



University of Padova

School of Medicine

**CATALOGUE
OF COURSES
HELD IN
ENGLISH**

FOR ERASMUS, FOREIGN AND ITALIAN STUDENTS

academic year 2013 > 2014

MASTER DEGREE OF THE SCHOOL OF MEDICINE ENTIRELY HELD IN ENGLISH

Medical Biotechnologies

MASTER DEGREE OF THE SCHOOL OF MEDICINE WITH COURSES HELD IN ENGLISH

Pharmaceutical Biotechnologies

Master degree = Second-cycle degree

FOR COURSES BASED ON A SEMESTER ORGANIZATION

First semester: October 1st, 2013 to January 25th, 2014

Second semester: March 3rd, 2014 to June 14th, 2014

FOR COURSES BASED ON A TRIMESTER ORGANIZATION

First trimester: October 1st, 2013 to December 7th, 2013

Second trimester: January 13th, 2014 to March 15th, 2014

Third trimester: April 7th, 2014 to June 21th, 2014

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ADVANCED BIOMEDICAL TECHNOLOGIES

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st and 2nd semester

Lecturer: Fulvio Ursini

Credits: 8 ECTS

Examination: oral

1

- Spectroscopic techniques (including EPR and NMR).
- Advanced microscopy (including EM and AFM)
- Surface plasmon resonance for biomolecular interactions.
- Lipidomic (by MS/MS)
- Genome editing for gene therapy
- Principles of Cell Therapy

The course will be coordinated by the reference teacher and will include lectures and laboratory activity presented and guided by specialists in different fields

CELL AND ORGAN PHYSIOLOGY AND MEDICAL PATHOPHYSIOLOGY

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Carlo Merkel

Credits: 8 ECTS

Examination: written

2

General overview
Liver as a biochemical laboratory
Liver as a vascular organ
Viral infections and the liver
Hepatocellular carcinoma
Inherited liver diseases
The heart and heart failure
The kidney and renal function
Acute renal failure
Chronic renal failure
Infectious diseases

EXPERIMENTAL MODELS IN VIVO AND VITRO

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Andrea Porzionato

Credits: 6 ECTS

Examination: written

3

The post genomic era.

Animal model organisms: invertebrates, fishes, amphibians, mammalians; The mouse as a model organism.

Benefits of mouse for functional genomic studies in mammalians.

General features of mouse;

Transgenesis in mouse: gene transfer technologies and main fields of application of transgenesis in medicine.

Use and applications of transgenesis through DNA microinjection in the oocyte.

Cell cultures and their applications.

Features of a cell

GENETICS

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Leonardo Salviati

Credits: 6 ECTS

Examination: oral

4

Organization of the human genome

Genetic tests and their ethical issues

Genetic drift. Founder effect. Selection.

Hardy-Weinberg Law, Haldane' s Law, allelic frequencies.

Classification of mutations and their nomenclature

Nomenclature for reporting mutations

Molecular bases of dominance and recessivity.

Penetrance and expressivity.

Semidominant inheritance

Digenic inheritance

Analysis of genomic DNA vs. mRNA

Point Mutations

Deletions/Duplications

Next generation sequencing in clinical setting

Exome and genome sequencing

"Classical" acceptance criteria

In silico analyses, expression systems, hybrid minigenes, allelic frequencies

Mitochondrial genetics

Triplet expansion disorders.

Genomic imprinting disorders.

Molecular bases of Prader Willi and

Angelmann syndromes. Diagnostic techniques.

Structure of chromosomes

Classification of chromosomal abnormalities

Classical citogenetic techniques.

CGH-Array and its problematics.

Contiguous gene syndromes.

