FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Biochemical Methods
COURSE CODE NUMBER	05176
INSTRUCTOR (TEACHER)	Antonella D'Anneo Assistant Professor Università di Palermo
ECTS CREDITS	6 (5+1)
PREREQUISITES	None
YEAR OF STUDY	First
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	First
LECTURE TIMETABLE	Mon.- Fri.- 8.30-10.00.
CONSULTING TIME	Mon., Wed., Fri., 14.30-15.30, by appointment email:antonella.danneo@unipa.it tel.: 0916552447

SYLLABUS "Biochemical Methods"

The main educational aims of the course " Biochemical Methods" are oriented towards the acquisition of a level of expertise that will allow student to take part in scientific research concerning the MSc in Cellular and Molecular Biology.

To this purpose the course wants to develop and deepen student's knowledge on biochemical methods applied to the study of proteins and their identification, to protein-protein interactions and to possible post-translational modifications which control their function.

Particular attention will be paid to the evaluation of Real Time PCR and its application in biomedical field and agricultural and food processing. Aspects concerning regulatory RNAs, nucleo-cytoplasmatic RNA shuttling and methods for their analysis will be deepened. The course also intends to develop knowledge on methods to study both RNA degradation and folding. Methods to characterize and study cancer stem cells will be also discussed.

Proposed educational activities will provide an appropriate methodological know-how to allow student to independently manage experimental design and critically evaluate more appropriate methods to apply to basic biochemical research.

UNIT	Biochemical Methods
HOURS	**LECTURES**
1	Aims of the course and its organization.
6	**Methodological approaches to study proteins:** Introduction to proteomic approach for the study of proteins. Isolation and purification of proteins. Preparation of sample for proteomic analyses: solubilization, prefractioning and removal of contaminants. 2D PAGE: Isoelectrofocusing (IEF). Choice of pH gradient. IPG strips. SDS-PAGE. Methods to identify proteins in gel: Comassie, Silver and SYPRO Rub stain, potentialities and limitations of dyes. Mass Spectrometry analysis. Principles of mass spectrometry and anatomy of a mass spectrometer. Sources: Direct ionization, MALDI, ESI. Mass analyzers: Time of Flight (Tof), quadrupole, ion trap. Detectors. Peptide Mass Fingerprinting. **Principles and applications of proteomics**: use of proteomics in clinical analysis. Identification of post-translational modifications.
4	**Methods to study protein-protein interactions:** Roles of protein-protein interactions and their classification. The origin of protein interactions and allostery in colocalization. Methods to study stable

