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**Modern training of statisticians**

**for modern globalized economy**

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**Education of masters in official statistics**

**for globalized economy**

**and modern ICT environment**

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Education of Masters in official statistics

for globalized economy and modern ICT environment

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1. Need of modernization of education of high-level statistical staff in globalized economy and modern ICT environment

Official statistics is one of most important layers of the information infrastructure of societies, economies, states and international organizations. The duties of official statistics in modern economies are following:

* Elaborating of methods and tools of observation and measuring of social, economic, technological and ecological phenomena and processes, for which scientific statistical methods are relevant and applicable.
* Defining information standards and languages for describing quantifiable characteristics of real world phenomena and processes.
* Organizing and maintenance of the information infrastructure oriented on the monitoring, measuring, describing and analyzing the phenomena and processes.
* Realizing statistical production processes, storage and dissemination of official statistical information and metainformation.
* Providing professional statistical and analytical services.
* Active control of using statistical information standards, especially official statistical metadata, and quality control of official information relevant to the field of activity of official statistics: economic, social, ecological and technological.

The duties and rights of official statistics in the information infrastructure of democratic states and modern economies are specified in the UN Fundamental Principles of Official Statistics.

For fulfilling these duties all official statistical agencies, offices and institutes as well as all other organizations that are entitled by law to realize official statistical processes and to manage official statistical systems. The statistical professional staff of all active stakeholders of official statistical processes and systems responsible for that should have complex, modern knowledge on theoretical foundations, methods, techniques, tools and practices necessary for designing, implementing, managing statistical processes and systems in globalized economy and modern ICT environment. This knowledge is only partly delivered in the programs of education of statistics at the universities. Traditional education of statistics at the universities is limited to the basics of theory of statistics and to methods and tools of analysis of statistical data. The graduates coming from universities to statistics and the statisticians educated in traditional statistical knowledge based on existing “best practices” and on training-on-the-job petrifying existing habits of statistical activities, should be equipped with modern knowledge on how to develop and manage statistical processes and systems in modern information environment of economies, societies and states. This is the main objective of the MOS studies. Official statistics of today needs Masters in Official Statistics.

Main profile of the MOS studies is the delivering to the people who are actively working in statistical production systems and in statistical units of other economic, administrative and social subjects, the knowledge necessary for optimal realization of statistical processes and for the development of statistical systems in modern social, economic and technological environment, taking into account specific duties and functions of official statistics in the building of information infrastructure of the world of today, i.e.:

* democratic information society,
* knowledge – based economy,
* globalized, market – driven economy,
* deep institutional interventionism of international organizations, supranational institutions, governments, professional and social corporations in economic and social life,
* common use of global ICT technologies
* global, sectorial, national and regional information infrastructure,
* strategic role of the R&D sector in economic, social and political development.

The MOS post – graduate studies (Master in Official Statistics) have the educational profile similar to that of the MBA (Master of Business Administration) or MPA (Master of Public Administration).

The MOS is the complex of post-graduate courses for persons with B.A., B.Sc., M.A. or M.Sc. degrees (relevant level of knowledge of mathematics, statistics, ICT or equivalent subjects), with practical experience of work in official statistics or in statistical activities for scientific or business purposes (e.g. market analysis, scientific statistical surveys in economics, sociology, technical sciences and other disciplines etc.). The MOS studies are also addressed to the professionals with other experience, who are willing to extend their knowledge in management of statistical processes and systems, designs and organization of statistical surveys, dissemination of statistical data and in use of advanced statistical technologies and the ICT.

The MOS program is especially addressed to the managers of statistical agencies or offices, to statistical methodologists designing statistical surveys and systems, to the analysts producing official statistical data, to the consultants, experts and advisors of governments and businesses, using statistical data and methods for official purposes, and to the organizers of official statistical surveys, IT experts and managers of statistical resources and archives.

1. Who should be the **Master in Official Statistics** (**MOS**)

The MOS program represents the ***minimal common denominator of knowledge*** and skills necessary for managerial, methodological, analytical and research staff of all:

* international and supranational official statistical agencies and institutes,
* national statistical agencies and statistical services of governments,
* other institutes involved in the realization of official statistical processes and systems,
* agencies realizing professional statistical activites.

