UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

# COURSE SYLLABUS

# Proteomics and Metabolomics

**2526-1-F0902D010**

## Aims

The course will provide knowledge of proteomics and metabolomics technologies applied to biomedical and clinical investigations.
DD1_Expected learning outcomes in terms of:
1_Knowledge and understanding on: The course provides in-depth knowledge and understanding of proteomics and metabolomics to logically and comprehensively address regulatory and applicative aspects regarding:
-Terminology: definition of the meaning of each figure of merit of proteomics and metabolomics technologies and their estimation according to the regulations
-Methodologies: highlight the critical aspects of current investigation procedures that can be improved through the innovations introduced by new knowledge.
-Data analysis: awareness of the advantages and disadvantages of current data processing methodologies

DD2_Applying knowledge and understanding on:
Through experiments and data analysis, the course allows students to apply the theoretical training acquired in practical contexts for the analysis of the proteome and of the metaboloma. In particular, the course allows students to:
-Implement new analytical processes for the identification and characterization of proteins and of small molecules of living biological species
-Optimization of existing analytical processes by introducing the innovations offered by new knowledge derived from other sectors.
-Use of AI for the study of the proteome and of the metabolome
-Introduce the innovations deriving from new knowledge regarding advanced statistical tools

DD3_The contents of the course imparted through classroom teaching and laboratory activities will allow students to develop critical thinking and therefore make independent decisions regarding experiments and the interpretation of data concerning proteomics and proteomics. In particular, students will be able to:
-critically describe altered metabolic processes, identifying the nature of the modification, whether qualitative or quantitative;
-evaluate and interpret experimental data obtained or derived from scientific literature;

-formulate scientific opinions on specific issues;
-formulate judgments that concern professional activities.

DD4_The classroom and laboratory activities, together with the exam, allow to enhance the ability to effectively communicate complex scientific results, in written and oral form, both in academic and popular contexts. Students learn to present data regarding proteomics and metabolomics to colleagues, experts and non-experts, in a clear and coherent way, using multimedia tools and scientific writing techniques.

DD5_The teaching activities, the study of textbooks and scientific articles allow to:
-learn to work independently;
-collaborate in a team;
-understand texts concerning proteomics and metabolomics;
-study issues through specific bibliography;
-use the tools necessary for accessing and using scientific literature in English and databases;
-independently follow the development of technologies and their applications in the field of proteome and od metabolome study;
-select the available information and evaluate its reliability for the purpose of continuous updating of knowledge.

## Contents

The course will provide knowledge of proteomics applied to clinical investigations.
The course will introduce metabolomics technologies and platforms applied to biomedical investigations

## Detailed program

Proteomics: please consult the module syllabus
Metabolomics: please consult the module syllabus

## Prerequisites

Basic knowledge in the field of Chemistry, Biochemistry and Statistics

## Teaching form

Teaching method in-person for providing both lessons and exercises: please consult the module syllabus

## Textbook and teaching resource

Reviews e and scientific articles published on international journals will be provided during the course. Downard K., Mass spectrometry . A foundation course. Royal Society of Chemistry, 2004 ISBN 0-8504-609-7 Gary Siuzdak,

Mass Spectrometry for Biotechnology, Academic Press 1996 Per consultazione: J. H. Gross, Mass Spectrometry. A Textbook, Berlin – Heidelberg, Springer Verlag, 2004 E. De Hoffmann, V. Stroobant, Mass Spectrometry. Principles and Application, 2nd Edition Chichester, John Wiley & Sons, 2001. C. Dass, Principles and Practice of Biological Mass Spectrometry, New York, Wiley-Interscience, 2000. ISBN 0471330531 Chapman, John R. Mass Spectrometry of Proteins and Peptides, Humana press 2000, ISBN 0- 89603-609-X Walker, John M. The Proteomics Protocols Handbook Humana Press, 2005

## Semester

Second semester

## Assessment method

Among the 8-10 questions are included in the written-oral test on the contents of the course of Proteomics and Metabolomics. The questions are quiz with 4-5 possible answers of which only one is correct. Among them, there is always an open one and some that may require the execution of calculations or interpretation of mass spectrums (MS / MS) of peptides. The oral examination will be done based on the written/orals questions.

## Office hours

Every day upon appointment

## Sustainable Development Goals

GOOD HEALTH AND WELL-BEING