	and transient protein-protein interaction. Techniques to study DNA-protein interactions. Two hybrid assay. MAPPIT. Immunoprecipitation/Co-immunoprecipitation. TAP-tag method. Far western blotting. Phage display. Protein arrays. Crosslinking. FRET.
6	**Real time PCR-** Amplification plot. Fluorogenic probes (TaqMan probes, scorpion primers, molecular beacons, FRET, SYBR Green, Eclipes probes, Lux primers, Amplifuor probes, BD QZygen probes. Analysis of a plot of amplification. Threshold cycle (Ct) in quantitative assessments. Optimizing a QPCR assay (regression line, correlation coefficient, amplification efficiency, use of replicates). Analysis of data in real time PCR. Absolute quantification and standand curve. Relative quantification. Method of ΔCt and importance of calibrators in QPCR assays. Use of housekeeping genes in real time PCR analyses. Livak method ($2^{-\Delta\Delta Ct}$) for quantitative relative analysis. Pfaffl method. Troubleshooting in real time PCR analyses. Applications of Real Time PCR in biomedical field and in OGM identification.
7	**Functional analysis of regulatory RNAs**: Antisense RNA. First, second and third generation antisense oligonucleotides. Ribozymes. RNA interference and mechanism of action. Effects of dsRNA. Interferone response and Toll-like receptors. Tuschl roles for siRNA design. Silencing effects and methods to assess gene knockdown. Experimental controls in silencing assays. Factors affecting a reduced knockdown. Off-target effect. Strategies to reduce off-target effect: concentration, pooling, base modifications. Mention on bioinformatical approaches. siRNA delivery. Mention on piRNA. MicroRNA: biogenesis and processing. Microprocessor complex: Drosha and DGCR8. Argonaute proteins in RNA processing. Role of mir in development:lin4/lin14. Role of mir in emiocytosis of insulin containing vesicles. Oncomir and antioncomir. Methods to study miRNA.
5	**Nuclear –cytoplasmic shuttling of RNAs and export factors.** tRNAs, microRNAs and snRNAs export. Mechanisms of mRNA export. Control quality and nuclear surveillance in RNA export. mRNA export in yeast and metazoa. Ribosomal RNA export.
2	**Methods to study nuclear export.** Analysis of RNA export by using cells permeabilized with digitonin and molecular beacons.
3	**Exosome-dependent RNA degradation.** Quality control and RNA degradation. Bacteria degradosome. Exosome complex: structure and features of archea exosome, factors, RNA recognition and degradation. Eukaryotic exosome and mode of action. RNA degradation and role of sequence dependent and independent factors.
4	**Methods to study mechanisms of RNA folding.** Hierarchies in structural organization of RNAs. Strategies for RNA folding and assembly. Role of cations in the folding process; energetic landscape. Proteins assisting RNA folding. RNA chaperones: Histone like proteins (StpA1), Cps. RNA annelears. RNA helicases. Methods to study proteins with RNA chaperone activity: RNA annealing, Strand displacement, cis-splicing and trans-splicing assays, Rybozyme cleavage assay. Folding-trap and transcriptional antitermination.
2	**Methods to study cancer stem cells.** Features of stem cells, classification and potential applications in regenerative medicine. Cancer stem cells. Stem cell markers and methods for their analyses. Purification and isolation of cancer stem cells. Side population, selection by cell surface markers, tumor sphere, assessment of invasive and tumorigenic potential.
	LABORATORY ACTIVITY
12	During the course knowledge will be deepened by experimental approaches to guarantee students an adequate knowledge of methods and their applications in routine laboratory activities.

FACULTY	Sciences
ACADEMIC YEAR	2013-14
DEGREE	MSc in Cellular and Molecular Biology
COURSE	Biochemical mechanisms of cellular functions
COURSE CODE NUMBER	15559
SECTOR	BIO/10
INSTRUCTOR (TEACHER)	Michela Giuliano Associated professor of Biochemistry Università di Palermo
ECTS CREDITS	6
PREREQUISITES	None
YEAR OF STUDY	First
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	First
LECTURE TIMETABLE	Mon.- Wes.- Fri.- 8.30-10.00.
CONSULTING TIME	Mon., Wes., Fri., 14.30-15.30, by e-mail appointment (michela.giuliano@unipa.it)

SILLABUS "Biochemical mechanisms of cellular functions"

The course aims to provide students with advanced expertise for:

-understanding of the structure/function relationship of biological molecules, particularly focused on proteins and their identification, on protein-protein interactions and on the post-translational modifications which control their function;

-- understanding of the main cellular pathways employed to integrate the different signals that arrive to the membrane and to develop consistent and adequate metabolic or cellular responses;

--- acquiring a good grasp of the scientific method.

UNIT	**Biochemical mechanisms of cellular functions**
HOURS	**LECTURES**
1	Presentation and analysis of the objectives of the course.
8	Protein folding. Roles of chaperones. Molecular basis of protein-misfolding diseases.
8	Subcellular localization of proteins. Mitochondrial protein import, nuclear import and export. Protein quality control in the different subcellular compartments.
5	The degradation of proteins. The ubiquitin-proteasome system. The lysosomal-dependent degradation.
7	Post-translational modifications of proteins and their code. Ubiquitination, sumoylation, prenylation, ADP-ribosylation of transcription factors and their roles in transcriptional regulation.
6	The signal transduction as an example of cell ability to integrate and amplify the signals. Roles of scaffold proteins in cell signalling.
6	Interplay between different membrane receptors. Genomic, cytosolic, nuclear and mitochondrial actions of peptide, steroid and thyroid hormones.
7	Signal transduction of proliferation and death cell. Analysis of the different pathways of death. Ambiguous roles of oncogenes and tumor suppressor genes
SUGGESTED TEXT BOOKS	During the course will be provided articles and reviews on discussed subjects and all slides of the course.

FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Introduction to Biophysics
COURSE CODE NUMBER	17196
INSTRUCTOR (TEACHER)	Matteo Levantino Assistant Professor of Applied Physics
ECTS CREDITS	6
PREREQUISITES	-
YEAR OF STUDY	First
EVALUATION	Oral examination
GRADING SYSTEM	grades from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	First
LECTURE TIMETABLE	11/11/2013-18/01/2013, Mon-Fri 10:00-11:30
CONSULTING TIME	Tue, 15:30-17:30

SYLLABUS "Introduction to Biophysics"

The course is an introduction on how physical principles offer insights into modern biology, with a special focus on protein dynamics. Experimental techniques commonly used in biophysics, as optical spectroscopy (absorption, fluorescence, circular dichroism) and fluorescence microscopy, will be presented and their application to specific biological problems will be discussed. The flash-photolysis technique will be introduced as an example of a technique able to yield information on proteins energy landscape. Finally, the charge diffusion process and the electrical potential properties will be discussed in reference to cell ion transport and cell membrane potential.

UNIT	**INTRODUCTION TO BIOPHYSICS**
HOURS	**LECTURES**
2	Review: thermodynamics
8	Molecular interactions relevant for the stability and function of biological macromolecules
8	Optical techniques: absorption and fluorescence spectroscopy
4	Heme proteins saturation curves and hemoglobin cooperativity
8	Ligand rebinding kinetics to myoglobin after flash-photolysis
4	Protein conformational substates and energy landscape
2	Optics and microscopy
4	Fluorescence microscopy: confocal and two-photon excitation approaches
4	Review: electrical circuits
4	Ionic channels and electrochemical potentials
SUGGESTED TEXTBOOKS	Lecture notes and relevant scientific papers in electronic format will be supplied by the instructor.

FACULTY	Science
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Cellular Biology
COURSE CODE NUMBER	01597
INSTRUCTOR (TEACHER)	Fabiana Geraci BIO/06 Researcher
ECTS CREDITS	6
PREREQUISITES	Basal Cytology
YEAR OF STUDY	First
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	First
LECTURE TIMETABLE	Mon.-Fri.- 13:00-14.00
CONSULTING TIME	Daily, by email appointment (fabiana.geraci@unipa.it)

SYLLABUS "Cellular and Molecular Biology"

Aim of the course is to provide graduates an advanced knowledge of the mechanisms of cell-cell and cell-matrix communication. They will also learn how to approach original paper in cellular biology field.

UNIT	**Cellular Biology**
HOURS	**LECTURES**
2	Introductory lesson on structural organization of the cell and its components.
3	**Plasma membrane organization:** lipid composition, membrane proteins, lipid rafts.
4	**Cytoskeleton**: structure and composition. Microfilament and microtubule and role of proteins associated with them. Polymerization and depolymerization kinetics, cellular engines. Intermediate filaments: classification, structural organization.
3	**Endoplasmic reticulum**: structural and functional organization. Role in protein synthesis, SRP, Translocon. R.E domains. The sites of release of RE: regulation of intracellular Ca^{2+}. Membrane dynamics.
3	**Nuclear envelope**: structure and function of nuclear cistern. Pore complex: organisation and composition. Pore proteins. Nuclear localization signals: import and export, canonical and non canonical pathway. Ran-GTP GDP.
4	**Golgi apparatus**: Organization. The Golgi during mitosis. Golgins and postmitotic Golgi assembly, p115 and ARF1. The Golgi functions.
24	**Extracellular matrix**: organization of extracellular matrix proteins. Fibronectin, laminin, fibrillin, nidogen, SPARC, thrombospondin, Tenascin. **Collagens. Elastin.** **The proteoglycans:** SLRP, proteoglycans of the basal lamina. Ialectine. Heparan sulphate of the cell surface. **CAM:** Ig-like domains, classification, types of interactions. Signal transduction. **Integrins**: structural organization, extracellular domain (the type I domain), cytoplasmic domain, modulation of affinity. Focal adhesions and focal complexes: Assembly and maturation. Integrins and lipid rafts. Disassembly of focal adhesions. Hemidesmosome. **Selectins**: P, and L-selectins, ligands of selectins, selectins and cell signalling.

