Title of the course: Applied statistics

Credits: 2

Coordinator: Keszei, Ernő

Department: Department of Physical Chemistry

Pre-requisites: BSc calculus courses

Topics covered by the course:

The **aim of the course** is that students acqiure an active knowledge of the basics of probability theory and get skills in its application to the most important methods in applied statistics. They will also have skills in solving diverse statistical problems applying well-known statistical tools and methods.
Topics covered by the course are the following:
Outline of probability theory basics: Random experiment, random variables. Postulates of probability theory. Expected values and their properties. Stochastic convergence. The law of large numbers. Probability distributions: binomial and Poisson distribution. Identical, exponential and normal distribution. The Poisson process. Chi-squared, Student and Fisher distributions.
Statistics and its application: Population and sample. Sampling methods. Sample statistics. Statistical analysis. Expectation values of populations compared to sample statistics. Estimation methods: maximum likelihood, least squares, moments. Properties of estimators. Confidence intervals. Hypothesis testing: for one expectation, comparing two expectations. More expectations: methods of ANOVA. Comparing variances. Testing isoscedasticity. Statistical models. Linear and nonlinear parameter estimation. Goodness-of-fit tests. Implicit regression. Non-parametric estimation. Outlook to multivariate analysis.

Literature

Compulsory:
J. R. Green, D. Margerison: Statistical Treatment of Experimental Data, Elsevier, 1978

Suggested:

In English:

William Feller: An Introduction to Probability Theory and its Application, John Wiley, 1971

W. H. Press et al.: Numerical Recipes, The Art of Scientific Computing, Cambridge University Press, 1986

C. Chatfield, A. J. Collins:Introduction to Multivariate Analysis, Chapman and Hall, 1980

P.R.Bevington: Data Reduction and Error Analysis for the Physical Sciences, McGraw – Hill, 1969

In Hungarian:

Reimann-Tóth: Valószínűségszámítás és matematikai statisztika, Tankönyvkiadó, 1989