

Syllabus

N° documenti: 15

Testi del Syllabus

Resp. Did. **BIGGIOGERA MARCO** **Matricola: 004077**

Docente **BIGGIOGERA MARCO, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **502305 - ADVANCED MICROSCOPY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **6**

Settore: **BIO/06**

Tipo Attività: **D - A scelta dello studente**

Anno corso: **2**

Periodo: **Primo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento The course is aimed at presenting some advanced microscopy techniques, in their application to cell and molecular biology.

Programma e contenuti Basic concepts will first be given on fluorescence microscopy and on conventional transmission and scanning electron microscopy; students will then be introduced to more refined new tools (such as confocal microscopy and Energy Filtering electron microscopy, EFTEM) for visualizing in situ subcellular structures, also under living conditions. FRET (fluorescence resonance energy transfer), FRAP (fluorescence recovery after photobleaching), FLIP (fluorescence loss in photobleaching), electron tomography and electron spectroscopic imaging, as well as correlative microscopy will be also considered in their application to different cell models. Superresolution: scanning tunneling microscopy, atomic force microscopy; Stimulated Emission Depletion (STED), Photoactivated Localization Microscopy (PALM), Stochastic optical

reconstruction microscopy (STORM). Some of the above mentioned techniques will be used in the practical part of the course.

Metodi didattici

Lectures

Testi di riferimento

Chandler & Roberson: BIOIMAGING. Jones & Bartlett Publishers

Modalità di verifica dell'apprendimento

Oral exam

Altre informazioni

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Testi del Syllabus

Resp. Did.	GIULOTTO ELENA	Matricola: 002498
Docenti	GIULOTTO ELENA, 3 CFU MC VEY MITCHELL WAYNE, 1.5 CFU SULLIVAN KEVIN FRANCIS, 1.5 CFU	
Anno offerta:	2015/2016	
Insegnamento:	500805 - ADVANCED MOLECULAR BIOLOGY	
Corso di studio:	08412 - MOLECULAR BIOLOGY AND GENETICS	
Anno regolamento:	2015	
CFU:	6	
Settore:	BIO/11	
Tipo Attività:	B - Caratterizzante	
Anno corso:	1	
Periodo:	Primo Semestre	



Testi in italiano

Lingua insegnamento	INGLESE
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Testi in inglese

Lingua insegnamento	ENGLISH
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Prerequisiti	=
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Obiettivi formativi e risultati di apprendimento	The objective of the course is to provide advanced knowledge in genomics and post-genomics.
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Programma e contenuti	pecific subjects include: organization of different genomes; DNA markers; genome maps; sequencing of entire genomes; next generation sequencing methods and applications; genome sequence interpretation (sequence analysis, experimental approaches, gene identification); defining gene function (gene inactivation, RNAi); genome modification by engineered nucleases; chromosome architecture (chromatin, centromeres, telomeres); comparative genomics; molecular mechanisms of genome evolution. Model organisms. Production of recombinant proteins.
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Metodi didattici	=
Testi di riferimento	"Genomes 3", TA Brown, Garland Science Publishing "From genes to genomes, Concepts and applications of DNA technology", JW Dale, MV Schantz, N Plant, third edition, Wiley-Blackwell "Gene cloning and DNA analysis, An Introduction" Fifth edition, TA Brown, Blackwell Publishing
Modalità di verifica dell'apprendimento	esame scritto oppure orale, a scelta dello studente
Altre informazioni	=

Testi del Syllabus

Resp. Did. **BIONE SILVIA** **Matricola: 032430**

Docente **BIONE SILVIA, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **500190 - BIOINFORMATICS**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2015**

CFU: **6**

Settore: **ING-INF/06**

Tipo Attività: **C - Affine/Integrativa**

Anno corso: **1**

Periodo: **Primo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento Aim of the course is to provide students with the basic knowledge of bioinformatic methodologies, tools and approaches that are essential to integrate molecular biology and genetics studies and researches.

Programma e contenuti Course content. Functions and goals of Bioinformatics. NCBI and EBI sites. Query tools for integrated databases. Biomedical primary and derivative databases. Sequence comparison: basic notions and alignment tools. Multiple sequences alignment and evolutionary clustering. Genome Browsers. Regulatory elements in genome browsers. Transcriptional profiles in genome browsers and database. Analysis of nucleotide variations and repeated sequences. Human diseases and mutations. Bioinformatic analysis of alternative splicing. Bioinformatic analysis of microRNA targets. Laboratories. Finding information in biomedical databases. Tools for sequence comparison. The human UCSC genome browser. The architecture of regulatory elements. Making SNPs and repetitive sequences make sense. Data mining in gene lists. Analysis of

gene regulation: alternative splicing and microRNA analysis.

