

# Syllabus

for course at advanced level

**R Programming**  
**R programming**

**7.5 Higher Education  
Credits**  
**7.5 ECTS credits**

|                          |   |
|--------------------------|---|
| <b>Course code:</b>      | ST4101  |
| <b>Valid from:</b>       | Autumn 2020   |
| <b>Date of approval:</b> | 2019-12-11  |
| <b>Department</b>        | Department of Statistics  |
| <b>Main field:</b>       | Statistics  |
| <b>Specialisation:</b>   | A1N - Second cycle, has only first-cycle course/s as entry requirements |

## Decision

This course plan was approved by the board of the Department of Statistics at Stockholm University on 11/12/2019.

## Prerequisites and special admittance requirements

90 ECTS credits first-cycle courses, of which 30 ECTS credits in Statistics, or equivalent and of which 15 ECTS credits Bachelor's thesis in Statistics or another subject with quantitative focus. English 6 or equivalent.

## Course structure

| Examination code | Name                           | Higher Education Credits |
|------------------|--------------------------------|--------------------------|
| 11RT             | R programming, exam            | 4.5                      |
| 12RI             | R programming, home assignment | 3                        |

## Course content

The course only consists of one part and is examined by two exams according to the above course codes, where "Exam 1" is designated by 11RT and "Exam 2" is designated by 12RI.

The course covers programming in the programming language R, with focus on basic as well as more advanced statistical analysis. Particular emphasis is placed on data structures, functions and objects, strings, conditional statements, iteration, code performance optimization, debugging, numerical linear algebra and developing R packages. The course also provides an introduction to object-oriented programming and parallel programming.

## Learning outcomes

To pass, the student must be able to:

- write and organize R programs with programming techniques such as handling of different data structures, self-written functions, iteration, conditional statements, string handling, and numerical calculations, with the purpose of conducting statistical analysis.
- perform statistical calculations and simulations using R packages
- enhance R program code by code optimization methods
- test and debug R programs
- organize self-written code in the form of an R package
- give an account of the principles of object-oriented programming
- give an account of how parallel programming is implemented in R

**Education**

The teaching forms consists of lectures and computer labs. The course is given in English.

More detailed information may be found in the course description. The course description is published on the website of the Department of Statistics at [www.statistics.su.se/utbildning](http://www.statistics.su.se/utbildning) at least one month prior to the commencement of the course.

**Forms of examination**

a) The course is examined by assessing the students' mastery of the expected outcomes. Exam 1 is a written exam. Exam 2 consists of written group assignments. The course is examined in English.

b) Exam 1 is graded on a seven-step grade scale: A = Excellent, B = Very Good, C = Good, D = Satisfactory, E = Sufficient, Fx = Partially insufficient, F = Entirely insufficient. Both Fx and F are fail grades and require the exam to be retaken.

Exam 2 is graded on a two-step grade scale: U = Fail, G = Pass. An assessment of the individual performance of the student within the working group must be made available and documented.

c) The written grade criteria for Exam 1 and Exam 2 respectively will be provided to the students at the start of the course.

d) In order to pass the entire course, the student must achieve at least an E for Exam 1 and pass Exam 2. The aggregate grade for the entire course is equal to the grade for Exam 1. Assignments submitted after the designated submission time will not be assessed. Parts of courses that have been credited are excluded when establishing the final grade.

e) Each exam will be offered on a minimum of two occasions. During any semester when the course is not given, the exam will be offered on a minimum of one occasions.

Students who have received a failed grade for one of the two exams are entitled to resit the exams for as long as the course is given in order to achieve a pass grade.

Students who have received an Fx or F for Exam 1 or the grade U for Exam 2 twice in a row by the same examiner are entitled to a different examiner at the next exam, unless there are specific reasons against this. Students should apply for this in writing to the Prefect of the Department of Statistics. Students who have received the lowest grade, E, may not resit the exam to obtain a higher grade.

f) For this course, it is not possible to submit remedial assignments to convert the grade Fx to a pass grade.

**Interim**

Students can request examination in accordance with this syllabus once per semester during a period of three semesters after the course is no longer given. The request must be in writing and sent to the head of the department.

**Limitations**

This course may not be part of a degree together with any other course which fully or partially conforms with the contents of this course.

**Required reading**

The course literature is presented in the attachment.

The current course literature (and other teaching resources) is published on the website of the Department of Statistics, [www.statistics.su.se/utbildning](http://www.statistics.su.se/utbildning), at the latest two months prior to the start of the course.