Prerequisites for the Master Program in Biostatistics

Analysis (6 ECTS)

- sequences, series, convergence
- basic properties of functions (continuity, monotonicity, ...)
- differential calculus (uni- and multivariate)
- integral calculus (uni- and multivariate)
- Taylor's Theorem (uni- and multivariate)
- *Landau's notation*

Linear Algebra (3 ECTS)

- basic operations with vectors and matrices
- rank, determinant, positive definiteness, etc.
- linear combinations, linear independence, orthogonality
- inversion of matrices
- systems of linear equations and connection to matrices
- Cholesky factorization and other decompositions
- *eigenvalues and eigenvectors*

Probability (part of 9 ECTS)

- events, probabilities and conditional probabilities
- independence
- random variables and random vectors
- univariate density and distribution function
- multivariate density and distribution function
- expectation, variance, covariance
- expectation and variance of a function of a random variable or vector
- density of a function of a random variable ("change of variables")
- conditional distributions and conditional expectation
- density and distribution function of an i.i.d. sample of observations
- *law of large numbers and central limit theorem*

Statistics (part of 9 ECTS)

- descriptive statistics (sample mean, variance etc., some graphical displays)
- point estimation methods (MOM, MLE), bias
- concepts of tests of significance
- one- and two-sample standard tests
- interval estimation
- goodness of fit tests
- correlation and simple linear regression
- multivariate regression
- *one-way analysis of variance*

Biology/Biomedicine (6 ECTS)