Recurrent chromosomal abnormalities and their molecular bases

Recurrence risk for chromosomal abnormalities

Multifactorial disorders

Genes and environment. Polygenic inheritance. Quantitative traits. Hereditability. Twin studies. Estimation of genetic risk
Prenatal diagnosis
Circulating free fetal DNA and its applications
Population screenings
Genetic predisposition to Cancer
Faciocapulohumeral Distrophy Type I and II. miRNA mutations
Marfan syndrome and related disorders
Alterations of the RAS pathway
Spinal muscular atrophy
Cystic fibrosis and related disorders
Gene therapy, stem cells, and pharmacological approaches
Pharmacogenetics and Pharmacogenomics
Epigenetics

IMMUNOLOGY AND GENERAL PATHOLOGY

Master degree in Medical Biotechnologies
Language: English
Teaching period: 2nd semester
Lecturer: Luisa Gorza, Antonio Rosato
Credits: 8 ECTS
Examination: written

5

“Immunology (ECTS 4) (Dr. A. Rosato)

Hypersensitivity reactions (type I-IV according to Gell and Coombs classification).
Transplantation immunology and transplant rejection.
Primary and secondary immunodeficiencies
Vaccination, vaccines and adjuvants
In vivo molecular imaging

General Pathology (ECTS 4) (Prof. L. Gorza)

Stressors and the cell stress-response. The heat shock response in apoptosis and cancer. The ER stress-response. Pharmacological intervention on ER chaperones. New stress responses
Molecular pathology of diabetes and insulin resistance. Obesity and mechanisms of food intake regulation
Protein misfolding diseases. Emphysema, cystic fibrosis. Amyloidosis and Alzheimer’s disease. Inclusion bodies. Huntington’s and Parkinson’s diseases
Molecular mechanisms of cardiac hypertrophy. Mechanisms of heart failure.
Mechanisms of skeletal muscle atrophy.
Muscular dystrophies
Molecular and cellular biology of ageing.”

LABORATORY ACTIVITIES

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st and 2nd semester

Lecturer: Giorgio Palù

Credits: 8 ECTS

Examination: written

6

The course will consist in practical activities performed in selected research laboratories. The course will be coordinated by the reference lecturer and will also include lab meetings, lectures, and other related activities.

LABORATORY MEDICINE TECHNOLOGIES AND MOLECULAR DIAGNOSTICS

Master degree in Medical Biotechnologies

Language: English

Teaching period: 2nd semester

Lecturer: Arianna Loregian

Credits: 14 ECTS

Examination: written

7

Molecular biology techniques based on nucleic acid amplification or hybridization; techniques to study DNA methylation; techniques for diagnosis of pathogenic microbes not based on molecular biology (isolation and identification of pathogenic bacteria, techniques for virological diagnosis not based on molecular biology); Therapeutic Drug Monitoring, TDM (pharmacokinetic parameters usually determined for TDM, methods for dosing drugs in biological samples, HPLC methods for dosing drugs, applications of TDM in diagnosis, practical lessons in a laboratory diagnostic unit performing TDM); techniques to test the sensibility in vitro of microbial pathogens to drugs; pharmacogenetics (basic principles and applications for diagnostic purposes, enzymes involved in drug metabolism, most common single nucleotide polymorphisms (SNPs) in the enzymes involved in drug metabolism and their pathogenetic relevance; microchips for diagnosis of these SNPs); Next Generation Sequence (NSG) technologies; applications of NSG technologies; microarray technology, applications of microarray technologies; presentation and discussion of scientific articles describing recent and novel diagnostic techniques and technologies.

NANOBIOTECHNOLOGY

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Camilla Ferrante

Credits: 6 ECTS

Examination: written and oral

8

Unit (i) Physical Chemistry of the Nanosystems:

Physical and chemical properties of bulk and nanomaterials: highlights on the electronic structure of atoms, molecules, metallic, semiconductors and insulating materials. Intermolecular forces and molecular recognition, surface interactions, molecular self-assembly. Structure and properties of metal, semiconductor and oxide nanoparticles.