Metodi didattici

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Testi di riferimento

- Lesk A -Introduction to bioinformatics . Oxford Univ. Press, ed. -
Westhead DR, Parish JH, Twyman RM Bioinformatics (Instant notes)-
Taylor and Francis, ed. - NCBI Help Manual
(<http://www.ncbi.nlm.nih.gov/books/NBK3831/>)

**Modalità di verifica
dell'apprendimento**

Written examination

Altre informazioni

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Testi del Syllabus

Resp. Did. **MINETTI GIAMPAOLO** **Matricola: 019625**

Docenti **KÄSTNER LARS JÜRGEN, 1.5 CFU**
MINETTI GIAMPAOLO, 4.5 CFU

Anno offerta: **2015/2016**
Insegnamento: **500462 - CELLULAR BIOCHEMISTRY**
Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**
Anno regolamento: **2014**
CFU: **6**
Settore: **BIO/10**
Tipo Attività: **B - Caratterizzante**
Anno corso: **2**
Periodo: **Primo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento =

Programma e contenuti Protein synthesis and its regulation. Selenoproteins. Protein structure: overview of the main types of structural domains. Protein folding and molecular chaperones. Mechanisms and regulation of protein sorting and transport. Post-translational modifications of proteins. Protein turnover and degradation. Biological membranes. Membrane proteins. Membrane transport including ion channels. Exploring cellular biochemistry by imaging methods: Principles and Examples. Biochemistry of subcellular structures: cell organelles. Membrane trafficking and recycling. Cell signaling: pathways of signal transduction, signaling molecules, receptors. Programmed cell-death (apoptosis). Cancer.

Metodi didattici	=
Testi di riferimento	1) Lecture slides. 2) Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P: Molecular Biology of the Cell. 5th ed. Garland Science, 2007. 3) Voet D, Voet JG: Biochemistry. Wiley, 2010.
Modalità di verifica dell'apprendimento	Written exam
Altre informazioni	=

Testi del Syllabus

Resp. Did. **REDI CARLO ALBERTO** **Matricola: 000786**

Docente **REDI CARLO ALBERTO, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **502300 - DEVELOPMENTAL BIOLOGY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **6**

Settore: **BIO/06**

Tipo Attività: **B - Caratterizzante**

Anno corso: **2**

Periodo: **Primo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento =

Programma e contenuti

Mechanisms of sex determination. Gonad development and sexual phenotype. The development of germ cells: spermatogenesis and oogenesis. Stem cells. Stemness genes. Genetic reprogramming. Cloning: therapeutic and reproductive options. Fertilisation. Creating multicellularity: patterns of embryonic cleavage. Patterning of the body plan: setting up the body axes; origin and specification of the germ layers; general features of gastrulation. Pattern formation. Determination by cytoplasmic specification. Progressive determination. Genomic equivalence and differential gene expression.

Metodi didattici	=
Testi di riferimento	Materiale didattico formato da una quantità di lavori pubblicati su riviste specialistiche: indirizzo gli allievi alla consultazione.
Modalità di verifica dell'apprendimento	Una presentazione di 10 - 15 immagini in una presentazione in PPT su un argomento deciso insieme a ciascun allievo su un argomento della materia da me ritenuto idoneo ad un approfondimento.
Altre informazioni	=

Testi del Syllabus

Resp. Did. **RANZANI GUGLIELMINA** **Matricola: 002352**

Docente **RANZANI GUGLIELMINA, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **500811 - HUMAN MOLECULAR GENETICS**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2015**

CFU: **6**

Settore: **BIO/18**

Tipo Attività: **B - Caratterizzante**

Anno corso: **1**

Periodo: **Secondo Semestre**



Testi in italiano

Lingua insegnamento	INGLESE
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Testi in inglese

