Basic information about the subject (independent of the cycle)

Module name	**Basic Statistics**
Erasmus code	
ISCED code	
Language of instruction	English
Website	http://ekonomia.kampus.umcs.lublin.pl
Prerequisites	High school course in mathematics.
ECTS points hour equivalents	Contact hours (work with an academic teacher) Total number of hours with an academic teacher: **30h** Number of ECTS points with an academic teacher: 2ECTS Non-contact hours (students' own work) Total number of non-contact hours: 60h Number of ECTS points for non-contact hours: 4 ECTS Total number of ECTS points for the module: **6 ECTS**
Verification methods	Essay, paper, classroom activities, classroom discussion.
Description	Understanding statistics is essential to understand research in the social and behavioral sciences. In this course you will learn the basics of statistics; not just how to calculate them, but also how to evaluate them. This course will also prepare you for the next course in the specialization - the course Inferential Statistics. In the first part of the course we will discuss methods of descriptive statistics. You will learn what cases and variables are and how you can compute measures of central tendency (mean, median and mode) and dispersion (standard deviation and variance). Next, we discuss how to assess relationships between variables, and we introduce the concepts correlation and regression. The second part of the course consists of an introduction to methods of inferential statistics - methods that help us decide whether the patterns we see in our data are strong enough to draw conclusions about the underlying population we are interested in. We will discuss confidence intervals and significance tests.

	You will not only learn about all these statistical concepts, you will also be trained to calculate and generate these statistics yourself using freely available statistical software.
Reading list	Any good book in statistics should be useful. Our main reference will be Black, K. (2009). *Business statistics: Contemporary decision making*. John Wiley & Sons.

A list of topics	1. Introduction 1.1 What is Statistics? 1.2 Population versus sample 1.3 Types of variables 1.4 Cross-section versus time-series data 1.5 Sources of data 2. Organizing and graphing data 2.1 Raw data 2.2 Organizing and graphing qualitative data 2.3 Organizing and graphing quantitative data 2.4 Shapes of histograms 3. Numerical descriptive measures 3.1 Measures of central tendency for ungrouped data 3.2 Measures of dispersion for ungrouped data 3.3 Mean, variance, and standard deviation for grouped data 3.4 Measures of position 4. Simple linear regression 4.1 Simple linear regression model 4.2 Simple linear regression analysis 4.3 Standard deviation of random errors 4.4 Coefficient of determination 4.5 Linear correlation 5. Making inferences about population parameters 5.1 Statistical inference: estimation for single populations 5.2 Statistical inference: hypothesis testing for single populations 5.3 Statistical inferences about two populations 5.4 Analysis of variance and design of experiments
Educational outcomes	

Lecture title	Learning objectives
Introduction to Statistics	The primary objective is to introduce the student to the world of statistics, thereby enabling to: **1.** List quantitative and graphical examples of statistics within a business context. **2.** Define important statistical terms, including population, sample, and parameter, as they relate to

	descriptive and inferential statistics. **3.** Compare the four different levels of data: nominal, ordinal, interval, and ratio.
Organizing and graphing data	The overall objective of the lecture is for student to master several techniques for summarizing and depicting data, thereby enabling to: **1.** Construct a frequency distribution from a set of data. **2.** Construct different types of quantitative data graphs, including histograms, frequency polygons, ogives, dot plots, in order to interpret the data being graphed. **3.** Construct different types of qualitative data graphs, including pie charts, bar graphs, and Pareto charts, in order to interpret the data being graphed. **4.** Recognize basic trends in two-variable scatter plots of numerical data.
Numerical descriptive measures	The focus of the lecture is the use of statistical techniques to describe data, thereby enabling to: **1.** Apply various measures of central tendency—including the mean, median, and mode—to a set of ungrouped data. **2.** Apply various measures of variability—including the range, interquartile range, mean absolute deviation, variance, and standard deviation —to a set of ungrouped data. **3.** Compute the mean, median, mode, standard deviation, and variance of grouped data. **4.** Describe a data distribution statistically and graphically using skewness, kurtosis, and box-and-whisker plots. **5.** Use computer packages to compute various measures of central tendency, variation, and shape on a set of data, as well as to describe the data distribution graphically.
Simple linear regression	The overall objective of this lecture is to give you an understanding of bivariate linear regression analysis, thereby enabling you to: **1.** Calculate the Pearson product-moment correlation coefficient to determine if there is a correlation between two variables. **2.** Explain what regression analysis is and the concepts of independent and dependent variable. **3.** Calculate the slope and y-intercept of the least squares equation of a regression line and from those, determine the equation of the regression line. **4.** Calculate the residuals of a regression line and from those determine the fit of the model, locate outliers, and test the assumptions of the regression model. **5.** Calculate the standard error of the estimate using the sum of squares of error, and use the standard error of the estimate to determine the fit of the model. **6.** Calculate the coefficient of determination to measure the fit for regression models, and relate it to the coefficient of correlation.