Highlights on the techniques used to characterize nanomaterials: X-ray diffraction, Optical and electronic microscopy, Scanning Probe Microscopy: STM and AFM, Absorption and emission spectroscopy, IR and Raman spectroscopy, Micro-Raman and SERS.

Highlights on the use of nanoparticles and macromolecular compounds in the bio-medical field: Therapeutic and diagnostic protocols based on nanosystems and laser sources; microfluidic methods in bio-medicine; drug-delivery processes and tissue engineering.

Unit (ii) Bio-Imaging

Electromagnetic waves

Refractive index

Propagation laws

Optical systems and image formation

Fluorescence: molecular aspects

Conventional fluorescence microscope

Point Spread Function (PSF) and resolving power of the microscope

Confocal Microscopy

Multiphoton Microscopy

STED Microscopy

Ca²⁺ Imaging

FRET

FRAP

PHARMACEUTICAL BIOTECHNOLOGY: DESIGN AND ANALYSIS OF BIOPHARMACEUTICALS

Master degree in Medical Biotechnologies

Language: English

Teaching period: 2nd semester

Lecturer: Claudia Sissi

Credits: 6 ECTS

Examination: oral

9

“Biodrugs: basic concept; production; purification; storage Evaluation of the potential application of pharmacologically active macromolecules

Optimization of pharmacologically active macromolecules

combinatorial approaches

relevant examples (enzymes, hormones, antibodies, nucleic acids)

Data analysis

electrophoretic techniques (2D; sequencing, EMSA, CE)

Spectroscopic techniques (CD, FRET, fluorescence quenching)

Microcalorimetric techniques (ITC, DSC)

Biosensors (SPR)

computational tools

PHARMACOLOGY AND MOLECULAR THERAPIES

Master degree in Medical Biotechnologies

Language: English

Teaching period: 2nd semester

Lecturer: Giorgio Palù, Maria Cristina Parolin

Credits: 14 ECTS

Examination: written and oral

10

“Pharmacology” (4 ECTS)

Part I (Pharmacokinetics): absorbance; bioavailability; drug distribution; processes of bio-transformation; acute and chronic therapy; half-time of elimination; renal and extra-renal clearance.

Part II. Pharmacogenetics and Pharmacogenomics: variability in the response to drugs due to genetic factors; polymorphism of metabolizing enzymes, receptors, transporters; genetic traits of diseases with influence on the response to drugs; biomarkers predicting toxicity to drugs. Drug discovery and development . Biotechnology pharmaceutical products: types and classification, production, therapeutic use, pharmacokinetic and dynamic properties, general toxicity. Vaccines. Antibodies. Toxicology: classification criteria, organ-specific toxicity, mechanisms of drug-induced toxicity, immune reactions; idiosyncrasy; genotoxicity; teratogenesis.

“Molecular Therapies” (10 ECTS)

Gene and Cell Therapy

Advanced molecular therapies.

Concepts and tools of gene and cell therapy.

Delivery systems and therapeutic strategies for cell and gene therapy.

Development and application of virus-based vectors.

Oncolytic viruses for treatment of cancer.

Application of gene therapy to non neoplastic disorders.

Gene therapy approaches for HIV-1 infection.

Clinical trials and regulatory issues.

Intellectual property management.

R&D organisation in companies.

Product development in preclinical phase.

Product development in clinical phases.

Rare diseases and Orphan drugs.

Stem cell-based therapies.

Stem cell-based therapies as “medicinal products” and manipulation. according to GMP.

Advances in corneal surgery and cell therapy.

The human ocular surface and Limbal Stem Cell Deficiency (LSCD).

Techniques for Culture, Assessment and Preservation of Limbal Stem Cell Grafts.

Limbal stem cells and clonal analysis.

Impression Cytology.

Evaluation of the percentage of stem cells in cultured grafts.

Q-FIHC assay: application in manufacturing and research of corneal stem cells

Evaluation of endotoxin content, mycoplasma, and viral contamination to reduce post-grafting inflammatory responses.