The MOS knowledge and skills are necessary for staff of all statistical agencies and stakeholders playing active role in programming, planning, coordination, management of units and realization of statistical processes of statistical offices and other institutes mentioned above:

* high level managerial staff of statistical agencies and institutes (decision – makers and coordinators),
* middle – level managerial staff (heads of division and sections, regional statistical offices, statistical divisions of ministries and other governments) of statistical institutes,
* managers of statistical surveys and statistical production processes, data bases and warehouses, metadata bases and warehouses,
* methodologists responsible for development and maintenance of statistical metadata and other methodological standards, for statistical methodology of domains of statistics and surveys,
* analysts elaborating output data and official statistical analyses,
* ICT managers and experts developing and maintaining statistical ICT infrastructure, database systems,
* high – level experts responsible for development of system of dissemination of statistical information and cooperation with mass media, journalists specialized in domains of economic and social life, for which professional knowledge of statistical production is necessary.
* scientists, researchers and teachers of statistics,
* scientists and experts professionally using statistical data for research, consulting, advisory works for governments, social organizations and businesses.

1. General scope of knowledge of the MOS

The general scope of knowledge to be included to the ***common denominator* *of statistical knowledge*** of MOS:

* Mission of official statistics in democratic societies and in modern economies.
* Institutional frameworks of co-ordination and integration of official statistics in global scale (UN, ISI).
* Deontological, methodological and legal principles of official statistics of ISI, UN, EU and other organizations.
* Organization of information systems of official statistics on global scale, models of national systems of official statistics and their interrelations.
* Legal and institutional frameworks of national systems of official statistics. Model of co-operation between national official statistical agencies, governments, businesses and research.
* Models of information infrastructure of modern society and economy. Place and functions of official statistics in the information infrastructure. The system of official statistics as semantic and methodological integrator of social and economic information systems, especially of administrative records and information systems.
* Information standards relevant to statistics. Standardization of information systems in society and economy in modern ICT environment. Methodological foundations of standardization of metainformation. Types of information standards. Processes of standardization of information.
* Statistical standards and their role in harmonization and integration of social and economic information, with special reference to metainformation and methodological standards.
* Sources of official statistics in modern ICT environment. Administrative information systems and “big data” as the sources of statistical information.
* Statistical production processes in modern ICT environment. Basic types of statistical production processes. Impact of modern ICT on statistical production processes.
* Quality of statistical information: criteria, methods, tools of quality control.

Traditional training and education of statisticians at the universities does not cover the topics listed above satisfactorily. The profile of teaching statistics at universities is mainly oriented to statistical theory, sampling methods and techniques, basics of analyses of statistical data. Official statisticians are – as a rule – educated at work (training on the job). Because of that, they are accepting and following the approaches and habits existing in statistical units, in which they start their carrier after school. Those habits and approaches are often not adjusted to the needs of globalized society and economy and to the possibilities of modern ICT. The domination of “on the job” education of professional statisticians is the reason and cause of strong ***methodological inertia*** of official statistics. In practice of many statistical units there is acting the “fundamental law of development of official statistics”: ***the inertia is the main internal driving force of progress in official statistics***. The MOS studies should help to re-profile the attitude of official statisticians ***from inertia to creativity***.

 The re-education of all official statisticians helping them to meet the expectations of users and external stakeholders of official statistics in global information society and knowledge – based economy should the objective of statistical education of today.

Transformation of professional profile of official statisticians should be started from upper level of official statisticians – managers, methodologists, organizers of surveys, coordinators and disseminators of statistical information. Typical profile of education of most of employees in official statistical agencies is not adjusted to the needs of knowledge – based economy and information society. Often the common level knowledge of an official statistician of today is adjusted to the survey based on paper -embedded questionnaires (although replaced by electronic digits) and production of tables (“Q-T model”, i.e. *from questionnaire to table*). It is not what statistics needs today. Statistical production systems should be designed as flexible technological processes.

Education of statisticians today should be focused on the formation of statisticians for the future. In information society of the dear future official statisticians will be the providers of highly professional information services on the basis of data accessible for them by law. They will be responsible for the development of official standard methods and indicators for measuring social and economic phenomena and processes. The task of official statistics shall be also the development and maintenance of metadata standards for economic and social official information systems. Production of statistical “raw material”, dominating in official statistical agencies of today, could be outsourced to specialized firms offering data processing services or could be executed by the offices or institutions managing administrative information systems.

