
Course title	Mathematical statistics
Course code	Mate3007
Credit points	2
ECTS credit points	3
Total Contact Hours	32
Number of hours for seminars and assignments	32 practical

Course developer

Dr.math., Associate professor Anita Sondore

Prior knowledge

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Course abstract

The course aims to introduce students to the main notions and methods of mathematical statistics. Topics include grouping of the statistical information, descriptive statistics, emphasizing graphical displays, hypothesis testing, correlation and regression analysis, time series analysis. The seminars will focus on usage of mathematical statistics methods with Microsoft Excel and interpretation of the obtained results.

Learning outcomes

- students can construct frequency tables and representing data visually using MS Excel and without it;
- used mathematical statistical methods for analysis of the statistical information (using MS Excel and without it), for example, calculates the key indicators of descriptive statistics, calculates confidence intervals of the population mean and population variance; used statistical hypothesis tests for comparing two population means (variances); used pairs correlation and regression analysis; knows time series analysis;
- students can interpret the obtained results.

Course content

Seminars – 32 contact hours

Statistic, statistical observations and their organization. Population and sample. Samples types. Frequency tables and graphical representation of the frequency tables. Descriptive statistics: mean, mode, median, range, variance, standard deviation, coefficient of variation, standard error of the mean, relative standard error of the mean. Grand mean and variance. The confidence intervals of

the population mean and population variance. The required sample size calculation. Steps of the testing process. Normality test. Statistical hypothesis t-tests for comparing two population means (independent sample, dependent sample). Statistical hypothesis F-tests for comparing two population variances. Techniques used to quantify the associations between two continuous variables. Scatter plot. Two sample correlation coefficient. Linear and non-linear regression equations, the predicted values of the outcome. Times series concept. Seasonal time series. Methods of trend calculation, forecasting.

Course plan Seminars

– 32 CH

Seminar topics:

1. Statistic, statistical observations and their organization. Statistical information gathering. Sample types.
2. Data grouping (frequency tables) and graphical displays of frequency tables.
3. The calculation of key indicators of descriptive statistics using formulas.
4. The calculation indicators of descriptive statistics using MS Excel.
5. Grand mean and variance.
6. Steps of Hypothesis tests. Hypothesis about normal distribution.
7. The confidence intervals of the population mean and population variance.
8. The first test about topics- data grouping and graphical presentation, descriptive statistics, the required sample size calculation, the confidence intervals of the population mean and population variance.
9. Statistical hypothesis tests for comparing two population variances.
10. Statistical hypothesis tests for comparing two population means (independent sample, dependent sample).
11. Techniques used to quantify the associations between two continuous variables. Scatter plot.
12. Paired correlation analysis.
13. Paired regression analysis.
14. Times series concept. Methods of trend calculation, forecasting.
15. Seasonal times series, forecasting.
16. The second test about topics- some hypothesis testing, paired correlation and regression analysis, times series analysis.

Requirements for awarding credit points

The course provides the knowledge, skills, skills acquisition. During the study course examination form – marked pass. Requirements of the course learning – regular attendance and active work in 20%, independent work (two tests) execution of 80%. Used in study methods and forms – lectures, seminars, independent work.

Compulsory reading

1. I.Arhipova, S.Bāliņa. Statistika ekonomikā un biznesā. Risinājumi ar SPSS un Microsoft Excel, Datorzinību centrs, 2006.
2. M.Buiķis, J.Carkovs, B.Siliņa. Varbūtību teorijas un statistikas elementi, Zvaigzne, 1997.
3. L.Grīnglazs, J.Kopitovs. Matemātiskā statistika ar datoru lietojuma paraugiem uzdevumu risināšanā, Rīga, 2003.
4. Z. Goša. Statistika, Rīga, 2003.
5. A. Koliškins. Varbūtību teorija un matemātiskā, Zvaigzne ABC, 2011.
1. M.L. Samuels, J.A. Witmer. Statistics for the life sciences, Pearson Education, Inc, 2011.
2. Кремер Н.Ш. Теория вероятности и математическая статистика, ЮНИТИ-ДАНА, 2007.

Further reading 1. J.Smotrovs. Varbūtību teorija un matemātiskā statistika,

Zvaigzne ABC, 2004.

1. F.M.Dekking, C.Kraaikamp, H.P.Lopuhaä, L.E.Meester. A modern introduction to probability and statistics. Understanding why and how, Springer, 2005.
2. H.O.Georgii, Stochastics: Introduction to Probability and Statistics, De Gruyter, 2008.
3. G.K.Kanji. 100 Statistical Tests. Sage Publications Ltd, 2006.
4. M.R.Spiegel, J.J.Schiller, A.V.Srinivasan Easy Outline of Probability and Statistics. McGrawHill, 2002.
5. J. Schmuller. Statistical analysis with Excel for dummies, Wiley Publishing, Inc., 2009.
6. Баврин И.И. Теория вероятностей и математическая статистика, Высшая школа, 2005.

Periodicals and other sources

<http://www.de.du.lv>

We identify programs and portions (A, B, C, D) adheres to this course Bachelor's

study program "Mathematics" Part A.