



**Karolinska  
Institutet**

Course syllabus for

## **Biostatistics 1, 7.5 credits**

Biostatistik 1, 7.5 hp

This course syllabus is valid from autumn 2024.

Please note that the course syllabus is available in the following versions:

Autumn2019 , Autumn2023 , Autumn2024

|                            |   |
|----------------------------|---|
| Course code                | 4FH083                                  |
| Course name                | Biostatistics 1                         |
| Credits                    | 7.5 credits                             |
| Form of Education          | Higher Education, study regulation 2007 |
| Main field of study        | Public Health Sciences                  |
| Level                      | AV - Second cycle                       |
| Grading scale              | Pass with distinction, Pass, Fail       |
| Department                 | Department of Global Public Health      |
| Decided by                 | Utbildningsnämnden PHS                  |
| Decision date              | 2018-10-09                              |
| Revised by                 | Education Committee GPH                 |
| Last revision              | 2024-03-07                              |
| Course syllabus valid from | Autumn 2024                             |

## **Specific entry requirements**

A Bachelor's degree or a professional degree equivalent to a Swedish Bachelor's degree of at least 180 credits in public health science, healthcare or other relevant social sciences subject area. And proficiency in English equivalent to English B/English 6.

## **Objectives**

The aim of the course is to a) provide students with robust knowledge of basic statistics to carry out common statistical analyses used in epidemiology, b) develop skills needed to conduct pertinent analyses, c) adequately interpret the results, d) learn to use of a statistical software.

After completion of the course, the student should be able to:

- Describe empirical distributions of data
- Extract information from theoretical probability distributions
- Describe basic probability rules
- Explain the logic of statistical inference

- Construct and interpret point estimates and confidence intervals
- Formulate and conduct test of hypothesis
- Explain the type of errors associated with statistical inference
- Compare two or more populations
- Differentiate parametric vs. non-parametric statistics identifying conditions for their use
- Describe, carry out and interpret common types of statistical analyses of continuous and categorical data

## Content

The contents of the course were purposely set and organized hierarchically to be aligned with the learning outcomes as follows: Type of data (dichotomous, continuous, nominal, categorical, ordinal, etc.), handling datasets including defining, computing, selecting and recoding variables for data analyses), measures of central tendency (mean, median, mode), measures of dispersion (range, extreme values, percentiles, variance, standard deviation), table of counts and relative counts, data presentation (tabulations, bar/pie graphs, boxplots, scatterplots, etc.), theoretical probability distributions (normal, binomial, Poisson, Chi-square), central limit theorem; type I error, type II error, power, confidence level, point estimate and confidence intervals, measures of associations (OR-odds ratio) (Pearson and Spearman correlation), hypothesis testing (null and alternative hypotheses, one-sided, two-sided tests), test of independence for categorical data (Pearson difference between 2 means (student's t-test of independent samples), difference among more than 2 means (ANOVA, F-test, non-parametric statistics (sign-test, Mann-Whitney and Wilcoxon tests for independent samples), measures of linear association.

## Teaching methods

A combination of teaching techniques (i.e. interactive and traditional lectures, group and independent work, group dynamics, and computer labs) will be used depending on the specific study subject aimed at engaging students in the teaching-learning process to promote reflective thinking and active collaborative education following a deep approach to learning. Lectures, group activities and computer tutorials will be interconnected so that students can link the theoretical knowledge with the practical skills of performing statistical analyses using a computer.

## Examination

The course learning outcomes will be assessed using a quantitative instrument.

The grades used are fail, pass or pass with distinction. To "pass" the course students must attain 65 points or more of the total score of 100 points. Students that attain more than 90 points will receive "pass with distinction".

### Compulsory participation

Some lectures are compulsory as indicated in the schedule. The examiner assesses if, and in that case, how, absence from compulsory educational elements can be compensated for. Before the student has participated in the compulsory educational elements or compensated the absence in accordance with the examiner's instructions, the final course results will not be reported. Absence from a compulsory educational component may imply that the student cannot compensate for the missed compulsory educational elements until next time the course is given.

### Limitation of number of occasions to write the exam

The student has the right to write the exam six times. If the student has not passed the exam after four participations he/she is encouraged to visit the study advisor.

The number of times that the student has participated in one and the same examination is regarded as an examination session. Submission of a blank examination is regarded as an examination. An examination for which the student registered but not participated in will not be counted as an examination.

If there are special grounds, or a need for adaptation for a student with a disability, the examiner may

decide to deviate from the syllabus's regulations on the examination form, the number of examination opportunities, the possibility of supplementation or exemptions from the compulsory section/s of the course etc. Content and learning outcomes as well as the level of expected skills, knowledge and abilities may not be changed, removed or reduced.

## Transitional provisions

Examination will be provided during a time of two years after a possible cancellation of the course. Examination can take place according to an earlier literature list during a time of one year after the date when a major renewal of the literature list has been made.

## Other directives

Course evaluation will be carried out in accordance with the guidelines established by the Committee for Higher Education.

The course language is English.

## Literature and other teaching aids

### Mandatory literature

Course literature is based on key articles, power-point presentations, and handouts. However, the following books will be used as reference or as additional support.

*Pagano, Marcello; Gauvreau, Kimberlee*

#### Principles of biostatistics

2. ed. : Pacific Grove : Duxbury, cop. 2000 - xvi, 525 s. , [42] s.

ISBN:0-534-22902-6 ; No price LIBRIS-ID:5036554

[Library search](#)

*Kirkwood, Betty R.; Sterne, Jonathan A. C.*

#### Essential medical statistics

2. ed. : Malden, Mass. : Blackwell Science, cop. 2003 - x, 501 s.

ISBN:0-86542-871-9 LIBRIS-ID:8731249

[Library search](#)

### Recommended literature