Official statistical agencies should be prepared to deep structural changes of professional profile of statistical staff. Designers of questionnaires and tables, data entry staff and so called EDP personnel will be significantly reduced. The knowledge of the statisticians of the future cannot be limited to “classic statistics”, data processing technology and production of publications. Education of professional statisticians should include “classic statistical knowledge” and the following basic problem areas:

* statistical ethics and its practical implications for official statistical activity,
* statistical metainformation theory and practice of development and maintenance of statistical metainformation systems,
* standardization and standards in official statistics, standard driven coordination of official information systems,
* information infrastructure of global economy and information society, official statistics as a segment of the infrastructure,
* economic and social indicators for measuring social and economic phenomena in global, open economy,
* adjustment and use of administrative information systems for statistical production,
* organization of statistical production using modern ICT,
* dissemination methods and techniques of statistical data and metadata using ICT and mass media
* TQM in statistics and administrative information systems,
* IT assisted design of statistical surveys,
* economy of information activity and official statistics.

The knowledge “beyond classic statistics” is also necessary for official statisticians for realization of the functions of official statistical agencies as integrators and coordinators of information infrastructures of states and supranational agencies within the frames relevant to statistics.

The process of MOS education of leading staff of official statisticians shall be an integral part of the programs of capacity building of official statistical systems and agencies.

1. Specification of subjects of the MOS studies

The subjects of the MOS studies are divided into two groups:

* **Basic subjects** creating the ***minimal common denominator of knowledge*** of all Masters in Official Statistics
* **Specific subjects** delivering detailed knowledge needed by statisticians in their specific occupations and duties.

**4.1. Basic subjects**

1. Official statistics and its role in modern information society and knowledge – based economy
2. Deontological principles of official statistics (in the light of official statistical document of UN, ISI, EU and national statistical societies)
3. Role and organization of global official statistical system
4. Models of national systems of official statistics
5. Programming, planning and coordination of official statistics on national and supranational level
6. Statistical confidentiality and its impact on statistical methodology
7. Official statistical indicator - theoretical and methodological foundations of official statistical measuring
8. Statistical metadata
9. Statistical frames
10. Statistical surveys based on questionnaires
11. Statistical surveys based on administrative records and “big data” sources
12. Official statistical interviewing in modern ICT environment
13. Statistical database systems
14. Statistical production process
15. Models of statistical surveys in modern ICT environment
16. Quality control of statistical processes and data editing
17. Integrity and integration of official statistical information
18. Dissemination of statistical knowledge in modern ICT environent
19. Archiving of official statistics
20. Economics of official statistics
21. Analytical activity of official statistics
22. Cooperation with stakeholders of official statistical processes and systems

**4.2. Subjects relevant to special interest and responsibilities**

1. ICT for managers of official statistical surveys, systems and agencies(impact of modern ICT on methodology and organization if surveys)
2. Electronic questionnaires
3. Electronic censuses
4. Impact of internet on statistical methodology and organization of surveys
5. Municipal statistics
6. Statistical GIS
7. Delimitation of geographic space based on official statistical data (from the points of view of specific criteria, e.g. local labor markets, environment pollution areas, demographic processes, factors of economic growth etc.)
8. Dealing with non-response
9. Bringing data to integrity: conceptual integrity, completeness, comparability, timeliness
10. Statistical data capturing and editing techniques in ICT environment
11. Documenting of statistical surveys and data
12. Optimization of information sources (administrative records vs. questionnaires vs. interviews)
13. Standardized problem – oriented statistical analyses
14. Methodological standards for selected domains of surveys
15. Supranational official statistics
16. Transborder statistics
17. Regional statistics
18. Small area statistics
19. International standard methodology of statistical surveys of specific branches (relevant to the professional profile of students and/or requirements of statistical agencies)

Other specific subjects could be added or extended on request of interested parties.

**4.3. Profiling of subjects**

The detailed scope of each subject could be delivered in two versions:

* Extended version, for students that shall use the knowledge of the subject directly in their work in statistics (the number of hours of lectures, seminars and laboratories depending the scope of the subject – to be specified in syllabuses).
* Abbreviated, tailored version, for students that need the knowledge of the subject as the auxiliary or supplementary information (2-3 hours of lectures or seminar plus 1 hour of discussion if necessary – to be specified in syllabuses).

The MOS courses shall be profiled according to the needs of specific groups of official statisticians and to specific requirements of national or international statistical agencies.

Full MOS course – 4 semesters (2 years). It could be also offered tailored course (2 semesters) for advanced participants. For tailored courses it should be checked weather the *MOS minimal common denominator of knowledge* covering all basic subjects is known by participants attending these courses (verification in the form of tests).

