UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Methods in Clinic and Epidemiologic Research (e-Learning)

2627-1-F8205B002

Learning objectives

The course aims to introduce students to the uncertainty inherent in the diagnostic process and to critically examine the measures used in the scientific literature to assess diagnostic validity, inter-observer agreement, disease frequency and outcomes, associations between exposures and disease risk, as well as the effectiveness and clinical impact of treatments.
The methodological aspects of different study designs will also be explored in depth, enabling students to critically appraise the medical scientific literature and to develop protocols for experimental and observational studies, as well as systematic reviews and meta-analyses.

Knowledge and understanding

Upon completion of the course, students will be able to:

- Recognize the sources of uncertainty in the clinical decision-making process, from diagnosis to therapeutic and preventive interventions.
- Understand the main measures and summary indicators used to evaluate diagnostic validity, inter-observer agreement, disease frequency, and clinical outcomes.
- Understand random and systematic errors in clinical measurements.
- Understand measures of association between determinants and disease risk, as well as measures of effectiveness and clinical impact of therapeutic and preventive interventions.
- Describe the main designs of experimental and observational clinical studies.

Applying knowledge and understanding

Upon completion of the course, students will be able to:

- Conduct and critically evaluate scientific literature searches.
- Calculate and interpret measures of association between determinants and disease risk, measures of effectiveness and clinical impact of therapeutic and preventive interventions, measures of diagnostic

validity, and measures of inter-observer agreement.
- Select and design the most appropriate study design to address a specific clinical question, and develop the protocol for an experimental study, an observational study, or a systematic review and meta-analysis.

Making judgements

These skills will be developed through self-assessment activities and intermediate evaluations.

Communication skills

These skills will be developed through intermediate evaluations and classroom discussions.

Learning skills

Through lectures, practical exercises, and supplementary learning materials, students will acquire the skills necessary to continue studying and updating their knowledge independently.

Contents

1. Uncertainty of the diagnostic process
2. Frequency of clinical events
3. Random and systematic errors of diagnostic measures
4. Observational and experimental studies
5. Introduction to meta-analyses and guidelines

Detailed program

1. Uncertainty measures of the diagnostic process Uncertainty of the diagnostic process
Operative characteristics of a diagnostic test
Predictive values of a diagnostic test
Multiple tests
Agreement between clinicians

2. Measures of frequency of clinical events and their predictors Incidence and prevalence
Measures of incidence
Measures of association
Measure of impact
The efficacy of treatments

3. Random and systematic errors of clinical measures Precision of measures
Validity of measures
The role of confounding

4. Observational and experimental studies Cohort studies
Case-control studies
Experimental studies

5. Introduction to meta-analysis and clinical guidelines Introduction to systematic reviews and meta-analysis, from data source to meta-analytic estimates by using fixed- or random effect models. Introduction to the main

methods for taking into account bias. Guidelines: from the systematic search of the literature to the formulation of the recommendations adopted in clinical practice.

Prerequisites

No prerequisites are required.

Teaching methods

The course combines e-learning activities and in-person lectures.
Teaching materials, including lecture slides, scientific papers, readings, and supplementary resources, will be made available through the University's e-learning platform.
The course is organized into five sections. For each section, in-person lectures will be delivered to further develop and clarify the key topics covered in the course.

Assessment methods

The exam consists of a final oral exam, during which students will be invited to discuss with the teacher the main subjects of the course, with the aim of verifying whether they have achieved the objectives that the course was intended for.

There are no distinctions, during the exam, between attending and non-attending students.

At the end of each section of the course an assignement (i.e. exercises and theorical questions, depending on the topics covered by the relative module) will be foreseen.

However, the final oral exam is not restricted to students who completed all the assignements.

Textbooks and Reading Materials

There is no specific reference text.
For each argument of the course, the teaching material will be available on the e-learning platform (slides of the lectures, exercises, scientific papers).

Semester

I Semester (Period I-II) and II Semester (Period III-IV)

Teaching language

Italian

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING