



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Tecniche Quantitative di Analisi

2627-2-E4002N009

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#### Learning objectives

*Knowledge and understanding:* To provide basic knowledge of critical reasoning and quantitative information about social phenomena.

*Applying knowledge and understanding:* To provide the skills necessary to independently apply the main techniques of critical reasoning to the analysis of quantitative information on social phenomena disseminated by mass media, social media, or academic communication channels.

*Making judgments:* To provide critical reasoning tools to assess the credibility of quantitative information on social phenomena independently.

*Communication skills:* To provide the necessary skills to communicate the results of a critical analysis of quantitative information on social phenomena.

*Learning skills:* To provide the necessary information to further explore the topics covered in the course.

#### Contents

Quantitative information. Critical reasoning. Intuition: potential and limitations. Source analysis. Deductive and non-deductive logic. Scientific method. Empirical research. Quantitative propositions and their components. The collection of quantitative data on social phenomena: measurement errors. The collection of quantitative data on social phenomena: representation errors. The analysis of quantitative data on social phenomena: errors of interpretation.

## Detailed program

This course covers the fundamentals of critical reasoning as applied to the analysis of quantitative information about social phenomena. The first part of the course presents the CRInALE approach to critical analysis of information. This approach establishes the credibility of factual claims by subjecting them to a reality check based on four elements: intuition, source analysis, logic, and empirical evidence. The characteristics, uses, and limitations of each element are explained. The second part of the course applies the CRInALE approach to the critical analysis of quantitative information about social phenomena – that is, factual claims that directly or indirectly, explicitly or implicitly represent the social reality of interest through one or more quantities. First, the different types of quantitative propositions and their components are discussed. Next, all the errors that can be made during the data collection stage in quantitative propositions are explained. Finally, the main errors in interpreting quantitative data are examined.

## Prerequisites

Knowledge of the basics of social science methodology.

## Teaching methods

The course consists of 56 hours of in-person lectures. Each lecture consists of a first part, in which the content of interest is presented (standard mode), and a second part, in which individual or group exercises, presentations, and discussions by the students take place (interactive mode). The proportion of standard mode and interactive mode varies from lecture to lecture. Overall, about 70 percent of the time is devoted to the standard mode, while 40 percent of the time is devoted to the interactive mode. The course is taught in Italian.

## Assessment methods

There are two modes in which the exam can be taken.

In *standard mode*, you take a written test consisting of twenty questions (eighteen multiple-choice and two open-ended) on topics from the course material. You have 40 minutes to complete the test. Multiple-choice answers will be scored as follows: correct answers will be scored 1.5 points, and incorrect answers will be scored 0 points. Open-ended answers will be scored between 0 and 3 points. The overall grade will be the sum of the scores assigned to each answer, rounded to the nearest whole number if necessary. If the sum is less than 18, the test will be judged insufficient. If the sum is equal to or greater than 31, the grade will be 30 with honors. Responses to open-ended questions will be evaluated based on three criteria: correctness, completeness, and clarity of exposition.

The *alternative mode* consists of taking five mandatory partial written tests throughout the course. Four tests will be carried out outside of class hours in the form of group exercises, with groups formed at the beginning of the course and consisting of two or three people; one test will be carried out in class in the form of an individual exercise. Group tests will be scored between 0 and 5.5, while the individual test will be scored between 0 and 11. The final exam grade is the sum of the scores assigned to each partial test, rounded to the nearest whole number if necessary. If the sum is less than 18, the exam will be failed. If the sum is equal to or greater than 31, the final exam grade will be 30 with honors. The evaluation of the partial tests is based on three criteria: (a) knowledge of the relevant topics as they were covered in class, (b) the ability to apply this knowledge independently to the critical

analysis of texts or problem-solving, and (c) the ability to clearly and effectively present the results of one's analysis or solutions to problems.

## **Textbooks and Reading Materials**

Potochnik A., Colombo M. and Wright C. (2024) *Recipes for Science: An Introduction to Scientific Methods and Reasoning*, 2nd ed. New York, NY: Routledge (chapters 1, 3, 4, 6, 7, 8, 9, 10, 11, 12, Glossary).

Other teaching materials posted on the course e-learning page.

## **Sustainable Development Goals**

QUALITY EDUCATION

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