		7. Use the t and F tests to test hypotheses for both the slope of the regression model and the overall regression model. **8.** Calculate confidence intervals to estimate the conditional mean of the dependent variable and prediction intervals to estimate a single value of the dependent variable. **9.** Determine the equation of the trend line to forecast outcomes for time periods in the future, using alternate coding for time periods if necessary. **10.** Use a computer to develop a regression analysis, and interpret the output that is associated with it.
	Time-series forecasting	This lecture discusses the general use of forecasting in business, several tools that are available for making business forecasts, the nature of time-series data, and the role of index numbers in business, thereby enabling you to: **1.** Differentiate among various measurements of forecasting error, including mean absolute deviation and mean square error, in order to assess which forecasting method to use. **2.** Describe smoothing techniques for forecasting models, including naïve, simple average, moving average, weighted moving average, and exponential smoothing **3.** Determine trend in time-series data by using linear regression trend analysis, quadratic model trend analysis, and Holt's two-parameter exponential smoothing method. **4.** Account for seasonal effects of time-series data by using decomposition and Winters' three-parameter exponential smoothing method **5.** Test for autocorrelation using the Durbin-Watson test, overcoming it by adding independent variables and transforming variables and taking advantage of it with autoregression. **6.** Differentiate among simple index numbers, unweighted aggregate price index numbers, weighted aggregate price index numbers, Laspeyres price index numbers, and Paasche price index numbers by defining and calculating each.
Teaching methods	Lectures including multimodal presentations, Case studies, Work in computer laboratories Statistics is learned through reading the book, hearing the lectures, and doing the homework. If a student is not doing the reading, then he is more likely to have more difficulty following and comprehending the lectures.	

Assessment methods	1. **General requirements:** Students are requested to complete required readings and prepare for lectures before attending. Three hours of outside self-study is recommended for each hour of class and counseling time.

2. **Lecture attendance:** Students have to arrive on time to class, stay the entirety of the class and keep absences to a minimum. I expect to be informed beforehand if you need to miss a class. To encourage this policy, a student who is not present in class more than one time will not be grade for course based on “collection of the points” but based on final exam.

3. **Counseling:** Individual or small group volunteer access to the lecture. It is the responsibility of the student to seek help and ask questions when concepts presented in lecture or the textbook are not clear. However, if the student encounters the decline in scores, a counseling meeting may be initiated by the lecturer.

4. **Exams:** A series of short exercises are required to make up the total course grade – only for the students who attended the classes (one absence is acceptable). These exercises would be available for students during the whole course: lecture and e-learning module. Student collects the points which will be given for solving exercises, and at the end of course an appropriate grade would be given. Grades for course are setup according to the following scale:

Points	Grade
Below 50	2.0 / F (Fail)
50 - 60	3.0 / E (Sufficient)
61 - 70	3.5 / D (Satisfactory)
71 - 80	4.0 / C (Good)
81 - 90	4.5 / B (Very good)
91 - 100	5/ A (Excellent)

Students who fail to collect a sufficient number of points or for those who has more than one absence, can attempt one time to pass that exam (counseling meetings), however there will be no “makeup” of exams if students receive grade 3.0 / E (Sufficient) or higher. Cheating is not acceptable in any form. Any evidence of cheating in exams will lead to annulling the grade and disciplinary procedure. Exams may include material from all reading assignments, all lectures, and all assignments. Grades for exam are setup according to the following scale:

%	Grade
Below 50	2.0 / F (Fail)
50 - 60	3.0 / E (Sufficient)

61 - 70	3.5 / D (Satisfactory)
71 - 80	4.0 / C (Good)
81 - 90	4.5 / B (Very good)
91 - 100	5.0 / A (Excellent)

Student who gets 2.0 (Fail) as finale course grade can attempt two times to pass the extra final exam, but there will be no makeup of that exam if student receive grade 3.0 (Sufficient) or higher.

If student is not present for an exam, the missed grade will be dropped from the averaging process. If student miss in excess of one exam, a grade of 2.0 will be recorded for the second missed exam and averaged into the final grade.

5. **Course changes:** This course syllabus provides a general plan for the course. The instructor reserves the right to make changes to the syllabus; including: assignments (projects), timetable, and examinations, etc., in order to accommodate the needs of the class as a whole and fulfill the goals and objectives of the course. If changes are necessitated during the term of the course, the instructor will immediately notify students of such changes by e-mail communication and/or announcement in class.