Lingua insegnamento	ENGLISH
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Prerequisiti	=
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Obiettivi formativi e risultati di apprendimento	=
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Programma e contenuti	The human genome: structure, organization and function. From the Human Genome project to ENCODE, 1000-Genomes, and beyond. Human DNA variability: extent and technologies. DNA polymorphisms as tools in forensic genetics and in medical genetic research. Identification of disease-genes and linkage analysis. Genes in pedigrees; inheritance of genetic diseases, genotype-phenotype correlations. Cystic fibrosis. The human hemoglobins: structure, organization and evolution of globin genes; hemoglobinopathies; sickle-cell anemia; molecular basis of thalassemias. Cancer genetics: oncogenes and tumor suppressor genes, genome instability. The genetic model of retinoblastoma. The sporadic and hereditary colorectal cancers. Epigenetics (histone code, DNA methylation, miRNAs); epigenetics and cancer. Complex diseases: the
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genetic component and the Genome Wide Association Studies (GWAS). Trinucleotide repeat disorders and the Huntington's disease. The nucleotide excision repair (NER) and the NER-defect syndromes. Pharmacogenetics and pharmacogenomics (applications in cancer treatment).

Metodi didattici	=
Testi di riferimento	HUMAN MOLECULAR GENETICS (edition 4th); Tom Strachan & Andrew Read; GARLAND SCIENCE
Modalità di verifica dell'apprendimento	ORAL EXAMINATION
Altre informazioni	=

Testi del Syllabus

Resp. Did. **GHERARDI ERMANNO** **Matricola: 007288**

Docente **GHERARDI ERMANNO, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **501708 - IMMUNOLOGY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **6**

Settore: **MED/04**

Tipo Attività: **D - A scelta dello studente**

Anno corso: **2**

Periodo: **Secondo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti Students enrolling in this Course will have covered Molecular Biology, Biochemistry and Genetics at BA level and such background is expected.

Obiettivi formativi e risultati di apprendimento To provide students with a comprehensive view of immunity, including the evolutionary basis of self - non self discrimination, the main types of immunity (innate and adaptive) and of the molecular and cellular processes responsible for resistance to infection and immune surveillance.

Programma e contenuti The Immunology Course addresses the biological processes responsible for resistance against disease. The Course offers an evolutionary and molecular perspective of the study of immunity and consists of several lecture blocks: Foundations, provides a short historic account of the discovery and impact of artificial immunity and the experimental foundations of modern immunology. Evolution of Immunity addresses the innate and adaptive immunity across the evolutionary ladder and introduces the cells and molecules responsible for immunity in higher vertebrates. Proteins and Genes is devoted to the study of the molecular basis of immunity, namely: the properties of antigens and the pathways of antigen presentation, the proteins involved in antigen recognition and

the complex genetics that underlies the diversity of the adaptive immune system. Cells of immunity covers the cellular basis of immunity: the development of B and T cells, the immune network and tolerance. Effector Responses reviews the processes responsible for immunity to viruses and bacterial and effector mechanisms: cell-, complement-, and cytokine-mediated. Blood Groups, Transplants and Vaccines address the impact of Immunology in these major areas of medical science. Immunity and Disease covers the causes and mechanisms of autoimmunity, hypersensitivities and immune deficiencies, genetic and acquired.

Metodi didattici

Lectures, seminars and tutorials.

Testi di riferimento

Students should be aware that the two Immunology and General Pathology Exam papers are based on the content of the Courses as taught. Nevertheless, student need to use a Immunology textbook and a General Pathology textbook for revision. There is now a wide range of excellent Immunology textbooks for Natural Science and Medical students. These are listed below and most are regularly updated and the choice of a particular one is largely a matter of personal preference for style, illustrations and emphasis on particular topics. Students should bear in mind that the most expensive books are not necessarily the best and that it is advisable to spend some time looking at several titles before deciding which one to buy. Most titles are also available for consultation at the Institute of General Pathology (contact Giuseppe Panebianco). The first title is extensively used in Universities in the United Kingdom and is one of two textbooks with contributions by Ivan Roitt, an immunologist who made important contributions to autoantibodies and autoimmunity and is currently a member of Middlesex University. The other British textbook listed is from Peter Wood who is a member of the University of Manchester and has research interests in the area of type I diabetes and T helper cells. The textbooks from the USA include Abul K Abbas's Cellular and Molecular Immunology. Abul K Abbas is currently a member of University of California at San Francisco also has a main interest in immunological tolerance. Janeway's Immunobiology is a follow up of the textbook of the late Charles Janeway (d 2003), a distinguished Yale immunologist who made important contributions to the field of innate immunity and the interface between innate and adaptive responses. The most recent edition of Janeway's Immunobiology has been produced by Kenneth Murphy, a member of the Washington University in St Louis. Kuby's Immunology is the continuation of the excellent and prize-winning textbook authored by the late Janis Kuby (d. 1996), an immunologist at the University of California, Berkeley. This textbook has reached the 7th edition and retains the original style with a strong emphasis on experimental strategies and foundations to the main concepts of contemporary immunological research. Immunology, Infection and Immunity is another excellent textbook whose lead author, Gerald B Pier has a strong research interest in bacterial pathogens and mechanism of pathogenicity. He is currently a member of Harvard University. Roitt's Essential Immunology. Delves PJ et al. Wiley Blackwell, 12th ed., (2011) £ 42.74 Understanding Immunology. Wood P. Prentice Hall., 3rd ed (2011) £ 48.44 Cellular and Molecular Immunology. Abbas AK et al. Saunders Co., 7th ed., (2011) £ 49.29 Janeway's Immunobiology. Murphy K et al. Garland Science. 7th ed. (2011) £. 48.94 Kuby's Immunology. Owen J et al. W.H. Freeman Co. 7th ed., (2013) £. 49.99 Immunology, Infection and Immunity. Pier GB, Lyczak JB & Wetzler LM. ASM International (2004) £ 54.00 The Immune System. Parham P. Garland Publishing. Garland Scienc. 3rd ed (2009) £ 44.65 Immunology. Male D et al. Saunders. 8th ed (2012) £ 46.99