**4.4. MOS thesis**

Each participant of MOS studies should elaborate a MOS thesis. It is recommended to agree the topics of the theses with statistical agency.

The topics should be relevant with the needs of agencies and/or with the duties or responsibilities (actual or planned) of a participant in a statistical agency or other unit. They should be focused on solving real problems that are faced by statistical agencies. One of peer reviewer of the thesis should be the representative of official statistical agency.

1. General description of the scope of basic subjects of MOS studies

**Subject 1.**

**Official statistics and its role in modern information society and knowledge – based economy**

* Information infrastructure in globalized, market – driven economy and in democratic information society.
* Role and place of official statistics and its place in the information infrastructure of society and economy.
* Specificity of official statistics vs. other statistical activities (e.g. statistics as science, implementation of statistics in scientific research, marketing, politics etc.).
* Role of statistical offices in the information order of economy and in the information infrastructure of countries and international organizations.
* Models of realization of infrastructural functions of official statistics in information society and globalized knowledge – based economy.

**Subject 2**

**Deontological principles of official statistics (in the light of official statistical document of UN, ISI, EU and national statistical societies)**

* Statistical ethics as the foundation of quality of data and trust to statistics
* ISI code of statistical ethics.
* UN Fundamental principles of official statistics.
* EU code of statistical practice.
* Codes of ethics of statistical associations or agencies (selected examples)
* Ethical principles in legal foundations of official statistics on national, international and supranational levels.

**Subject 3.**

**Global system of official statistics: laws, organization, functioning**

* UN statistical system: legal foundations, organization, functioning.
* Organs of the UN statistical system, their competences and practical activities: UNSC, UN regional conferences of official statisticians, UNSB and UN regional statistical division.
* Statistical systems and activities of UN associated international organizations: e.g. ILO, FAO, WHO, WTO, IMF, World Bank, UNIDO, UNESCO, UNHCR, WIPO, OECD etc.
* Statistical activities of sectorial international (global) organizations, e.g. OPEC, other branch – oriented organizations and associations of countries or producers
* Statistical systems and activities of regional political, economic and social international organizations, e.g. EU, CIS, statistical services of free trade and economic zones etc.
* Role of ISI in the development of global system of official statistics
* International statistical standards (general review)
* International information standards important for official statistics (general review)

**Subject 4.**

**Models of national systems of official statistics**

* Basic models of national statistical system – historical overview and the state of the art
* Centralized model (e.g. Scandinavian)
* Decentralized model (e.g. Germany)
* Distributed model (e.g. US)
* Case studies of mixed models
* Models of national statistical systems in integrated supranational structures (e.g. EU, CIS, EVRAZEC – planned)
* Relation of official statistical system with other information system of government administration and national economy of the country (selection of case studies should be adjusted to the profile of participants)

**Subject 5.**

**Programming, planning and coordination of official statistics on national and supranational level**

* General principles of programming, planning and coordination of official statistics.
* Master Plan of National Statistics and its role in programming and coordination of national statistical systems.
* UN system and procedures of programming and coordination of official statistics on regional and national level of UN member states, UN associated organizations (IMF, WTO, OECD, etc.)
* Supranational programming, planning and coordination of official statistics: (EU case study - laws and directives, organization and coordination of surveys, evaluation of experiences).
* Selected examples of programming, planning and coordination of official statistics on national level (selection of practices relevant to the interest of participants) for different models of national official statistics.

**Subject 6.**

**Statistical confidentiality and its impact on statistical methodology**

* Statistical confidentiality as the foundation of quality and reliability of statistics and its specificity (comparing with other confidentialities).
* Confidentiality of information in modern ICT environment: advantages, threats.
* Concept of statistical confidentiality (in the light of UN Fundamental Principles and ISI code of statistical ethics); importance of obeying statistical confidentiality for quality of statistics.
* Sensitive and non-sensitive data in the light of the concept of statistical confidentiality.
* Statistical confidentiality and microdata - safety and security of microdata.
* Practical problems of formulating and obeying the principles of statistical confidentiality, with special reference to small scale national economies, microaggregates, small area statistics, very large monopolistic or dominating companies.
* Practical methods and tools of statistical confidentiality defining and protection.
* Best practices in the field of statistical confidentiality. Most common questions, mistakes, effective solutions.
* ICT and metadata support of protecting statistical confidentiality.