Outcome of autologous cultured limbal stem cells grafts.

Long-term follow-up of regenerated corneal epithelium

Nucleic acids as drugs and drug targets.

PROTEOMICS AND BIOINFORMATICS

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Stefano Toppo

Credits: 6 ECTS

Examination: written

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Organization of the human genome
Genetic tests and their ethical issues
Genetic drift. Founder effect. Selection.
Hardy-Weinberg Law, Haldane's Law, allelic frequencies.
Classification of mutations and their nomenclature
Nomenclature for reporting mutations
Molecular bases of dominance and recessivity.
Penetrance and expressivity.
Semidominant inheritance
Digenic inheritance
Analysis of genomic DNA vs. mRNA
Point Mutations
BIOCHEMICAL CONCEPTS
Basic concepts on general properties of amino acids, secondary structures, protein domains
Interactions forces in proteins from quantum chemistry to molecular mechanics and dynamics
Introduction to force fields in molecular mechanics and the different interaction forces bonded and non-bonded. Protein folding from Anfinsen to modern theories
Protein folding in the cell
GroEL/GroES, Heat Shock Proteins.

MASS SPECTROMETRY IN PROTEOMICS

Mass spectrometry MS
Description of MS instrumentations
Mass Spectrum interpretation
Fragmentation rules and ion series
MS fingerprinting and MS/MS data identification analysis
Interpreting a MS/MS spectrum

Parametric and non-parametric methods, FDR, decoy sets, spectral clustering
Mass spectrometry quantification techniques
Signal processing, statistical analysis, normalization, Clustering and classification, Gene Set Enrichment Analysis (GSEA), Hypergeometric testing, Statistical experiment design

BIOINFORMATICS

Sequence alignments algorithms
Brief introductions to issues and unsolved questions from phylogenetic analysis to protein structure and function.
Dot Plot analysis, repeat and inverse repeats
Sequence alignment scores: random vs. match model to calculate the alignment score
Scoring matrices
Local (Smith and Waterman), global (Needleman-Wunsch), freeshift algorithms
K-tuple algorithms
Confusion matrices, ROC curves
Multiple alignments
Patterns
Frequency matrices and protein profiles
PSI-BLAST and the PSSM
Markov chains and Hidden Markov Chains (HMM).
Brief introduction to secondary protein structure prediction
Brief introduction to structural modeling from comparative modeling to fold recognition techniques
Visualizing proteins in 3D with molecular visualization systems

STEM CELL BIOLOGY AND MOLECULAR BIOLOGY OF DEVELOPMENT

Master degree in Medical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Sirio Dupont

Credits: 6 ECTS

Examination: written

12

Mechanisms of development. morphogenesis. cellular signals and signal transduction. animal models. stem cells: examples and definitions. The stem cell niche. adult, embryonic, induced and cancer stem cells

ADVANCED ORGANIC CHEMISTRY

Master degree in Pharmaceutical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Marcella Bonchio

Credits: 4 ECTS

Examination: written/oral

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Reactive intermediates in organic chemistry. Carbocations, carbanions, carbenes and radicals. Aliphatic nucleophilic substitution. Mechanism and stereochemistry of SN2 and SN1 reactions. Examples of internal nucleophilic substitution (SNi). Elimination reactions. E1 and E2 mechanism. Aromatic electrophilic substitution. Effects of activation, deactivation and orientation of substituents in benzene derivatives. Reactions of nucleophilic aromatic substitution. Addition reactions. Addition to the double and triple carbon-carbon bond. Electrophilic addition. Radical and nucleophilic addition. Addition to polyenes. Addition to multiple carbon-heteroatom (O, S, N) bond. Rearrangement reactions. Reactions Hofmann, Curtius and Lossen. Claisen and benzidine rearrangement. Types of hetero-atoms (N, O, S) and size of rings. Triatomic heterocycles. Lactones and lactams. Structure and reactions of pyrrole. Properties of Furan and thiophene. Indole. Benzofurane and benzothiofene. 1,3- Azoles. Imidazole derivatives. Structure and reactivity of thiazole and oxazole, pyrazole, isoxazole and isotiazole. Benzimidazole and benzothiazole. Triazoles. Structure and reactions of pyridine. Quinoline and isoquinoline. IUPAC Nomenclature of heterocyclic compounds.

