UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Big Data in Behavioural Psychology

2627-2-FDS02Q039-FDS02Q03901

Aims

This lab course provides students with an overview of fundamental psychological concepts, theories, and methods, with particular emphasis on how they inform the study of behaviour in the era of Big Data. Students will explore how psychology investigates constructs such as attitudes, identity, personality, language use and behaviour, and how these constructs can be examined through digital trace data, large-scale behavioural datasets and computational tools. The course promotes an interdisciplinary mindset, enabling students to integrate psychological perspectives into the analysis of complex behavioural data while critically evaluating the opportunities, methodological challenges, and ethical implications of Big Data in psychological research.

At the end of the course, students will be able to:

1. Knowledge and understanding

- Demonstrate a foundational understanding of key psychological concepts, theories, and methods relevant to the study of human behaviour
- Understand how Big Data enables the measurement, modelling, and analysis of psychological processes and individual differences at scale

2. Applying knowledge and understanding

- Apply basic psychological frameworks to interpret patterns in digital behavioural data
- Identify appropriate computational and psychological methods for linking digital traces and large-scale behavioural datasets to psychological constructs and variables

3. Making judgments

- Critically assess the validity, reliability, reproducibility, limitations and ethical implications of using digital behavioural data to investigate psychological processes
- Reflect on the theoretical assumptions underlying psychological applications of Big Data

4. Communication skills

- Present and discuss psychological findings and interpretations derived from Big Data sources in clear, structured written and oral forms

5. Learning skills

- Develop interdisciplinary learning strategies by integrating perspectives from psychology and data science
- Engage with psychological literature to inform data-driven inquiry

Contents

The course offers an introduction to key psychological constructs, such as attitudes, personality, bias, language, and behaviour, and examines how they can be studied using Big Data. Students will explore foundational psychological theories and methods, and learn how digital trace data (e.g., from social media, online behaviour, and language) can be used to measure, model, and predict psychological phenomena. The course covers psychological measurement and construct validity, computational approaches to behavioural data analysis, applications of machine learning for psychological assessment, and ethical and methodological challenges in the use of Big Data. Case studies and real-world examples are discussed to illustrate both the opportunities and limitations of Big Data in psychology.

Detailed program

Psychological science in the era of Big Data.
Introduction to psychology as an empirical science and its main methodological traditions. Focus on Big Data in psychology, with particular attention to digital behaviour as a source of large-scale observational data for the study of human behaviour.

Psychological measurement and construct validity.
Operationalization of psychological constructs, measurement models, and the distinction between self-report, behavioural, and digital measures. Issues of reliability, validity, and inference from large-scale behavioural data. Discussion of the distinction between prediction, explanation, and interpretability in psychological research using behavioural data.

Theory-driven and data-driven approaches to explaining and predicting behaviour in psychology.
Introduction to models of decision making and behaviour (e.g., Theory of Reasoned Action and Planned Behaviour), as well as dual-process accounts of judgment and cognitive biases. Introduction to behavioural measures of attitudes, including implicit approaches such as the Implicit Association Test and priming paradigms.

Language and behavioural inference.
Language as a form of behavioural data and its use for psychological inference. Introduction to the application of computational linguistic approaches to the study of attitudes, identity, and individual differences.

Applications: digital inference.
Prediction of psychological traits, attitudes and affective states from digital behaviour, with particular attention to personality and transient states inferred from language use and online activity. Ethical and societal implications of these approaches are addressed throughout, including issues of validity, transparency, and responsible use of behavioural big data.

Prerequisites

No prior knowledge of psychology is required.

Teaching form

The course is delivered in English and takes place entirely in person. It combines introductory lectures with interactive, hands-on activities. Students will work individually and in small groups to analyse case studies, discuss scientific literature, and apply psychological concepts to real-world behavioural datasets and computational tools.
Active participation is an integral part of the course, and students are expected to contribute to discussions and collaborative exercises during class.
Students who are unable to attend a class (with valid reasons for absence) may request the teaching materials and seek clarification during office hours.

Textbook and teaching resource

Slides and additional material in English will be provided to students through e-Learning.

Semester

Second semester.

Assessment method

Verification of the acquisition of laboratory concepts takes place through a written exam and a group-based applied project.

The written exam is an individual assessment and constitutes 70% of the final grade. It includes multiple-choice questions, short open-ended questions, and case-based items aimed at evaluating conceptual understanding and the ability to apply psychological theories and methods to behavioural data.
The written exam also functions as a minimum requirement for passing the course. A minimum score of 18/30 is required. Students who do not achieve a passing grade in the written exam will not be considered as having successfully completed the course, regardless of their performance in the project component.

The applied project is carried out in small groups and accounts for 30% of the final grade. It focuses on the analysis of behavioural or digital trace data using the concepts and methods introduced during the course. Each group submits a single structured deliverable (e.g., report, notebook, or slide-based presentation following a provided template).
To ensure individual accountability within the group-based activity, each student also submits a brief individual reflection on their contribution to the project and their learning outcomes. This reflection is included in the evaluation of the project component and does not constitute a separate graded element.

The final grade is computed as a weighted average of the two components, according to the following formula: Final grade = (written exam score × 0.70) + (project score × 0.30).

Office hours

Individual appointments for office hours are available upon request. Students interested in scheduling an appointment should directly email the instructor.

Sustainable Development Goals