**Subject 7.**

**Official statistical indicator - theoretical and methodological foundations of official statistical measuring**

* General model of statistical indicator; interrelation between official statistical indicators, laws and administrative regulations
* Official statistical indicator – concept and processes of building official indicators, factors determining the forms and methodological foundations of official statistical indicators, semantic and pragmatics
* Detailed structural model of official statistical indicator
* Basic types of official statistical indicators:
	+ - Primary indicators
		- Elementary indicators
		- Official aggregated indicators; processes of aggregation
		- Derived indicators
		- Statistical indexes
		- Composite indicators
* Methodological problems of integrity of official statistical indicators (comparability, continuity, completeness, timeliness) in dynamic legal and administrative environment
* Relation between official statistical categories (and statistical indicators) and the categories used in administrative records and in “big data” resources; practical problems of transforming administrative and “big data” indicators into officialstatistical indicators.

**Subject 8.**

**Statistical metadata**

* Metadata – basic concepts and definitions. Specificity of statistical metadata.
* Metadata in the structure of statistical variable (indicator)
* Types of statistical metadata, standards, problems of building, maintenance, updating and development.
	+ - Classification
		- Nomenclature
		- Typology
		- List
		- Thesaurus
		- Catalogue
		- Glossary
		- Register
* Integrity principles and integration of statistical metadata (correspondence tables, comparability, continuity).
* Statistical metadata base systems:
* Review of basic statistical metadata standards (UN, OECD, EU, CIS etc.)
* Case studies of statistical metadata bases.
* Practical experiences in designing, maintenance and development of statistical metadata bases (case studies).

**Subject 9.**

**Statistical frames**

* Basic concepts and definitions relevant to statistical frames theory
* Basics of the theory of very small samples and its implications for statistical frames.
* Frames for sampling based of the concept of behavioral typologies of statistical units
* Types of statistical frames: strong frames vs. week frames; case studies
* Evaluation criteria of quality of frames
* Process of building, maintenance and use of frames in the process of survey design and realization: censuses, surveys of legal entities, household surveys, frames for surveys based on administrative records
* Case – studies of best practices on building and use of frames for specific types of surveys, e.g. household surveys, businesses, surveys based on administrative records and “big data”, frames for heterogeneous populations.

**Subject 10.**

**Statistical surveys based on questionnaires in modern information infrastructure and ICT environment**

* New functions and forms of statistical questionnaires in the environment of modern ICT and information infrastructure of economy.
* ICT based production of statistical questionnaires from primary records of businesses
* Approach to implementing electronic questionnaires
* Matching questionnaires and administrative data in statistical production
* Role of microdata bases in modern surveys based on questionnaires
* Practical experiences of transformation of questionnaire-driven surveys in modern ICT environment

**Subject 11**

**Statistical surveys based on administrative records and “big data” resources**

* Statistical categories and data vs. administrative data
* Differences of legal foundations of official statistics and administrative information systems
* Methodology of survey design based on administrative records
* Basic administrative information systems relevant for specific domain of the official statistics (representative examples review and evaluation)
	+ - Tax information systems
		- Customs and foreign trade systems
		- Social insurance
		- Health insurance
		- Vital registration
		- Population registers
		- Business registers
		- Territorial registers
		- Specific administrative registers, e.g. vehicles (cars, planes, ships), buildings and constructions,
* Use of administrative records for building and maintenance of statistical frames and microdata bases.
* “Big data” as the source data for statistic. Legal, technological and methodological prerequisites of use of “big data” for statistical purposes. Best practices and practical problems,.
* Cooperation of statistical offices with governments managing administrative information systems and with organizations managing information systems and storing “big data” resources.

**Subject 12.**

**Official statistical interv**i**ewing in modern ICT environment**

* Review of interview – driven statistical survey.
* Techniques and organization of interviews in modern ICT environment (CAPI, CATI, CASI, internet interviewing)
* SWOT analysis of forms and techniques of interviewing
* Matching data from interviews, administrative records, big data files and questionnaires
* Practical experiences, best practices and mistakes in choosing techniques and forms of interviewing – representative case studies (individuals, households, farms, microbusinesses)

**Subject 13.**

**Statistical database systems**

* Models of statistical database systems
	+ General model of statistical database system and its specificity vs. other types of data bases (e.g. for MIS
	+ metadata layer – data layer
	+ homogeneous vs. heterogeneous statistical data bases
* Statistical microdata bases, operational database systems, analytical database systems
* Statistical microaggregates bases
* Statistical timeseries bases
* Heterogeneous statistical database systems
* Integrity constrains and integrity control of statistical indicatorsstatistical databases
* Case studies of statistical database systems for specific