Modalità di verifica dell'apprendimento

General The Immunology exam of the Course at the University of Pavia is a written paper and consists of the following three parts: Long Essay (one) (30% of the marks). This requires an extensive and in-depth discussion of the topic assigned and students should pay special attention to the following points: (i) the essay should be logically structured and the different parts should be balanced, (ii) where relevant, a brief conceptual/historical introduction should be given, (iii) technical terms should be defined. The length of this essay typically is one A4

page. Short Essays (four) (60% of the marks). These should be structured as discussed above for the long essay but these essays are more concise (half an A4 page). Problem Solving (one) (10% of the marks). Typically each exam paper contains one problem of immunochemistry, immunogenetic (HLA typing) or agglutination reactions (blood typing). Typical examples include calculations of K_d or K_a of antibody-antigen reactions, analysis of VDJ rearrangements, MHC typing and ABO typing. When problems involve numerical calculations, it is sufficient for students to give the answer in outline. Discussion Paper. In addition, students may choose to write a short discussion paper on one of the primary research papers listed at the end of each lecture. Students may write this paper anytime during the Course but should hand it on the day in which they take the Immunology exam. The discussion paper is up to three pages in length and must address critically the contents of the research paper under study (strength of the study, limitations, alternative experimental strategies, etc). It must not be a mere summary of the results of the study. Marking Students have one hour and half for completing the Immunology paper. I attach great importance to the exam paper and the integrity of the exam procedure. Misconduct will not be tolerated and the students involved will be asked to leave the examination and will be denied access to the subsequent exam date. Students are not allowed to request clarifications on meaning or interpretation of questions during the exam itself as this leads to disruption. They can comment in writing, however, about their understanding of the exam question (or lack of clarity where applicable) and these comments will taken into account at the marking stage.

Altre informazioni

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Testi del Syllabus

Resp. Did. **IADAROLA PAOLO** **Matricola: 000498**

Docente **IADAROLA PAOLO, 9 CFU**

Anno offerta: **2015/2016**

Insegnamento: **500802 - METHODS IN BIOCHEMISTRY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2015**

CFU: **9**

Settore: **BIO/10**

Tipo Attività: **B - Caratterizzante**

Anno corso: **1**

Periodo: **Primo Semestre**



Testi in italiano

Lingua insegnamento	INGLESE
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Testi in inglese

Lingua insegnamento	ENGLISH
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Prerequisiti	A basic knowledge on basic biochemistry is required.
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Obiettivi formativi e risultati di apprendimento	Aim of the course is to provide students with the basic knowledge of techniques typically applied in a biochemical laboratory.
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Programma e contenuti	a) Methods for extraction and purification of proteins from animal/vegetal tissues and cultured cells. Procedures typically used in industry/research laboratories for primary purification of proteins. Theoretical principles and practical protocols of the most common chromatographic approaches: adsorption; partition; ion-exchange (IEC); gel-filtration (SEC); affinity; hydrophobic-interaction (HIC); perfusion; gas-chromatography (GC) and supercritical-fluid chromatography (SFC). Chromatofocusing; high performance liquid chromatography (HPLC); fast protein liquid chromatography (FPLC) and principles of green chromatography. b) Electrophoretic techniques: analytical and preparative monodimensional (1-DE) electrophoresis of proteins in their native and denaturated state. Sodium-dodecyl-sulfate gel electrophoresis (SDS-PAGE).
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Isoelectrofocusing (IEF). Two-dimensional (2-DE) electrophoresis: application to proteomic studies. Capillary Zone Electrophoresis (CZE) and Micellar Electrokinetic Chromatography (MEKC). c) Spectroscopic techniques for the qualitative/quantitative characterization of proteins. Adsorption spectroscopy: ultraviolet (U.V.); Visible; Infrared (IR); Nuclear Magnetic Resonance (NMR); Electron Spin Resonance (ESR). Emission spectroscopy: fluorescence and phosphorescence. Mass Spectrometry (MS).

