UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Statistics for The Social Sciences

2526-1-E2006P006

Learning area

2: Psychosocial aspects underlying communication.

Learning objectives

Knowledge and understanding

The course faces the task of objective information in data driven opinions and decisions, generating knowledge from data. Students deepen epistemological processes to express abstract concepts into variables, through the operationalization of the latter into statistical measures. Statistical phenomena are illustrated and understood in the two disciplinary branches of the discipline, descriptive statistics and inference, in the framework of quantitative synthesis of behavioral and psychosocial events. Statistical data are investigated information into their multidimensional informative traits. Access to and navigation into different statistical sources: official, parallel and Big Data. Their metadata are decoded and the system of quality validation is analyzed, with particular attention to the European Statistical System.

Applying knowledge and understanding

Statistical knowledge is permanently applied in an interdisciplinary perspective, in order to enable students to recognize and integrate data with other informative sources. Competencies apply to a twofold applicative context. In the first place, knowledge previously acquired on data collection, questionnaires and surveys are turned into reasoned performance of data analysis in particular with open source packages. Computation or estimation of statistical measures by means of software strengthen mastery in use of the different statistical measures, thanks to the reasoned elaboration and the critical interpretation of results.
In the second place, pondering data dissemination as current informative production enables to overcome epidermal approaches to quantitative information thanks to the systematic retrieval of statistical premises and

practices apt to identify key elements for quantitative assessment of phenomena and situations.

Making judgements

Ability in self-directed judgment and critical reasoning in processing the mass of current data in science and information at large represents a fundamental driving force in modern communication, composed of multiple languages including quantitative values. Fine-tuning sensitiveness in generative data processes upgrades students to contextualization, to clarify background, to grasp collection procedures that shape their reach, mastering their full meaning. Students experiment the quick observation of numeric information, avoiding superficial interpretations, assessing their true background, developing strategies and styles for eluding trivialities. To this respect, they will be guided to search for these very types of information in current communication and to decipher presentation options. Self-directed judgment ad critical sense will be openly encouraged both in data analysis and in understanding official reports, in addition to media, during the various activities during the course and in final exams.

Communication skills

Empowering quantitative communication skills is crucial in the framework of graduation, both for a full mastery of results from the scientific literature, largely based on empirical validation, and for expressing complex messages, necessarily differentiating languages. Expressing synthetical numerical data will go hand in hand with the ability to describe their empirical meaning, definitions and metadata in order to clarify their reach and avoid naive traps. The practice in choosing how to express statistical phenomena will rely on graphs, tabs or narratives. Activities in the classroom and individual exercises, discussed and rehearsed in dedicated moments, will allow to reinforce these communicative forms, assessed during final exams.

Learning skills

The didactic framework of the course aligns with the course of study, directed to acquire a lifelong learning, both self- and hetero-directed, to increase knowledge and skills useful for theoretical and practical purposes, at university and in the workplace. This approach allows to pursue further academic paths both in information technology for communication and communication social studies evidence-based. The sound acquisition of learning skills will be monitored during personal involvement in individual and group activities and finally assessed during final examinations.

Contents

The course provides students with theoretical and analytical tools for processing quantitative and qualitative-quantitative information. Data production methods are addressed to official national statistics as part of the Eurostat network and then extended to parallel sources and Big Data. The operationalization of abstract concepts and phenomena in variables, the recognition of the related measurement methods are illustrated with reference to surveys on multidisciplinary topics, primarily other courses of the degree course.
The autonomous and personal acquisition of adequate reading keys and guidelines in the understanding of information and statistical-computational reasoning is promoted, both in the learning of basic quantitative techniques and in accessing the results of investigations and their dissemination through different media. The distinction between descriptive statistics and inferential statistics includes rudiments of inference from statistical experiments. Furthermore, the context of textual data and social networks is addressed.

Detailed program

- Statistical terminology.