	Tight junctions (TJ): Organization, occludin, claudin and JAM, tetraspanin of myelin. ZO-1, ZO-ZO-2 and 3 (PDZ). Assembly of TJ. Tight junctions and the blood-brain barrier. **Cadherins**: classification, functional domains, cis-dimers, trans-dimers, armadillo proteins. β-catenin, γ e α-catenin and p-120. **Nectin.** **Adherens junctions** (JA): ultrastructure, integration between cadherins, catenin and microfilaments. Desmosomes: desmosomal cadherins and their integration with intermediate filaments. **Communicating junctions**: connexins and connexons.
3	**Extracellular microparticles: r**ole of extracellular microparticles in cellular communication, mRNA and sRNA.
2	**Stem cells and niche concept.**
	TUTORIALS
TESTI CONSIGLIATI	
SUGGESTED TEXTBOOKS	Reviews supplied by teacher

FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
MODULE	Recombinant DNA technology and bioinformatics applications
MODULE CODE NUMBER	13906
TEACHER (LECTURER)	Maria A. Ragusa Molecular Biology Researcher
ECTS CREDITS	6 (5+1)
PRE-REQUISITES	Basal Molecular Biology, Biochemistry and Genetics
YEAR OF STUDY	First
ASSESSMENT	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	Second
LECTURE TIMETABLE	Mon.-Fri.- 9.00-10.30
CONSULTING TIME	Daily, by email appointment (maria.ragusa@unipa.it)

EDUCATIONAL AIMS OF THE LECTURES

Learning Outcome

Knowledge of the scientific method, reproducible research, and experimental designs that are valid for a molecular and cellular biologist. Knowledge of Methods of Molecular Biology, Molecular Cloning and Molecular Tools for Studying Genes and Gene Activity.

Understanding that Computational biology and bioinformatics are integral part of genomics.

Knowledge and use of Bioinformatics tools for problem solving: from sequence fragment assembly, to gene prediction, , to identification of regulatory signals in DNA, to building phylogenetic trees, to browsing genomes.

MODULE	**MODULE TITLE**
HOURS	**LECTURES**
4	**Molecular Tools for Studying Genes and Gene Activity:** **Assaying DNA-Protein interactions** Filter Binding Gel mobility shift DNase footprinting ChIP: chromatin immuno-precipitation
6	**Functional Analisys** Transfection methods Reporter genes In vitro mutagenesis
6	**Transcription analisys: mapping and quantifying transcripts** Northern blots *In situ* hybridizations RNase protection (RPA) Reverse transcription-PCR (RT-PCR) Differential display/ subtractive hybridization
9	**Methods of Molecular Biology for:** Cloning Promoter identification

	studying enhancers Transcription factor binding site identification
6	**Chromatin structure and its effects on transcription** Nucleosome positioning (HS site mapping) Histone post-translational modifications and Chromatin remodeling (ChIP) Promoter-enhancer interaction Tridimensional chromatin structure (RNA- TRAP, Chromosome conformation capture)
6	**Bioinformatics and Computational Biology** **Genome contents and organization** **Genome analysis** Eukaryotic genomes: man, , rat, mouse; Drosophila, nematodes , sea urchins as model organisms **Genome sequencing projects** ENCODE project **Mapping, sequencing, annotation** Next-generation DNA sequencing techniques DNA assembly, clustering, and mapping Protein, RNA and DNA sequence analysis - **Whole genome sequencing** Chromosome walking (BAC-to-BAC) Shotgun sequencing
3	**Databases** **Gene Prediction in DNA Sequences** **Pattern matching** Computer and informatics Database screening methods Pattern matching tridimensional in structures **Molecular biology database design and development** Nucleic acid databases Genome browsers Protein databases OMIM Structure databases Access to biomedical literature
	EXERCISES
12	**DNA sequence analisis** **Gene finding** **Bioinformatics Tools for Sequence Similarity Searching** FASTA, BLAST tools Pairwise and multiple sequence alignments Phylogenetic three **DNA- protein interaction** DNA binding protein structural motifs , sequence recognition . DNA binding site Transcription factor binding site database Tools for searching TFBS: Transfac, Jaspar
	TUTORIALS
SUGGESTED TEXTBOOKS	Weaver, Molecular Biology McGraw-Hill Brown MOLECULAR BIOTECHNOLOGY Blackwell Pub. Watson et al RECOMBINANT DNA Zanichelli Tramontano BIOINFORMATICA Zanichelli J. Pevsner, Bioinformatics and Functional Genomics Wiley Material (papers and reviews) provided by teacher

FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Molecular Genetics and Genetics and Cytogenetics Methods
COURSE CODE NUMBER	16480
MODULE 1	Molecular Genetics
MODULE 2	Genetics and Cytogenetics Methods
INSTRUCTOR (TEACHER)	Laura Lentini, Researcher
ECTS CREDITS	6+6
PREREQUISITES	Molecular Biology and Genetics
YEAR OF STUDY	1st
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	2nd
LECTURE TIMETABLE	Mon.-Fri.- 10.30-12.30
CONSULTING TIME	Daily, by email appointment (laura.lentini@unipa.it)

SYLLABUS " Molecular Genetics and Genetics and Cytogenetics Methods"
To provide students with the forefront molecular genetics knowledge useful to understand the mechanisms and pathways responsible for the proliferation of normal and tumor cells.

EDUCATIONAL AIMS OF THE MODULE 1
This module will focus on recent advances in Genomics and cancer molecular genetics. Specifically it will be addressed genetic factors with respect to altered genes and cellular pathways that control correct cell proliferation.

UNIT	**Molecular Genetics**
HOURS	**LECTURES**
6	Analysis of structure and function of genes, chromosomes genomes
12	Genomics and postgenomics. DNA microarrays and Gene chip.
4	Reverse Genetics, screening of mutants, RNA interference.
4	Cancer Genetics: models of tumorigenesis.
12	The cell cycle and its checkpoints. The tumor suppressors TP53, pRB, the ATM gene and its effectors CHK1 and CHK2 and their role in genetic instability. E6-E7; EIA-E1B; LargeTag oncoproteins and their targets.
5	The p14/19ARF, ATM, TP53/RB pathway. The Hippo pathaway.
5	Disease gene identification, Positional cloning, CFTR gene.

SUGGESTED TEXTBOOKS	Human Molecular Genetics, T. Strachan-A. Read. During the course students will be provided with PowerPoint presentation regarding the topics treated and with PDF files of the correlate scientific articles.

FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Molecular Genetics and Genetics and Cytogenetics Methods
COURSE CODE NUMBER	16480
MODULE 2	Genetics and Cytogenetics Methods
INSTRUCTOR (TEACHER)	Aldo Di Leonardo Associated Professor of Genetics
ECTS CREDITS	6
PREREQUISITES	Molecular Biology and Genetics
YEAR OF STUDY	1st
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	2nd
LECTURE TIMETABLE	Mon.-Fri.- 10,30-12.30
CONSULTING TIME	Friday at 3 pm

SYLLABUS " Molecular Genetics and Genetics and Cytogenetics Methods"
To provide students with the forefront molecular genetics knowledge useful to understand the mechanisms and pathways responsible for the proliferation of normal and tumor cells.

EDUCATIONAL AIMS OF THE MODULE 2 (Genetics and Cytogenetics Methods)	
Scientific tools that enable research in cancer genetics will be addressed, such as genomic screens and siRNA approaches and molecular cytogenetics tools. The course will consist of Landmark publications in a variety of model organism systems.	
UNIT	**Genetics and cytogenetics methods**
HOURS	**LECTURES**
10	Evidences of aneuploidy as an oncogenic or as a tumor suppressor factor. In search for genes responsible for the aneuploidy tolerance.
16	Molecular dissection of the checkpoints functioning in mitosis. Mutation of genes of the spindle assembly checkpoint (SAC) and aneuploidy.
16	Alterations of centromeric proteins (CENPs) and chromosomal instability. The kinetochore assembly alterations and chromosomal instability.
6	Conventional and Molecular Cytogenetics methods as tools to study aneuploidy.
SUGGESTED TEXTBOOKS	During the course students will be provided with PowerPoint presentation regarding the topics treated and with PDF files of the scientific articles.

FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Genetics of microorganisms
COURSE CODE NUMBER	03560
INSTRUCTOR (TEACHER)	Anna Maria Puglia Full Professor
ECTS CREDITS	6
PREREQUISITES	none
YEAR OF STUDY	First
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	Second
LECTURE TIMETABLE	Mon.-Fri.- 12.30-13.30
CONSULTING TIME	daily, by email appointment (a.maria.puglia@unipa.it)

SYLLABUS "Genetic of microorganism"
the main aim of this course it is to understand **t**he molecular mechanism that govern the regulation of gene expression of prokaryotic and eukayiotic microorganism

UNIT	**GENETIC OF MICROORGANISM**
HOURS	**LECTURES**
9,0	*E. coli* as a model organism for the study of bacterial gene expression. Identification of mutant strains; characterization of pleiotropic mutations and localization of genes by genetic recombination experiments.
8,0	Complementation of mutations. Identification of genes and their products. Determination of the nucleotide sequence of the genes. Analysis of mutations at the molecular level.
8,0	Role of regulatory proteins. Over-espressione of proteins, protein-protein, protein-DNA and protein-RNA interactions.
6,0	Analyses of the post-genomic era. Transcriptomics, Proteomics, Metabolomics
8,0	Bacteria-plant interactions. Bacterial life cycle effect on plant tissues. Bacterial virulence and plant resistance
4,0	Eukaryotic microorganisms: interactions protozoa-man
5,0	Virus, and mimivirus.
	TUTORIALS
SUGGESTED TEXTBOOKS	Scientific articles published in international journals, as well as bioinformatics equipments will be provided during the course

FACULTY	Sciences
ACADEMIC YEAR	2013-14
SECOND LEVEL DEGREE	Cellular and Molecular Biology
COURSE	Functional Genomic
COURSE CODE NUMBER	08309
INSTRUCTOR (TEACHER)	Fabrizio Gianguzza Molecular Biology associated Professor
ECTS CREDITS	9
PREREQUISITES	Basal Molecular Biology and Genetic
YEAR OF STUDY	Second
EVALUATION	Oral examination
GRADING SYSTEM	Marking from sufficient (18/30) to excellent (30/30 cum laude)
TEACHING SEMESTER	First
LECTURE TIMETABLE	Mon.-Fri.- 08.30-10.30
CONSULTING TIME	Thursday 12.00 – 13.00 And daily, by email appointment (fabrizio.gianguzza@unipa.it)

SYLLABUS "Functional Genomic"

the main aim of this course it is to understand **t**he molecular mechanism that govern the first level of gene expression in eucariotes : basal and activated trascription mechanisms. This aim will be achieved by an excursus that start from structural/functional features of RNApol II and promoter sequences, that carry on whit the structural and functional features of transcriptional regulators, whit the structural and functional genomic organization of single genes or of genomic loci, and terminate whit the chromatin organization, its dynamic, and epigenetic effect of histones code on gene expression.

UNIT	**FUNCTIONAL GENOMIC**
HOURS	**LECTURES**
7,5	Structural and functional features of RNApol II The capability of RNA pol II to regulate the co-transcriptional modification of primary transcript
7,5	E. Coli as model to understand the promoter role, its recognition and repressor/activator role on transcription mechanism (LAC and ARA regulation)
18	Yeast as model to understand -the promoter role, its recognition and repressor/activator role on transcription mechanism. -coactivator and corepressor role on trascription -molecular mechanism of chromatin silencing and remodelling (SIR proteins and acetylation/deacetilation) Yeast mating as example of differential transcrtiption regulation to differenziate.
18	Drosophila as model to understand -molecular mechanism of development -molecular mechanism of chromatin silencing and remodelling (acetylation/deacetilation/methylation; PcG and Trx proteins) -structural features and functional roles of INSULATOR
9	Structural organization of genetic loci (Hb locus – Igf/H19 locus) as "functional island" looped by insulator. CTCT as master organizer of functional regulator complex or functional nuclear island
11,5	Some example of regulation network by means of : WNT1 structure, function and transcriptional regulation Ras structure, function and transcriptional regulation

	Src structure, function and transcriptional regulation ErbA structure, function and transcriptional regulation Myc structure, function and transcriptional regulation pRb structure, function and transcriptional regulation p53 structure, function and transcriptional regulation
	TUTORIALS
SUGGESTED TEXTBOOKS	During the course students will be provided with PowerPoint presentation regarding the topics treated and with PDF files of the correlate scientific articles. Text books Genes and signals Ptashne – Zanichelli Chromatin structure and function Wolffe – Academic Press Eucaryotic Transcription Factors Latchman – Academic Press Molecular Biology of the gene Watson et al. - Zanichelli Gene X Lewin - Zanichelli