

Course title Statystyka / Statistics		ECTS code 13.3.1006	
Name of unit administrating study Faculty of Chemistry			
Studies			
Field of study	Type	Form	
Chemistry	Bachelor	Full-time studies	
Teaching staff Prof. dr hab. Tomasz Puzyn			
Forms of classes, the realization and number of hours		ECTS credits 2	
A. Forms of classes, in accordance with the UG Rector's regulations lecture		classes - 15 h tutorial classes – 15 h student's own work – 20 h	
B. The realization of activities in-class learning		Total: 50 h - 2 ECTS	
C. Number of hours 15 h lecture			
The academic cycle 2020/2021 winter semester			
Type of course obligatory		Language of instruction Polish	
Teaching methods Lecture, talk, solving tasks		Form and method of assessment and basic criteria for evaluation or examination requirements	
		A. Final evaluation, in accordance with the UG study regulations course completion (with a grade)	
		B. Assessment methods written exam – test assessment	
		C. The basic criteria for evaluation or exam requirements Demonstration of knowledge of basic statistical terms, the ability to interpret research results, knowledge about the applicability of statistical methods in the field of study of issues realized during the lecture by providing answers to the test. Obtaining over 50% of points from the test assessment.	
Required courses and introductory requirements Knowledge of mathematics at the level of the secondary school basic programme			
Aims of education The aim of the course is to provide students with the basics of general statistics in the field of description methods and statistical inference; developing the ability to freely use basic statistical terms; development of the ability to interpret the obtained research results; learning the possibilities of applying statistical methods in the studied field. The discussed methods will give students the basis for a deeper study of statistical methods within specialist subjects carried out during their studies.			
Course contents Initial issues and structure analysis The concept and methods of statistics, applications of statistics, basic concepts, statistical survey (types, stages), types of variables and scales. Data presentation: series, tables, charts. Analysis of distribution properties: classic and position measures of central tendency, dispersion, asymmetry and kurtosis. Random variables and their distributions A random step variable and a continuous random variable. The concept of probability density function and cumulative functions. Properties of distributions: binomial, Poisson, normal, t-Student, chi-square. Statistical inference			

The concept of random sample, statistics from the sample and estimator. Point and interval estimation: mean, variance and proportion. Determination of the minimum sample size. Verification of statistical hypotheses. The essence of testing hypotheses. Relationship between type I and type II error in testing statistical hypotheses. Severity level and critical area - critical level of significance (p-value). The concept of test power. Examples of issues in which parametric and non-parametric tests are used. Analysis of interdependence and regression
 Pearson's linear correlation coefficient and testing its significance. Linear regression function (estimation and interpretation of function parameters, assessment of the match, testing of the significance of the regression coefficient). Spearman's rank correlation coefficient and testing its significance. Estimation and interpretation of the parameters of the trend function, assessment of the match, testing the significance of changes over time.

Bibliography of literature

A. Literature required to pass the course

Augustyniak H., 1999, Statystyka opisowa z elementami demografii, Przedsiębiorstwo Wydawnicze „Ars boni et aequi”, Poznań;
 Górecki T., 2011, Podstawy statystyki z przykładami w R, Wydawnictwo BTC, Legionowo;
 Makać W., Urbanek-Krzysztofiak D., 2003, Metody opisu statystycznego, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk;
 Stanisław A., 2006, Przystępny kurs statystyki w oparciu o program STATISTICA PL na przykładach z medycyny (Tom I), StatSoft
 Kryszczyński W., Bartos J., i in., 1986. Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach. Część II Statystyka matematyczna, PWN;
 Luszniwicz A., Słaby T., 1997, Statystyka stosowana, PWE, Warszawa;
 Sobczyk M., 2003, Statystyka. Podstawy teoretyczne, przykłady – zadania, Wydawnictwo UMCS, Lublin;
 Kala. R., 2011, Statystyka dla przyrodników, Wydawnictwo BTC, Legionowo;

B. Extracurricular readings

Makać W., Urbanek-Krzysztofiak D., 2004, Metody opisu statystycznego, Wyd. UG, Gdańsk;
 Balicki A., Makać W., 2002, Metody wnioskowania statystycznego, Wyd. UG, Gdańsk;
 Koronacki J., Mielniczuk J., 2018, Statystyka dla kierunków technicznych i przyrodniczych, PWN, Warszawa;
 Kot S., Sokołowski A., Jakubowski J., 2011, Statystyka, Wyd. 2, PWN, Warszawa;
 Michalski T., 2004, Statystyka. Podręcznik, WSiP, Warszawa;
 Wieczorkowska G. i in., 2004, Statystyka. Wprowadzenie do analizy danych sondażowych i eksperymentalnych, Wydawnictwo Naukowe Scholar, Warszawa;

Knowledge

Universal level 6 knowledge characteristics

Student knows the advanced methods of statistical description of processes and phenomena occurring in space / in the natural and human life environment

Student knows, to an advanced degree, statistical methods for describing relationships between objects / facts / processes / phenomena occurring in the natural and human life environment

Knows and understands the terminology in the field of statistics

Second degree characteristics typical of qualifications obtained within the framework of higher education in the field of knowledge:

Student knows, to an advanced degree, statistical methods for the description of processes and phenomena occurring in space / in the natural and human life environment, characteristic for the studied field

Student knows, to an advanced degree, statistical methods of describing dependencies between objects / facts / processes / phenomena occurring in space / environment.

Skills

Universal level 6 characteristics in terms of skills:

Can routinely use statistical methods to solve tasks and complex and unusual problems in variable and not fully predicted conditions

Characteristics of the second degree typical of qualifications obtained in the framework of higher education in the field of skills:
 Is able to routinely use the knowledge in the field of statistics to solve tasks and complex and atypical problems in the field of oceanography and socio-economic geography and spatial economy in changing and not fully predicted conditions through the selection and use of appropriate statistical methods

Is able to communicate using the basic terminology in the field of statistics

Can conduct a discussion (argue and counterargument) using the proper terminology and facts confirmed scientifically.

Can explain the meaning of basic statistical terms and their interpretations in social communication

Social competence

Universal characteristics of level 6 in the field of social competences:

Is ready to independently decide on the use of known statistical methods, critical evaluation of the results of statistical surveys,

Second degree characteristics typical of qualifications obtained under higher education in the field of social competences:

Recognizing the importance of statistical knowledge in solving cognitive and practical problems in the field of the studied field.