

Subject name	Statistics (for Biotechnology students)	
Subject code	IS-SBS-23	
Department	Dep. of Applied Mathematics	
Faculty	Environmental Engineering and Land Surveying	
Subject supervisor/Lecturer	Prof. Marek Ptak Ph.D., Agnieszka Rutkowska, Ph.D.	
General information	Teaching period	summer semester
	ECTS credit	6
	Lectures total	15
	Lab practical's	30
Objective and general description	The main objective of the course is understanding basic rules of discrete and continuous random variables, the probability distribution functions and density functions as well as basic statistical analysis methods: confidence intervals, parametric and non-parametric tests, goodness of fit tests and the correlation and regression analysis.	
Lectures 15 hours	<ol style="list-style-type: none"> 1. Probability – sample space and events, conditional probability, total probability and Bayes' Law. 2. Discrete and continuous variables. Measures of Central Tendency (the mean, median and mode values) and measures of dispersion (the variance, standard deviation and range). 3. Theoretical distributions of discrete and continuous variables (binomial, Poisson, uniform, normal, exponential, lognormal). 4. The central limit theorem, Cheebyshev Inequality. 5. Sample characteristics. 6. The parametric test of the mean value and of the variance for one and for two populations. 7. Goodness of fit tests (, Kolmogorov-Smirnoff) 8. Two variables: the Pearson correlation coefficient , test of , the linear regression. 	
Lab practicals 30 hours	<ol style="list-style-type: none"> 1. Application of the theorem of the total probability and the Bayes' theorem. 2. Discrete and continuous variables. Calculation of measures of the central tendency and dispersion. 3. The normal distribution. The use of the limit theorems. 4. Calculation of sample characteristics: the mean, variance, standard deviation and quantiles. 5. The sample distribution, histogram. 6. Parametric tests of the mean, proportion, variance. 7. Comparison of two populations using the parametric tests. 8. The sample correlation coefficient. 9. The linear regression. 10. Testing of the significance of the coefficient of correlation. 	

References

1. H. Browker, G. J. Lieberman “Engineering statistics”, Englewood Cliffs, 1961.
2. H. G. Tucker “Probability and mathematical statistics”, New York, 1962.
3. N. L. Johnson, F. C. Leone “Statistics and experimental design: in engineering and the physical science”, New York, John Wiley and Sons, 1969.
4. L. L. Chao “Statistics: methods and analyses”, McGraw – Hill Book Co., 1974.
5. J. T. McClave, Terry Sincich, “Statistics”, Upper Saddle River: Prentice Hall, 2000.