

# Renewal of a course on Survey Sampling at Kyiv University for speciality Statistics<sup>1</sup>

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## Abstract

We describe the present situation on teaching Survey Sampling in the Department of Probability Theory and Mathematical Statistics at Kyiv National University. The shortcomings are analyzed and needed changes are suggested.

## 1 Introduction

Last year (2007) Ukraine joined the Baltic-Nordic Network on Survey Statistics. Kyiv University, in particular the Department of Probability Theory and Mathematical Statistics has become the first but I hope not the last partner from Ukraine. A web-page on the Baltic-Nordic-Ukrainian Network and its activities concerning Ukraine has been developed within our Department's web-site in English. [1] A Ukrainian version of it will be available in the nearest time and will favor further promotion of the network among Ukrainian statisticians.

Ukraine, as well as other ex-Soviet republics, has a high level in Probability Theory and those parts of Mathematical Statistics that are applicable in engineering, biology, climatology, etc. But such branch of Mathematical Statistics as Survey Sampling almost had not being developed. It is clear that a need of this branch becomes stronger and stronger with time.

The course of Survey Sampling was introduced at our Department in 1996 within the speciality "Statistics". It became possible due to the two European Tempus-Tacis projects running from 1996 to 2000.

This course is intended for the last year students specializing in Statistics: in the fifth year for the "Specialist" degree and in the sixth year – for the "Master" degree. It

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includes one double lecture and one double practical lesson per week during the autumn semester. This situation is not very convenient. Usually students in the final stage of university studies have already become formed in their area of research interests. So far, this situation is not very favorable for the attraction of students to make research in Survey Sampling. Those who become interested need to study this subject on their own. Since Kyiv University has joined to the Bologna process it could be possible to make some changes in the teaching programme and move the Survey Sampling course to an earlier stage.

The first person who started to teach Survey Sampling at our Department was Victoria Parkhomenko. She was involved in the two Tempus projects mentioned above. As a result the book "Survey Sampling Methods" by her appeared in 2001 [2]. Another book in the Ukrainian language, "Survey Sampling Technique" by Oleksandr Chernyak [3], was published at the same time. These two books have been used for the teaching purposes at our Department.

Both of them have some advantages and disadvantages. Parkhomenko's book includes a good overview of the basic ideas and types of sampling schemes. The main drawback is a lack of mathematical grounds. That is, the mathematical proofs of the statements are not provided in it. Chernyak's book has very good structure and contains basic notions and proofs where it is appropriate. It suits very well for self-instructions of students. But the main drawback is that only a few copies of this book are available in the library.

Another shortcoming common for these two books is the neglect of such an important point in Survey Sampling as the Model-based approach. The phenomenon of nonresponse and other sources of nonsampling errors are not completely covered.

## **2 Plans for renewal**

According to what is written above there is a strong need for renewal of the teaching materials in order to cover these shortcomings. Last academic year the lectures on Survey Sampling were based mostly on the book "Sampling: Design and Analysis" by Sharon Lohr [4]. Taking into account good mathematical background of our students

we have decided to use the book "Model Assisted Survey Sampling" by Carl-Erik Särndal et al. [5] as basic next year. Unlike the majority of the textbooks on Survey Sampling the central ideas of sampling theory in this book are developed from the unifying perspective of unequal probability sampling. This seems to us is a suitable point of delivering the sampling theory to students with strong ground in probability and mathematical statistics. We also try to include such topics as domain estimation, variance estimation, methods for handling nonresponse and use of statistical modeling in derivation of estimators within, of course, the limits of teaching time available.

Beginning from the next academic year it is planned to use modern technical aids (projector, etc.) for delivering lectures. The lectures on Survey Sampling will be available in electronic form on the web-site of our Department.

During the practical lessons students have the possibility to process data using SPSS (basically) and also Statistica and Mathematica (optionally). The choice of SPSS as the main tool for working with data was caused by two reasons. The first is that the last year students have already the elementary experience in using this software. The second reason lays in use of it by main governmental statistical institutions. Despite this, SPSS is not very suitable software for teaching purposes. It is desirable that students can implement probabilistic sampling schemes step by step on their own. Relying on the experience of Nordic and Baltic countries, in particular Estonia [6], we intend to work out the tasks for practical lessons based on Statvillage (Schwarz 1997) [7] and R-language [8].

The Department of Probability Theory and Mathematical Statistics at Kyiv National University continues to develop co-operation with scientists and practitioners from the Scientific and Technical Complex of Statistical Research at the State Statistics Committee of Ukraine and from the Institute for Demography and Social Research. Our students have 4 weeks of practice at different departments of these organizations and are invited to prepare their qualification papers (for bachelor, specialist or master degree) under supervision of scientists and practitioners from these institutions.

Participation in the Baltic-Nordic-Ukrainian Network on Survey Statistics helps very much in increasing interest to this area. Now we have four students preparing their theses in Sampling Theory. Subjects of the students' theses are more oriented on the

practical implementation of Sampling Theory. Two of them are partly employed in the Scientific and Technical Complex of Statistical Research. The other two work on their theses under joint supervision of Olga Vasylyk and leading scientists from the Institute for Demography and Social Research.

### 3 Acknowledgments

We would like to thank Prof. Gunnar Kulldorff who kindly hosted visitors from Ukraine during this spring. We believe that our co-operation with Nordic and Baltic countries and Belarus will be fruitful and cause strong increase of interest to Survey Sampling Theory in Ukraine.

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