MOLECULAR BIOLOGY II

Master degree in Pharmaceutical
Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Dorianna Sandonà

Credits: 6 ECTS

Examination: written and oral

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- Epigenetic and monoallelic gene expression: epigenetic markers and “Histone code”, genomic imprinting and developmental disorders, X chromosome inactivation, monoallelic gene expression,
- Post transcriptional gene regulation by small RNAs: expression, processing and mechanisms of action of microRNA., microRNA involvement in organism development, cancer, other pathologies; interfering RNAs, RNA interference as a tool to study genes, RNAi and therapeutic perspectives
- Molecular therapy of cancer: the molecular basis of cancer, cancer and epigenetic, new approaches for the molecular therapy of cancer, immunologic therapy of cancer, DNA vaccines.
- Treatments able to modify the RNA transcript or able to alter protein translation: molecular basis of Duchenne and Becker muscular dystrophies, frame shift and nonsense mutations, exon skipping, oligonucleotides as drugs, oligonucleotides delivery; the nonsense mediated mRNA decay, stop codon read through, molecules able to induce stop codon read through.
- Recombinant protein production: expressing vectors, bacteria, yeast and mammalian cells as guest organisms.
- Practical experience: transfection of the cDNA encoding the Green Fluorescent Protein (GFP) in human model cells and silencing of GFP by RNA interfering,

definition of appropriate controls.
Determination of GFP expression by western blot and fluorescence confocal microscopy analyses.

Examination

1. Bibliographic search and oral presentation of the results regarding a particular aspect of a program topic.
2. Written report on the practical part of the course
3. Oral examination regarding the course topics

BIOTECHNOLOGICAL DRUGS

Master degree in Pharmaceutical
Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Barbara Gatto

Credits: 7 ECTS

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The course covers the following topics:

- Molecular Biotechnology. Biotech-related technologies. Analytical methodologies for protein drugs characterization.

Legal requirements and normative for biotechnological inventions.

- General principles of biotech processes applied to the production of proteins for therapeutic use. Production and downstream processing of Biotech Therapeutics. Good Manufacturing Practices (GMP) for biotech drugs.

- Biosimilars

- Protein therapeutics: Monoclonal Antibodies, Immunoadhesins, Cytokines, Growth factors, Hormones, Enzymes, Vaccines.

Nucleic acids-based biotech drugs: Antisense. Aptamers. siRNA.

Literature searches. Databases: how to search databases for technical and patent information, how to read and interpret a patent document.

Examination

Oral Presentation by students (monograph assignment on biologics recently approved or in clinical trial)/Multiple choice test

RATIONAL BASIS OF DRUG DISCOVERY

Master degree in Pharmaceutical
Biotechnologies

Language: English

Teaching period: 2nd semester

Lecturer: Barbara Gatto

Credits: 7 ECTS

Examination: oral

16

The course focuses on the molecular basis of target-based drug discovery, with emphasis on the biological targets of therapeutic relevance for rational discovery & development of small molecules drugs.

Topics covered through the course are:

Principles governing drug-receptor interactions, molecular mechanism of drug-receptor recognition, stereochemistry.

Discovery of Lead compounds, structure-activity relationships.

Rational development of drugs: natural products and existing drugs as chemical scaffolds for the discovery and design of novel therapeutics, analog design, computer-aided rational design, peptidomimetics.