Metodi didattici

frontal lectures and visit to experimental laboratories

Testi di riferimento

"Principles and Techniques of Biochemistry and Molecular Biology" di K.Wilson and J.Walker. Cambridge University Press.

Modalità di verifica dell'apprendimento

The exam consists in an oral presentation of a scientific publication taken from the web.

Altre informazioni

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Testi del Syllabus

Resp. Did. **CALVIO CINZIA** **Matricola: 008756**

Docente **CALVIO CINZIA, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **500810 - MICROBIAL GENETICS**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2015**

CFU: **6**

Settore: **BIO/18**

Tipo Attività: **B - Caratterizzante**

Anno corso: **1**

Periodo: **Secondo Semestre**



Testi in italiano

Lingua insegnamento	INGLESE
Prerequisiti	Conoscenze di base di genetica e biologia molecolare
Obiettivi formativi e risultati di apprendimento	Conseguimento di un adeguato livello di conoscenza dei meccanismi genetici di maggiore rilevanza nel campo dei microorganismi.
Programma e contenuti	Bacterial Genetics: importance and tools. Mutations and their origin. Genetic exchange in Bacteria and its evolutionary role. Transformation and competence in the Gram+ B. subtilis. Plasmids: general properties, replication, partitioning and incompatibility. Conjugation: F plasmid, Hfr strains, Prime factors. From the discovery of conjugation to genetic maps. Genetics of bacteriophages. Lytic phages: developmental cycle, gene expression regulation and replication. Lysogenic phages: the Lambda paradigm. Genetic analysis with bacteria and phages. Benzer experiments with T4. Cell division and DNA segregation. Gene expression regulation: Promoters, RNA polymerase, sigma factors. Positive and negative transcriptional regulation; attenuation & antitermination. Regulons: Catabolite Repression. Bacterial defense systems; CRISPR; Toxin-Antitoxin systems. Signal transduction in bacteria: two-component systems, quorum sensing, phosphorelay and sporulation. Developmental processes in bacteria: Biofilm formation, bistable switches and phenotypic heterogeneity.
Metodi didattici	Lezioni frontali; materiale di supporto disponibile sulla piattaforma KIRO

Testi di riferimento	L. Snyder & W. Champness, Molecular Genetics of Bacteria, 3rd Edition. ASM Press.
Modalità di verifica dell'apprendimento	Esame scritto con domande aperte
Altre informazioni	=



Testi in inglese

Lingua insegnamento	ENGLISH
Prerequisiti	Familiarity with Genetics and Molecular Biology concepts
Obiettivi formativi e risultati di apprendimento	Achievement of an adequate level of knowledge of the main genetic mechanisms in the field of microorganisms.
Programma e contenuti	Bacterial Genetics: importance and tools. Mutations and their origin. Genetic exchange in Bacteria and its evolutionary role. Transformation and competence in the Gram+ B. subtilis. Plasmids: general properties, replication, partitioning and incompatibility. Conjugation: F plasmid, Hfr strains, Prime factors. From the discovery of conjugation to genetic maps. Genetics of bacteriophages. Lytic phages: developmental cycle, gene expression regulation and replication. Lysogenic phages: the Lambda paradigm. Genetic analysis with bacteria and phages. Benzer experiments with T4. Cell division and DNA segregation. Gene expression regulation: Promoters, RNA polymerase, sigma factors. Positive and negative transcriptional regulation; attenuation & antitermination. Regulons: Catabolite Repression. Bacterial defense systems; CRISPR; Toxin-Antitoxin systems. Signal transduction in bacteria: two-component systems, quorum sensing, phosphorelay and sporulation. Developmental processes in bacteria: Biofilm formation, bistable switches and phenotypic heterogeneity.
Metodi didattici	Lectures; supplementary material available on the KIRO platform
Testi di riferimento	L. Snyder & W. Champness, Molecular Genetics of Bacteria, 3rd Edition. ASM Press.
Modalità di verifica dell'apprendimento	Written test with open questions on the programme.
Altre informazioni	=