- Types of data.
- Classification of statistical sources.
- Measurement scales.
- Data collection.
- Official statistical sources. Types of surveys.
- Data quality: concepts and definitions.
- Sampling strategies. Some sampling issues in social research.
- Basic aspects of questionnaire and aits dministration.
- Notes on scaling techniques.
- Data visualization.
- Distribution measures. Position and analytical means. Variability.
- The shape of the distribution. Asymmetry and kurtosis.
- Comparisons between quantities. Ratios and indexes. Composite indicators.
- Elements of probability. Normal distribution as a significant distribution.
- Hypothesis testing for the equality of means.
- Bivariate analysis: contingency, cogradation and correlation.
- Hypothesis testing in bivariate analysis.
- Notes on text analytics and social networks.

Prerequisites

Base math: high school commonly shared knowledge.
Informatics: competencies related to the first-semester course are required. Specific mathematics and/or informatics support paths will be devised when needed.

Teaching methods

The course is in blended learning with different teaching methods:

- 5-hour frontal lessons in didactic method, with planned interaction when assessing full understanding of new topics;
- 5 2-hour streaming in didactic method, with illustration of topics;
- 9 2-hour streaming interactive lessons, with applications and analysis of official statistics websites and related production;
- 9 2-hour on-site exrcize in informatic labs for software interactive application.

The first module develops along with two thematic modules. The first one concerns statistical methodology, with emphasis on the meaning and the rationale at the basis of analytical concepts, with specific attention to psycho-social topics. Computer-assisted practice transpose systematically this knowledge into applications, so as to set them into their context., by means of IBM Spss software together with open-source packages for statistical computation. All computer-assisted practice are frontal and in person, as well as first and last theoretical lessons, while the other theoretical ones are frontal in streaming.

Mastering access to official statistics is at the core of the second thematic module, with Istat as a node of the Eurostat network, together with their open database. Official data are widely explored with reference to the pertaining disciplinary fields. Accessing the official statistical website, students practice how to retrieve the online documentation of interest, data quality assurance and metadata. Web conferences face the methodological aspects of official data, while hands-on activities allow navigating official data portals.

A section of the online activities consists of teamwork, exercises and simulations freely accessible on the e-learning platform, with the aim of harmonising the two modules. namely setting theoretical knowledge into the current publicly available data information. From the teaching point of view, mastering this competence enables to debate the huge data flow coming from all media, also in the light of the official statistical production. This debate takes place in groups of students based on issues and topics at the base of their academic interest.

Assessment methods

The assessment is strictly written and is composed of a project workand in a computer exam on Moodle platform, with no intermediate tests.

The project work , henceforth project, consists of an inspection and a critical analysis on a topic investigated by means of the statistical methods of designated institutions, where each student develops a communication scheme of a topic. Availability of data and related database from official statistical institutes are reckoned in terms of methods and metadata. Then the chosen official statistical topic is critically compared with current general information on the matter. This exam section assesses competencies in identifying fundamentals of descriptive statistics in the quantitative informative dissemination, of its unbiased reading in the light of modes and collection instruments, of the optimal communication strategies. Besides the pertaining methodological aspects, students are required to provide, as original contributions, a concise representation of issues, an infographic and a critical comparison of the use of data in current information. The project provides 35% of finale grade.

The computerised exam on Moodle platform consists of a comprehensive basic statistical analysis, both descriptive and inferential, on a data set that simulates a simple real survey. The step-by-step solution to the problem is performed by means of IBM Spss and it requires the mastery of both the theoretical statistical fundamentals and the basic software functions. These problems, developed in an organic sequence, are answered with numerical closed, True/False, multiple-choice quizzes and graphs. Some mutiple-choice questions, with some highlights on key methodological aspects, complement the exam. This section of the exam calls for competence in the conceptual understanding and the problem-solving attitude on bth theoretical and computational ground. The computerised exam on Moodle platform provides 65% of finale grade.

Textbooks and Reading Materials

- Iezzi, Domenica Fioredistella, (2024) *Dai dati alla conoscenza. Statistica per le decisioni*. Roma: Carocci.
- Websites and additional learning material as indicated by instructors.

Although this course is held in Italian, for Erasmus students, course material is available also in English, and students can sit the exam in English if they wish.

Sustainable Development Goals

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