Examples treated in details will be benzodiazepines, opioid analgesics, renin-angiotensin-aldosterone inhibitors, Histamine-2 antagonist, COX-inhibitors and kinase inhibitors. Particular attention will be devoted to the discovery and development of HIV-protease inhibitors and sialidase inhibitors, and in general to the development of antibacterial and antiviral drugs.

MICROBIAL DIAGNOSTIC METHODS AND IMMUNOCHEMISTRY

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A. MICROBIAL DIAGNOSTIC METHODS

Master degree in Pharmaceutical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Antonella Caputo

Credits: 6 ECTS

Examination: written/oral

The course covers the following topics:

- Concepts on: bacteria, virus, mycetes and protozoa of medical interest, biotechnological drugs, direct and indirect diagnostic procedures, safety procedures in a microbial laboratory, microbial procedures, including
- 1) samples collection, storage and delivery;
- 2) methods for isolation and identification of bacteria;
- 3) methods for virus isolation and identification;
- 4) methods for isolation and identification of mycetes and protozoa;
- 5) methods of molecular diagnostics;
- 6) immunological methods.

B. IMMUNOCHEMISTRY

Master degree in Pharmaceutical Biotechnologies

Language: English (upon request)

1st semester

Lecturer: Susanna Mandruzzato

Credits: 4

Examination: written/oral

The course covers the following topics:

Characteristics of the immune system. Innate and adaptive immunity. Identification of the pathogen by the cells of the innate system: PAMP and PRR. Toll-like receptors. Origin of the cells of the immune system. Recruitment of the leukocytes to the infection site. Natural killer cells and their role in the immune system. Major histocompatibility complex: gene organization, protein structure and biological

function. HLA typing. Antibody structure. Monoclonal and polyclonal antibodies, generation of monoclonal antibody and their use in the lab and in the clinic. Evolution of monoclonal antibody. Monoclonal antibodies as drugs. B cell activation and antibody production: signal transduction and functional responses. Helper T cell-dependent antibody responses. The germinal center reaction. Effector mechanisms of the humoral immunity. The complement system. The innate response to viral infections. TRANSPLANTATION IMMUNOLOGY. Lymphocyte development and antigen receptor gene rearrangement. B lymphocyte development. Maturation of T lymphocytes. Signals for T cell activation. Balancing T cell activation and control. Functional responses of T lymphocytes: Th1, Th2, Th17. Decline of T cell responses. Immunity to tumors. Immune responses to tumors. Tumor antigens. Evasion of immune responses by tumors. Immunotherapy for tumors. Recent advances in the immunotherapy of cancer. Flow cytometry: principles and application in immunology. Immunofluorescence direct and indirect.

PROTEIN ENGINEERING

Master degree in Pharmaceutical
Biotechnologies

Language: English

Teaching period: 2nd semester

Lecturer: Barbara Spolaore

Credits: 6 ECTS

Examination: oral

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The course deals with molecular biology and chemical methods that can be used to study protein structure and function and to develop proteins with new and useful properties.

The course covers the following topics:

- Site-directed mutagenesis of proteins to increase their thermodynamic stability
- Chemical stability of proteins and strategies to improve it
- Methodologies to create libraries of mutants (directed evolution) and methods of high-throughput screening
- Antibodies, antibody fragments and new binding proteins developed from non-immunoglobulin domains
- Circular permutation of proteins
- Inteins and their applications
- Chemical synthesis of peptides and proteins
- Production of proteins and peptides containing non-natural amino acids.

All techniques will be illustrated with examples of applications.