Testi del Syllabus

Resp. Did. **ORIOLO DONATA** **Matricola: 029446**

Docente **ORIOLO DONATA, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **501561 - MOLECULAR GENETICS**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **6**

Settore: **BIO/18**

Tipo Attività: **D - A scelta dello studente**

Anno corso: **2**

Periodo: **Primo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento =

Programma e contenuti

The aim of the course is to give basic and advanced knowledge on transgenic animals, ranging from the *Drosophila*, *C. elegans*, *Xenopus laevis* and Zebrafish organisms to the Mouse system. It covers the techniques and applications of knock-out, knock-in and knock-down animals, as well as the generation and use of conditional transgenic organisms designed to inactivate, express and silence genes in an inducible, tissue-specific manner. Besides homologous recombination, the course faces the use of zinc-finger nucleases and TALENS recombinant proteins for the purpose of targeting DNA on specific loci. Moreover, the course describes large-scale approaches of functional genomics in transgenic animals, like gene-trapping and genome-wide screenings by RNAi libraries. It includes a discussion on the mouse

system as an invaluable genetic tool to engineer strains that show disease conditions similar to those of human disorders and some "disease model" mouse strains are detailed described. The topics include the subject of genetic reprogramming by cell-cell fusion, nuclear transfer technology (animal cloning) and generation of induced Pluripotent Stem cells (iPS).

Metodi didattici	=
Testi di riferimento	=
Modalità di verifica dell'apprendimento	=
Altre informazioni	=

Testi del Syllabus

Resp. Did. **RICCARDI GIOVANNA** **Matricola: 001093**

Docente **RICCARDI GIOVANNA, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **502301 - MOLECULAR MICROBIOLOGY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **6**

Settore: **BIO/19**

Tipo Attività: **B - Caratterizzante**

Anno corso: **2**

Periodo: **Secondo Semestre**



Testi in italiano

Lingua insegnamento INGLESE



Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento =

Programma e contenuti Host-pathogen interaction. Innate and adaptive immunity. Phagocytosis process. Autophagy in infectious diseases. Antigen processing and presentation. Microbial pathogenesis: adhesion/invasion, Type III Secretion Systems, iron acquisition, evasion of host defences, antigenic variation, endotoxin and exotoxins. Pathogenicity Islands. Tuberculosis as a model of host-pathogen interaction. Multidrug resistance and efflux pumps. New antibacterial drugs. Quorum sensing and biofilm. Phage therapy. Animal viruses: HIV, HCV, HPV, H1N1. Vaccines.

Metodi didattici =

Testi di riferimento	Slides
Modalità di verifica dell'apprendimento	orale con seminario tenuto da studenti
Altre informazioni	=

Testi del Syllabus

Resp. Did. **FORNERIS FEDERICO** **Matricola: 021554**

Docente **FORNERIS FEDERICO, 6 CFU**

Anno offerta: **2015/2016**

Insegnamento: **500812 - MOLECULAR PHARMACOLOGY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2015**

CFU: **6**

Settore: **BIO/14**

Tipo Attività: **B - Caratterizzante**

Anno corso: **1**

Periodo: **Secondo Semestre**



Testi in italiano

Lingua insegnamento	INGLESE
Prerequisiti	Knowledge of molecular biology methods for recombinant protein production and protein engineering, as well as protein structure and function. It is expected that students can easily visualize and interpret structural representations of proteins to understand their mechanisms of function.
Obiettivi formativi e risultati di apprendimento	The course will provide an advanced view on modern strategies for drug development and targeted therapeutics, starting from analysis of drug targets, their structures and functions.
Programma e contenuti	Molecular Pharmacology addresses the study of the molecular mechanisms and biological consequences of the interactions of drugs and other small molecules with biological targets. The course will comprehensively explore the topics of modern molecular pharmacology with a strong focus on the structure-function relationships that enable the specific interactions between drugs and their biological targets. The material covered by this course include: i) modern biophysical and structural approaches to study molecular interactions; ii) basic principles of drug-receptor interactions; iii) structure-based drug design iv) principles of pharmacokinetics and pharmacodynamics; v) pharmacogenetics and pharmacogenomics; vi) structural biology of drug targets: GPCRs, signalling complexes, kinases, with examples of interacting drugs as tools to achieve knowledge of cell macromolecular structure and function; vii) mechanism of action of various drugs commonly used in clinical practice; viii) therapeutic potential of biotechnological drugs (ranging from biologicals, such as recombinant proteins and humanized monoclonal antibodies, to nucleic acids, such as oligodeoxynucleotides, ribozymes, modified siRNAs); ix) strategies to overcome possible drawbacks associated with use of biotech drugs; x) modern approaches to molecular pharmacology (molecular engineering,

