Trowchez Editions. Berkeley.

  Available here.

- Other course material such as lecture notes, exercises, instructions for submissions and more are posted on the course page in Athena. There you can also find some preliminary instructions of reading for each teaching session.

Teaching format

The teaching consists of eight lectures and eight computer sessions. See the reading instructions that are available in Athena for a reading list. You can see the full schedule here.

There is no mandatory attendance at the course, however it is strongly recommended to participate in all lectures and computer sessions.

Teachers and general information

Teacher	Role
Edgar Bueno	Examiner
	Lectures
Ralf Xhaferi	Computer labs
	Home Assignment
Akram Mahmoudi	Computer labs
	Home Assignment

All teachers have reception times by appointment.

The Department of Statistics is located at Campus Albano, Albanovägen 12, Building 4, Floor 6. General information about the department can be found on the department's website. You can also visit the course webpage.