BIOCHEMICAL METHODOLOGIES AND PROTEOMICS

Master degree in Pharmaceutical
Biotechnologies

Language: English

Teaching period: 2nd semester

Lecturer: Patrizia Polverino de Laureto

Credits: 6 ECTS

Examination: oral

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The course covers the following topics:

Proteomics: introduction and theory
Purification techniques: 2D electrophoresis and multidimensional chromatography
Mass spectrometry of proteins: theory and applications
Mass spectrometry of proteins: instrumentations
Ion sources (Electron Impact, Chemical Ionization, Electrospray ionization, MALDI)
Ion analyzers (Quadrupole, time of flight, FT-ICR, Orbitrap)
Tandem Mass Spectrometry and sequencing: theory, instrumentation and application)
Interpretation of Ms and ms-ms spectra
Determination of the protein primary sequence by Edman Degradation
Bioinformatic Tools in proteomics
Determination of the post-translational modification
Quantitative Proteomics
Functional Proteomics
Biomarkers
Proteomics in medicine

DELIVERY AND FORMULATION OF BIOTECHNOLOGICAL DRUGS

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(PART A)

Master degree in Pharmaceutical Biotechnologies

Language: English

1st semester

Lecturer: Gianfranco Pasut

Credits: 6 ECTS

Examination: written/oral

The course firstly introduces polymers and their characteristics, facilitating the comprehension of the drug delivery systems. Liposomes, hydrogels are discussed as drug delivery system together with the definition of their physico-chemical properties. The biotech drugs are introduced firstly from the legal point of view taking into consideration also the biosimilar definition. Then the advantages and problems of biotech drugs are presented. The several solutions to overcome the limits of biotech drugs are presented. Firstly, the main parameters for the development of a protein formulation are described and then the lyophilization process is introduced. Secondly advances methods of protein delivery are introduced with particular emphasis to protein conjugation with polymer and fusion proteins. Finally the some approaches of gene delivery are presented.

The experimental section is carried out in the laboratory involving the preparation of liposomes, hydrogels and conjugation.

(PART B)

Master degree in Pharmaceutical Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Stefano Salmaso

Credits: 5 ECTS

Examination: written/oral

The course is aimed at providing the knowledge in advanced pharmaceutical technology and drug delivery. Basic concepts of preformulation studies, dissolution of drugs and absorption through biological membranes will be recalled. Special attention is paid to colloidal systems in drug delivery: properties and stability issues. Suspensions and emulsions in pharmaceutical technology. Use of microemulsions for oral administration of drugs. Preparation of polymer and lipid based micro- and nano-particles for the administration of biotech drugs. Examples of commercial nanoparticles for the delivery of anticancer and biotech drugs. Updated techniques for the characterization of nanocarriers. Use of gold nanoparticles and super paramagnetic nanoparticles (SPIONS) for diagnostic and drug delivery purposes. Protein energetics involved in the formulation processes of biotech drugs. Strategies to improve the stability and immunological performances of vaccines (commercial examples). Use of biodegradable polymers in drug delivery and biotechnology. Transdermal, transmucosal, pulmonary routes as non-conventional administration routes of biotech drugs. Cyclodextrins as natural carriers for targeted delivery of drugs and si-RNA delivery, clinical example. Carbon nanotubes as innovative carrier for intracellular delivery of biotech drugs. Basic concepts of the good laboratory and manufacturing practice.

STRUCTURAL BIOCHEMISTRY

Master degree in Pharmaceutical
Biotechnologies

Language: English

Teaching period: 1st semester

Lecturer: Patrizia Polverino de Laureto

Credits: 6 ECTS

Examination: oral

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Program and content of the course:

Amino acids properties

Protein primary structure

Protein secondary structure

Protein Domains

Protein tertiary and quaternary structure

Chemical bonds, forces and interactions in
proteins

Protein Folding

Protein Unfolding

Protein Misfolding

Intrinsically disordered protein

Protein-protein interaction and surface
plasmon resonance

Membrane protein

Transport across membranes, Endocytosis and
involved proteins

Spectroscopy and determination of protein
structure

Fluorescence: theory

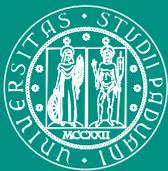
Applications

Circular dichroism: theory

Applications

Infrared

X Ray and crystallography.



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