UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Big Data in Behavioural Psychology

2526-2-FDS01Q039-FDS01Q032M

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 behavior in the era of Big Data. Students will explore how psychology investigates constructs such as attitudes, identity, personality, and behavior, and how these constructs can be examined through digital trace data and computational tools. The lab course promotes an interdisciplinary mindset, enabling students to integrate psychological perspectives into the analysis of large-scale behavioral data. It also fosters critical thinking on the opportunities, limitations, and ethical considerations of using Big Data in psychological applications.

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 behavior
- Understand how Big Data offers new opportunities to observe and analyze psychological constructs at scale

2. Applying knowledge and understanding

- Apply basic psychological frameworks to interpret patterns in digital behavioral data
- Identify appropriate methods for linking digital traces to psychological variables

3. Making judgments

- Critically assess the validity, limitations, and ethical implications of using digital data to study 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, and behavior—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 or online behavior) can be used to measure and predict psychological phenomena. The course also covers challenges of construct validity, applications of machine learning for psychological assessment, and ethical considerations in data use. Case studies and real-world examples are discussed to illustrate both opportunities and limitations of Big Data in psychology.

Detailed program

Introduction to the course and psychological foundations
• Main psychological approaches and research methods
• Introduction to Big Data in psychology
Psychological measurement
• Constructs, operationalization, and types of measures
• Introduction to measurement models
• Validity and reliability
• Exploratory and Confirmatory Factor Analysis
Explanatory models of behavior
• Theory of Reasoned Action and Theory of Planned Behavior
• Introduction to Structural Equation Modeling
• Predictive models and causal ML
• Explainable AI techniques
Attitudes and dual-process theories
• Implicit vs. explicit attitudes
• Dual-system models of evaluation
• Measurement tools (IAT, priming, AMP)
Social identity, language bias, and ML
• Identity theories and intergroup processes
• Word embeddings and linguistic bias detection
Digital prediction of traits and states
• Personality traits and affective states models
• Traits and states inference from language and online behavior
• Ethical considerations
Persuasive communication and AI
• ELM model and framing effects
• Psychological targeting and LLMs

Prerequisites

No prior knowledge of psychology is required.

Teaching form

The course consists of in-class lectures with sessions aimed at discussing case studies.
Lectures will be delivered in English, entirely in presence, and will be recorded.
No interactive activities are foreseen.
Access to recordings is restricted to students with valid reasons for absence and must be requested by email to the instructor.

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 through a written exam with open and closed questions.
• Final project based on work in small groups. Each group member will submit their individual final written project (collective written projects or copy-pasting of projects among group members will not be allowed).

The written exam must earn at least a sufficient grade for the lab to be considered successfully attended. The grade will consist of the evaluation of the project.

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