gene therapy, and drug delivery).

Metodi didattici	Lectures
Testi di riferimento	John Dickenson, Fiona Freeman, Chris Lloyd Mills, Christian Thode, Shiva Sivasubramaniam, Molecular Pharmacology from DNA to Drug Discovery, Wiley Blackwell, ISBN: 978-0-470-68443-6
Modalità di verifica dell'apprendimento	Oral or written test, to be discussed with students
Altre informazioni	The book will be integrated with slides from various structural biology books and recent literature. Slides will be available only after lectures.



Testi in inglese

Lingua insegnamento	ENGLISH
Prerequisiti	Knowledge of molecular biology methods for recombinant protein production and protein engineering, as well as protein structure and function. It is expected that students can easily visualize and interpret structural representations of proteins to understand their mechanisms of function.
Obiettivi formativi e risultati di apprendimento	The course will provide an advanced view on modern strategies for drug development and targeted therapeutics, starting from analysis of drug targets, their structures and functions.
Programma e contenuti	Molecular Pharmacology addresses the study of the molecular mechanisms and biological consequences of the interactions of drugs and other small molecules with biological targets. The course will comprehensively explore the topics of modern molecular pharmacology with a strong focus on the structure-function relationships that enable the specific interactions between drugs and their biological targets. The material covered by this course include: i) modern biophysical and structural approaches to study molecular interactions; ii) basic principles of drug-receptor interactions; iii) structure-based drug design iv) principles of pharmacokinetics and pharmacodynamics; v) pharmacogenetics and pharmacogenomics; vi) structural biology of drug targets: GPCRs, signalling complexes, kinases, with examples of interacting drugs as tools to achieve knowledge of cell macromolecular structure and function; vii) mechanism of action of various drugs commonly used in clinical practice; viii) therapeutic potential of biotechnological drugs (ranging from biologicals, such as recombinant proteins and humanized monoclonal antibodies, to nucleic acids, such as oligodeoxynucleotides, ribozymes, modified siRNAs); ix) strategies to overcome possible drawbacks associated with use of biotech drugs; x) modern approaches to molecular pharmacology (molecular engineering, gene therapy, and drug delivery).
Metodi didattici	Lectures
Testi di riferimento	John Dickenson, Fiona Freeman, Chris Lloyd Mills, Christian Thode, Shiva Sivasubramaniam, Molecular Pharmacology from DNA to Drug Discovery, Wiley Blackwell, ISBN: 978-0-470-68443-6

Modalità di verifica dell'apprendimento

Oral or written test, to be discussed with students

Altre informazioni

The book will be integrated with slides from various structural biology books and recent literature. Slides will be available only after lectures.

Testi del Syllabus

Resp. Did. **CARBONERA DANIELA** **Matricola: 001909**

Docente **CARBONERA DANIELA, 3 CFU**

Anno offerta: **2015/2016**

Insegnamento: **504226 - PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY - MOD. 1**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **3**

Settore: **BIO/04**

Tipo Attività: **C - Affine/Integrativa**

Anno corso: **2**

Periodo: **Primo Semestre**

Testi in italiano

Lingua insegnamento INGLESE

Programma e contenuti

The genetic manipulation of plants: case studies. Controlling plant response to the environment: insects, nematodes and other pests. Biotechnological approaches to disease resistance: cry proteins and Bt crops; cowpea trypsin inhibitor; novel insecticidal protection. Plant viral diseases: RNA silencing-based applications for developing resistant plants. Biotechnological approaches for phytoremediation. Plants as factories: metabolic engineering of carbohydrates and lipids, bioplastics, edible vaccines, medically related proteins, volatiles, and aroma compounds.