**Subject 14**

**Statistical production process**

* General model of statistical process
* Typologies of statistical processes from the point of view of different criteria
* Specification of phases of statistical production process
	+ Generating primary data
	+ Data capturing
	+ Editing
	+ Storage
	+ Integrity control
	+ Processing
	+ Dissemination
	+ Absorption
	+ Interpretation
	+ Final use of data
	+ Archiving
* Stakeholders od particular phases of statistical process and their functions
* Case studies of selected types of statistical processes:

**Subject 15**

**Models of statistical surveys in modern ICT environment**

* General model of information process and specificities of statistical production process
* Types of statistical surveys and their specificity as information processes and case – studies as representative examples for each type of survey in modern ICT environment
	+ - censuses,
		- questionnaire – based surveys of legal entities and economic units,
		- surveys based on administrative records,
		- survey based on big data files
		- surveys driven by statistical interviewing: PAPI, CATI, CAPI, internet interviewing, self – interviewing, mixed forms of interviewing
		- composite surveys
* Organization of the process of designing a surveys
* Practical problems of organization and management of the realization of the survey

**Subject 16**

**Quality control of statistical processes and data editing**

* Quality of statistics: basic concepts and definitions.
* Criteria of quality control of statistical surveys: methodology, organization of surveys, coverage, technology, safety and security.
* Quality control of statistical microdata
* Quality control of statistical output data
* Quality control of statistical metadata
* Principles of quality control of statistics (e.g. EU recommendations)
* Methods, procedures and tools of editing in different classes of surveys
* Best practices of quality control

**Subject 17**

**Integrity and integration of official statistical information**

* Concept of integrity of statistical information
	+ relevance, pertinence,
	+ accuracy, precision,
	+ timeliness,
	+ comparability,
	+ completeness,
	+ continuity
* Main factors destroying the integrity of statistical information
* Criteria, tools and methods of integrity control
* Integrity of metadata in different surveys
* Role of international metadata standards in integrity control of statistical information
* Common metadata bases for protection and control of integrity of statistical information
* Practical examples of destruction and recovery of integrity of statistical data

**Subject 18**

**Dissemination of statistical knowledge in modern ICT environment**

* Principles of active information policy of official statistics
* Analysis of needs of stakeholders of statistical processes
* Dissemination of output data
* Dissemination of metadata
* Dissemination of methodological knowledge
* Dissemination of organizational knowledge
* Cooperation of statistical offices with stakeholders of statistical processes
* Cooperation with mass media
* Active dissemination of statistical knowledge via Internet
* Best practices of dissemination policy of statistical knowledge

**Subject 19**

**Archiving of official statistics**

* Statistical archives, their specificity and role in official statistics
* Legal regulations of archiving statistical information
* Maintaining and updating statistical archives
* Information retrieval systems for statistical archives

**Subject 20**

**Economics of official statistics**

* Economic foundations of statistical activities
* Identification of costs of statistical processes and contributions of all stakeholders of statistical processes and classification of costs by kinds and phases of statistical processes
* Measuring costs of participation of all types of stakeholders of statistical processes: respondents, intermediaries, statistical agencies, users
* Costs of maintenance of the infrastructure of official statistics: methodological, organizational, personnel, technical infrastructure
* Budgeting of statistical surveys, processes, systems and offices
* Economic optimization of statistical surveys and systems: censuses, economic surveys, social surveys, interviewing, storage, dissemination, maintenance of the infrastructure of official statistics
* Policy of official statistics on information market; policy of commercialization of statistical activity vs. supplying statistical knowledge as a public good in democratic society and knowledge –based economy.
* Practical examples: how to minimize costs of statistics for all stakeholders

**Subject 21**

**Analytical activity of official statistics**

* Analytical tasks of official statistics – what should be the final output of statistical surveys produced by statistical agency
* Division of analytical responsibilities between statistical agencies and official users (governments) -
* Models of organization of analytical services of statistical offices for governments
	+ - Central
		- Regional and local
* Supply of analytical services for businesses and non-profit organizations
* Commercial analytical services of official statistical agencies for businesses
* Best practices of analytical activities of statistical offices

