



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Tecnologie Diagnostiche di Laboratorio Biomedico

2324-3-I0302D035

Aims

Scienze Tecniche di Medicina di Laboratorio: Classification and description of the main features of qualitative and quantitative analytical methods. Internal and external reference standards, calibration curves, data analysis, sources of errors. Principles of chromatography. HPLC and GC. Derivatives for chromatography. Mass spectrometry.

Therapeutic Drug Monitoring: Explain the basic principles of therapeutic drug monitoring, monitoring of toxic substances and drugs and related methods

Genetica Molecolare: Provide knowledge related to the use of the main cytogenetic and molecular biology methods, with particular reference to PCR, with application examples in a biomedical laboratory (eg haematology). Discuss and exemplify the role of the biomedical laboratory technician in the context of a clinical protocol. Provide applicative skills of the preferential analytical method according to clinical question.

Diagnostica Biotecnologica: Molecular diagnostics of Thrombophilia, Hereditary hemochromatosis, cardiovascular risk, and cancer. Epigenetic modifications. Pharmacogenetics and pharmacogenomics. Tools for gene expression analysis (Calibrated RT-PCR, Real Time RT-PCR, Microarrays). Molecular diagnostic in solid tumors and haematological malignancies

Contents

Scienze Tecniche di Medicina di Laboratorio: The primary goal of the course is to provide tools for the understanding of basic and practical aspect of chromatography and of spectroscopy for qualitative and quantitative analysis.

Therapeutic Drug Monitoring: The primary goal of the course is to provide tools for the understanding of the laboratory techniques to approach the field of Therapeutic drug monitoring.

Genetica Molecolare: Cytogenetics and particular genetic diseases. FISH, aCGH, imprinting diseases, triplet expansion diseases as examples of various techniques applicable in a genetics laboratory. Molecular Biology: PCR and its many applications, with examples related to a hemato-oncology laboratory

Diagnostica Biotecnologica: The primary goal of the course is to provide tools for the understanding of the laboratory techniques of clinical molecular diagnostics.

Detailed program

Scienze Tecniche di Medicina di Laboratorio: Classification of analytical methods. Qualitative and quantitative analysis and their terminology and methods. Sample preparation: extraction and purification by chromatographic techniques. Chromatography and its principles: efficiency of a chromatographic column, resolution, selectivity). Reference products: internal and external calibrators. Gas-chromatography/HPLC: derivatization reactions. Instrumental characteristics and components: of GC and HPLC: injectors, columns, detectors. Mass spectrometry: instruments, principles, components: ionization processes (EI-CI), analyser (magnetic, quadrupolar, ion trap), detectors (EM-PM). EI spectra interpretation. Examples of practical applications.

Therapeutic Drug Monitoring: General principles of therapeutic drug monitoring: definition and rational basis of the Therapeutic Drug Monitoring (TDM); main analytical methods of drug monitoring (Particular parts of mass spectrometry: ESI and APCI ionization processes; Orbitrap and linear trap mass analysers; tandem mass spectrometry and its different modality of use). Rationalization of the TDM of the most frequently monitored drugs, toxins and drugs.

Genetica Molecolare: Cytogenetics and particular genetic diseases. FISH technique: when to apply it, what allows you to see and what are its limitations. aCGH molecular karyotype: how to apply it in prenatal diagnosis or in syndromic children, limits. Techniques for analyzing imprinting diseases, brief summary of imprinting diseases and what they are caused by. Use of microsatellites and their variability in the genetic field and personal identification. How can I analyze the expansion of triplets (or microsatellites in general) ? Molecular Biology: PCR and its many applications (examples relating to a hemato-oncology laboratory): Structure of nucleic acids. Principles of polymerase chain reaction, multiple types of PCR for different applications, applications of PCR in medicine: from diagnostics to molecular monitoring mutation analysis, gene expression analysis. Quantitative PCR, principles and applications. Molecular monitoring of minimal residual disease in hemato-oncology, digital PCR

Diagnostica Biotecnologica: Molecular diagnostics of cardiovascular risk and thrombophilia (FV, FII, MTHFR, CBS, APO-E, gene mutations), hemochromatosis molecular diagnosis (HFE, TFR2, FPN1, etc), molecular diagnosis of cancer. Genetic and phenotypic screening. Pharmacogenetics e pharmacogenomics. Genetic expression studies (calibrated RT-PCR, Real Time RT-PCR, Microarrays).

Prerequisites

Having passed the compulsory courses of the degree

For Genetica Molecolare: Students should know the basic principles of Mendelian genetics, nucleic acid structure and molecular biology.

Teaching form

Scienze Tecniche di Medicina di Laboratorio: Lectures and exercises

Therapeutic Drug Monitoring: lectures

For Genetica Molecolare: Lectures with theoretical explanations and applications in the context of the biomedical laboratory.

Visit to a molecular biology laboratory.

Diagnostica Biotecnologica: lectures

Textbook and teaching resource

The Teachers will provide educational materials

Semester

First semester

Assessment method

In order to pass the final exam, students must have successfully passed the ongoing tests of the modules that make up the course (Therapeutic Drug Monitoring; Molecular Genetics and Biotechnological Diagnostics). The final exam consists of a written test with closed-ended questions (True/False, Multiple choice, etc.) and open-ended questions. Discussion of the written test through an oral interview.

Office hours

On appointment requested by mail

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING
