

Course Syllabus for “Introduction into Statistics”

Approved by the Academic Council of the
Master’s Degree Programme Population and
Development
Minutes No. 2 , dated 26.06.2019

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No. of credits	2
Contact hours	16
Independent study (hours)	60
Year of study, degree programme	1st year, Master's Programme Population and Development
Study format	Lectures, classes and independent work

1. Objectives, Results of the Course Study and Pre-requisites

The course is primarily aimed at promoting the reproducible approach to academic workflow. The goal of this course is to systematize students’ knowledge of statistics and to practice its application using mostly Microsoft Excel package.

It is assumed that after completing the course a student

- owns the basic terminology of statistics;
- performs analysis of academic literature on a selected topic. Uses special sources of information: legislative databases, statistical databases, websites of Russian and international organizations (Rosstat, OECD, World Bank, UN, Eurostat, etc.), processes data of population surveys using one of common statistical packages and interprets the results;
- chooses research area, collects necessary information, relates theoretical concepts to actual statistical and legislative information. Reads and analyzes the academic literature on a selected topic in English. Uses special sources of information: statistical databases, websites of Russian and international organizations (Rosstat, OECD, World Bank, UN, Eurostat, etc.);
- proposes quantitative tool that evaluates and explains the processes taking place in society, as well as an adequate method for its evaluation;
- finds the necessary statistical data for research;
- assesses the required quantitative tool using available statistical data using modern statistical software;
- gives a meaningful interpretation of the obtained results of application a quantitative tool.

2. Course Contents

Topic (course section)	Total hrs	Expected learning outcomes (ELO) to be assessed	Assessment formats
	LC		
	SM		
	onl/sw		
Topic 1. Basic statistics	4	Calculates basic statistics for both categorical and numerical data. Presents initial data and the results of exploratory statistical analysis	First assignment
	4		
	30		
Topic 2. Introduction to inferential statistics	4	Makes basic statistical inference based on primary data	Second assignment, Term final
	4		
	30		
Hours for types of classes:	8		
	8		
	60		
Total hours	76		

Course formats:

LC – lectures;

SM - seminars/practical courses/ laboratory work;

Onl. –online lectures and other Internet courses;

SW – student independent work.

Course section contents:

Topic 1. Basic statistics

Population and sample. Classification of variables. Measures of central tendency: mean and mode. Measures of spread: variance (standard deviation), inter quartile range. Numerical data summary. Basic statistics for time series data.

Topic 2. Introduction to inferential statistics

Random experiment, outcomes, events. Probability postulates and rules. Binomial and normal probability distributions. Confidence intervals for population proportion and population mean. Sample size determination. Confidence intervals as a way to hypothesis testing.

3. Assessments

Assignments will be announced once certain blocks of topics have been covered. There will be 2 assignments and all deadlines will be announced in advance. All will count towards the course grade. Assignment should be submitted before next classes. All work should be written clearly in complete sentences and in a reasonable font size.

At the term final you will be allowed to use a single-sided formula sheet that is hand written/typed, there should be no words on it. A calculator will be allowed too.

Overall grade will be determined as follows:

A_1 and A_2 = first and second assignments correspondently (0-10 points each),

S = seminar/practical class activity (0-10 points),

T = term final (0-10 points)

$$\text{Overall grade} = 0,25A_1 + 0,25A_2 + 0,25S + 0,25T.$$

The rule of rounding is arithmetic.

Grading scale:

8-10 points: Great understanding of the theory and practical skills, correct solutions

6-7 points: One solution is not complete, theory and practical skills are not presented fluently

4-5 points: Solutions are not complete, there are gaps in knowledge/skills

1-3 points: Unsatisfactory work.

4. Examples of Assessment Materials

Preliminary analysis of cross-sectional data

The aim of the research: To summarize data on households living conditions in Russia and present a statistical report

Data source: micro data of the Households Budget Survey (<https://www.hse.ru/en/monitoring/income/>) from <https://www.hse.ru/en/monitoring/>.

1. Present data for two different territories (regions) of your choice and a brief summary of the data in tables and graphs separately for categorical and numeric types.
2. Compare the regions on qualitative aspects of living conditions using diagrams.
3. Calculate order statistics (median, quartiles, etc.) and moments for numeric data.
4. Present the density of numeric data in the form of histogram.
5. Calculate mean value and variance for interval data and compare the results with the results of initial data processing.

Blocking elements are not present.

5.

6.

7.

8. Resources

8.1. Key recommended reading

№ p/p	Name
1	<i>Newbold, P., Carlson W., Thorne, B. (2013) Statistics for Business and Economics. Pearson.</i>

8.2. Recommended further reading

№ p/p	Name
1	<i>Upton, G., Cook, I. (2008) A dictionary of statistics. Oxford University Press.</i>
2	<i>Williams, D. (2010) Weighing the odds: a course in probability and statistics. Cambridge University Press.</i>

8.3. Software

№ p/p	Name	Terms for access/downloading
1	MS Office	<i>from HSE University's internal network (agreement)</i>
2	IBM SPSS Statistics	<i>from HSE University's internal network (agreement)</i>

8.4. Professional databases, information reference systems, e-resources (eLearning resources)

№ p/p	Name	Terms for access/downloading
1	HSE Monitoring Studies	<i>from HSE University's internal network</i> (https://www.hse.ru/en/monitoring/)
2.	UNDP	<i>Data of United Nation Development Programme</i> Open access on http://www.undp.ru
3.	Eurostat	<i>Data of Eurostat</i> Open access on https://ec.europa.eu/eurostat/
4	WHOSIS	<i>Data of World Health Organization Statistical Information System</i> Open access on http://www.who.int/whosis

8.5. Supplies and technical support for the course

As a rule, seminars are held in computer classes where, in addition to open source software, licensed statistical software is installed.

9. Organization of Studies for Persons with Limited Mobility and Disabilities

If necessary, learners with limited mobility or a disability (as per his/her application), as well as per his/her individual rehabilitation programme, may be offered the following options for receiving learning information with due consideration of his/her individual psycho-physical needs (e.g., via eLearning studies or distance technologies):

9.1.1. *for persons with impaired vision:* enhanced fonts in hard copy documents; e-documents; audio files (transfer of study materials to an audio-format); hard copy documents

with the use of Braille; individual consultation with a facilitated communicator; individual assignments and mentoring;

9.1.2. *for persons with hearing impairments*: in hard copy; e-documents; video materials with subtitles; individual consultation with a facilitated communicator; individual assignments and mentoring;

9.1.3. *for persons with a muscular-skeleton disorder*: in hard copy; e-documents; audio-files, individual assignments and mentoring.

10. Additional Information

Classes: Attendance and keeping track on class activities is your responsibility of students. Students are expected to actively participate in the classes. This implies solving proposed problems, explaining solutions to the class and answering other questions on the topic discussed.

The lecturer reserves the right to make any changes that he deems academically advisable. Changes will be announced in class. It is responsibility of students to keep up with any changed policies.