Metodi didattici Frontal lessons

Modalità di verifica dell'apprendimento Oral exam

Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti	=
Obiettivi formativi e risultati di apprendimento	=
Metodi didattici	=
Testi di riferimento	non vi sono testi consigliati ma articoli specifici su riviste internazionali
Modalità di verifica dell'apprendimento	Oral exam
Altre informazioni	=

Testi del Syllabus

Resp. Did. **BALESTRAZZI ALMA** **Matricola: 005864**

Docente **BALESTRAZZI ALMA, 3 CFU**

Anno offerta: **2015/2016**

Insegnamento: **504227 - PLANT MOLECULAR BIOLOGY AND BIOTECHNOLOGY - MOD. 2**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2014**

CFU: **3**

Settore: **BIO/04**

Tipo Attività: **C - Affine/Integrativa**

Anno corso: **2**

Periodo: **Primo Semestre**

Testi in italiano

Lingua insegnamento INGLESE

Testi in inglese

Lingua insegnamento ENGLISH

Prerequisiti =

Obiettivi formativi e risultati di apprendimento =

Programma e contenuti

Module 2. The genetic manipulation of plants: case studies. Controlling plant response to the environment: insects, nematodes and other pests. Biotechnological approaches to disease resistance: cry proteins and Bt crops; nematode-resistant crops; cowpea trypsin inhibitor; novel insecticidal protection. Plant viral diseases: RNA silencing-based applications for developing resistant plants. The genetic manipulation of stress tolerance: water-deficit stress, oxidative stress. Plants as factories: metabolic engineering of carbohydrates and lipids, bioplastics, edible vaccines, medically related proteins, volatiles, and aroma compounds. OGM traceability in food and environment.

Metodi didattici	=
Testi di riferimento	non vi sono testi consigliati ma articoli specifici su riviste internazionali
Modalità di verifica dell'apprendimento	Oral exam
Altre informazioni	=

Testi del Syllabus

Resp. Did. **MATTEVI ANDREA** **Matricola: 007207**

Docenti **FRAAIJE MARCO WILHELMUS, 1.5 CFU**
MATTEVI ANDREA, 4.5 CFU

Anno offerta: **2015/2016**

Insegnamento: **500806 - STRUCTURAL BIOLOGY AND PHARMACOLOGY**

Corso di studio: **08412 - MOLECULAR BIOLOGY AND GENETICS**

Anno regolamento: **2015**

CFU: **6**

Settore: **BIO/11**

Tipo Attività: **B - Caratterizzante**

Anno corso: **1**

Periodo: **Secondo Semestre**



Testi in italiano

Lingua insegnamento	INGLESE
Prerequisiti	Buone conoscenze di biologia molecolare, chimica e matematica
Obiettivi formativi e risultati di apprendimento	Il Corso intende approfondire le metodiche ed i concetti fondamentali nello studio della struttura tridimensionale delle macromolecole biologiche con particolare enfasi sugli aspetti attinenti allo sviluppo di farmaci.
Programma e contenuti	Metodi per lo studio della struttura tridimensionale di macromolecole biologiche. Introduzione alla biocristallografia. Teoria della diffrazione. Problema della fase e metodi per la sua soluzione. Metodologie sperimentali in biocristallografia. Spettroscopia NMR NMR Multidimensionale Altre tecniche (microscopia elettronica, spettroscopia di massa) "Structure-based drug design" Esempi di farmaci sviluppati a partire da dati strutturali
Metodi didattici	Lezioni
Testi di riferimento	Physical Biochemistry: Principles and Applications, 2nd Edition David Sheehan Wiley-Blackwell
Modalità di verifica dell'apprendimento	Esame orale



Testi in inglese

Lingua insegnamento	ENGLISH
Prerequisiti	Bachelor-level knowledge of molecular biology, chemistry and math.
Obiettivi formativi e risultati di apprendimento	This course investigates the fundamental concepts and methods for the study of the structures of biological macromolecules with a focus on the implications for drug development and design.
Programma e contenuti	Methods for the study of the three-dimensional structure of biological macromolecules. Introduction to biocrystallography. Diffraction theory. The phase problem and methods for its solution. Experimental methods in biocrystallography. NMR spectroscopy Multidimensional NMR Other methods for structural biology (electron microscopy, mass spectrometry) Structure-based drug design Examples of the application of the structural biology methods for drug development
Metodi didattici	Lectures
Testi di riferimento	Physical Biochemistry: Principles and Applications, 2nd Edition David Sheehan Wiley-Blackwell
Modalità di verifica dell'apprendimento	Oral test
Altre informazioni	=