**Subject 22**

**Cooperation of statistical agencies with stakeholders in official statistical processes and systems**

* Forms of cooperation of official statistical agencies with stakeholders in specific phases of statistical processes of different classes of survets
* Programming and organizing of education and training of statistical staff in the NSI, ministries and local governments
* Cooperation with of official statisticians and users of
* Cooperation of intermediaries, infobrokers and journalists
* Statistical education of journalists
* Statistical education of politicians
* Cooperation with mass media in the field of statistical education
* Cooperation with universities and secondary schools as stakeholders of official statistics and related problems
1. Profiled subjects for special needs of MOS students

For specific groups of participant special topics should be added as supplementary short courses. The EU short term training courses of European statisticians may be used as patterns. For example:

* ICT for statistical managers (impact of modern ICT on methodology and organization if surveys)
* Electronic questionnaires
* Electronic censuses
* Transborder statistics
* Municipal statistics
* Statistical GIS
* Delimitation of geographic space based on official statistical data (from the points of view of specific criteria, e.g. local labor markets, environment pollution areas, demographic processes, factors of economic growth etc.)
* Dealing with non-response
* Bringing data to integrity: conceptual integrity, completeness, comparability, timeliness
* Documenting of statistical surveys and data
* Optimization of information sources (administrative records vs. questionnaires vs. interviews)
* Standardized problem – oriented statistical analyses
* Methodological standards for selected domains of surveys
1. Forms and timing of MOS studies

The MOS studies may be tailored to the needs of potential participants, in particular:

* Top and high – level managers of statistical offices and agencies in the ministries and regional governments and international organizations
* Middle level managers of statistical units
* Methodologists
* Analysts and researchers
* Organizers of official statistical surveys
* ICT managers
* Higher level ICT system analysts and administrators
* Economists and administrators of statistical agencies
* Journalists professionally using statistics
* Info-brokers
* Professional users of statistical data and systems

The MOS program could be realized in the form of 2 years post-graduate studies, total number of hours estimated preliminary for traditional form of courses – 360 hours.

For specific profiles of participant tailored course of 1 year (2 semesters) studies – about 180 hours of lectures and seminars, may be composed. E.g. tailored EMOS training course for high level managers (e.g.heads of statistical offices and directors of statistical divisions and sections), methodologists (experts responsible for frames, metadata, registers, methodological evaluation of surveys of statistical system of a country of an international organization).

It is recommended to elaborate the e-learning materials, however it would need the time and financing of very good preparation of e-learning materials and their updating. Forms of education (stationary, extern, e-learning) should be discussed.

The MOS should be supervised by the **Scientific Council of MOS** representing:

* scholars organizing and conducting the MOS studies
* statistical offices (top management level)
* government sector (statistical divisions of ministries)
* universities organizing the MOS studies

should not exceed 10-12 persons.

It is suggested to organize experimental courses for 1-3 national statistical offices (full course and tailored courses.

Language of training should be adjusted to the needs and possibilities of participants, with special priority given to UN international languages. It is strongly recommend to deliver the lectures and seminars

1. Conclusions

The scope of education of Masters in Official Statistics (MOS) is complementary to “classic” education of statistics at the universities, as well as to common programs of statistical education of statisticians organized by national statistical institutes for their staff.

The knowledge of managers of statistical offices, divisions of statistical offices and managers of statistical surveys should cover institutional, legal, methodological, organizational and technological issues of all basic types of statistical processes as a whole information processes: *from the very beginning to the very end* - from idea of survey to final production of analyses and models on the basis of statistical data. They should also be acquainted with ICT, with special reference to the using of ICT in different phases of statistical processes. Leaders and managers of statistics should also understand and know the information environment of official statistics – administrative information systems, information systems of global and national companies, international information environment of statistics. This knowledge is distributed among many stakeholders participating in statistical processes and system. Proposed program of education of high-level statistical experts is oriented on integrating of the complex of knowledge necessary to understanding, programming, planning, coordinating and managing statistical information processes.

Special attention in education of masters in official statistics should be put on cooperation with external stakeholders of official statistical processes: suppliers of data, managers of *big data* resources, managers of ICT networks, providers of internet services, as well as intermediaries in dissemination of statistical knowledge (especially mass media) and final users of statistical information, both professional and non-professional.

Cooperation of universities and official statistical institutes in educating masters in official statistics shall also have positive impact on modernization of academic education of statistics and on education of users of statistics by government administration, businesses and other social and economic organizations.

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