



**Karolinska  
Institutet**

Course syllabus for

## **Biostatistics, 4.5 credits**

Biostatistik, 4.5 hp

This course syllabus is valid from autumn 2019.

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

Autumn2018 , Autumn2019

Course code	1BI043
Course name	Biostatistics
Credits	4.5 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Biomedicine
Level	G2 - First cycle 2
Grading scale	Pass with distinction, Pass, Fail
Department	Institute of Environmental Medicine
Decided by	Programnämnden för biomedicinprogrammen
Decision date	2018-03-23
Revised by	Programme committee for study programmes in biomedicine
Last revision	2019-03-27
Course syllabus valid from	Autumn 2019

## **Specific entry requirements**

At least grade pass (G) at the courses Introduction to biomedical science; General and organic chemistry; Cell-, stem cell and developmental biology and Genetics, genomics and functional genomics, and at least grade pass (G) at the part Biochemistry (5 credits) of the course Biochemistry, at the Bachelor's programme in Biomedicine.

## **Objectives**

The aim of the course is to give students knowledge of basic statistical concepts and tools that can be used to understand results published in scientific literature and to perform their own statistical analyses.

Upon completion of the course the student should be able to:

Regarding knowledge and understanding

- explain the concept of random variation in biological phenomena and how it is related to observational and experimental studies,
- describe appropriate statistical methods to quantify random and systematic effects in biological data,

- discuss (at an elementary level) the relevance of statistical inference for empirical research.

Regarding competence and skills

- choose and apply statistical methods to address research questions by means of statistical software,
- communicate statistical results in oral presentations and scientific publications,
- interpret and discuss statistical findings of basic complexity in relevant scientific literature.

Regarding judgement and approach

- assess scientific hypotheses based on empirical proofs.

## Content

Data types: nominal, ordinal and continuous variables. Descriptive measures. Graphical presentation. Randomness in biological observations. Statistical thinking around randomness. Data from experiments and observational studies. Probability concepts. Probability distributions: coin, dice, Poisson, Binomial, Exponential, Normal, Student's t. Parameter estimation: mean and proportion. Quantification of statistical uncertainty: standard error, confidence intervals and hypothesis testing. Elementary hypothesis testing: Z-tests, t-tests. Elementary considerations concerning power and samples size.

Correlation and linear regression. Statistical models. Verification of model assumptions. Robust (non-parametric and distribution free) methods. Analysis of contingency tables.

## Teaching methods

Teaching will be in the form of lectures and practical computer activities.

## Examination

The examination consists of written examination.

Limited number of examinations or practical training sessions

Students who have not passed the regular examination are entitled to participate in five more examinations. If the student has failed six examinations/tests, no additional examination or new admission is provided.

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

After each course occasion there will be at least six occasions for the examination within a two-year period from the end of the course.

## Other directives

The course language is English.

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

Oral evaluation in the form of course council meetings will be carried out during the course.

## Literature and other teaching aids

### *Recommended literature*

*Altman, Douglas G.*

#### **Practical statistics for medical research**

London : Chapman and Hall, 1991 - xii, 611 s.

ISBN:0-412-38620-8 (hft.) LIBRIS-ID:8286190

[Library search](#)

*Bland, Martin*

#### **An introduction to medical statistics**

3. ed., [Nachdr.] : Oxford : Oxford University Press, 2009 - XVI, 405 S

ISBN:978-0-19-263269-2 LIBRIS-ID:11926588

[Library search](#)

*Dalgaard, Peter*

#### **Introductory statistics with R**

2. ed. : New York : Springer, cop. 2008 - xvi, 363 s.

ISBN:978-0-387-79053-4 (pbk. : alk. paper) LIBRIS-ID:11305121

[Library search](#)

*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](#)

*Rosner, Bernard*

#### **Fundamentals of biostatistics**

6. ed. : Belmont, Calif. : Thomson/Brooks/Cole, cop. 2006 - xx, 868 p.

ISBN:0534418201 LIBRIS-ID:9942420

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