Testi del Syllabus

Resp. Did.	**SCHOEFTNER STEFAN**	**Matricola: 022775**

Docente	**SCHOEFTNER STEFAN, 6 CFU**

Anno offerta:	**2017/2018**
Insegnamento:	**676SM - REGOLAZIONE EPIGENETICA**
Corso di studio:	**SM53 - GENOMICA FUNZIONALE**
Anno regolamento:	**2017**
CFU:	**6**
Settore:	**BIO/11**
Tipo Attività:	**B - Caratterizzante**
Anno corso:	**1**
Periodo:	**Secondo Semestre**
Sede:	**TRIESTE**

Testi in italiano

Lingua insegnamento	Inglese
Contenuti (Dipl.Sup.)	1. Introduction into Epigenetics 2. Discussion of various types of chromatin marks and DNA methylation 3. Major model systems of epigenetic gene regulation 4. Epigenetic regulatory complexes (writers and readers) 5. RNAi mediated chromatin regualtion 6. Chromatin landscape of expressed and repressed genes 7. Interaction between epigenetic pathways 8. Histone variants 9. Genomic stability and epigenetics 10. Cancer epigenetics 11. Genetic syndromes related to epigenetic gene regulation (Rett syndrome, ICF) 12. Therapeutic approaches based on epigenetic drugs
Testi di riferimento	Epigenetics, Second Edition 2015 Cold Spring Harbor Laboratory Press Edited by C. David Allis, The Rockefeller University; Marie-Laure Caparros, London; Thomas Jenuwein, Max-Planck Institute of Immunobiology and Epigenetics; Danny Reinberg, Howard Hughes Medical Institute, New York University School of Medicine-Smilow Research Center; Associate Editor Monika Lachner, Max-Planck Institute of Immunobiology and Epigenetics The lecturers will provide reviews and scientific publications.
Obiettivi formativi	D1. Knowledge and understanding: The course has the aim to provide students with a detailed knowledge on the central processes in epigenetic gene regulation and an overview on main model systems to study epigenetic gene regulation. The obtained knowhow should extend knowledge previously obtained in bachelor's courses (molecular and cellular biology, gene expression, proteomics, developmental biology, etc) to provide an integrative view on mechanisms of gene regulation. After the end of the lecture program, students should have the capacity to use the obtained information in order to formulate scientific questions and propose experimental approaches to study an epigenetic phenomenon.

	D2: Applying knowledge and understanding: Students should be able to integrate the obtained knowledge obtained into a larger context. In particular, a student should be able to use the general concept and general key-messages from the lecture program to propose solutions for unprecedented and interdisciplinary scientific questions. D3: Making judgments: After the course a student should be able to manage the complexity of information related to epigenetics. A student needs to individuate central corner stones of epigenetics and be able to integrate this information to explain missing steps in the understanding of a biological pathway or system. In a situation with the availability of only fragmented information of an epigenetic mechanisms, students should be able to logically expand this information by proposing experimental strategies in order to obtain an more complete picture in the respective biological system. D4: Communication skills: at the end of the course a student has to demonstrate the ability to explain the key messages and processes of a complex topic discussed during the lectures. A student should be able to explain these messages to specialists but also non-specialists. D5: Learning skills: Based on the obtained knowledge students have to demonstrate the ability to autonomously expand their knowledge in the field of epigenetics using the appropriate sources of information.
Prerequisiti	Exams that should have been done before attending the lecture program in epigenetics (Italian: “prerequesiti”): "Biologia Molecular e Cellulare" (Molecular and Cellular Biology)
Metodi didattici	Classic lectures supported by Powerpoint presentations that illustrate the topics addressed during the course. Presentations, relevant scientific publications and reviews are provided to students via the platform Moodle federato.
Altre informazioni	--
Modalità di verifica dell'apprendimento	Written test. The test has the objective to verify the knowledge of topics addressed in the lecture program “SM53 - GENOMICA FUNZIONALE” and topics orally addressed during the lectures. In the test a maximum of 30 (31) points can be reached. A minimum of 18 points (18/30) is necessary to pass the test. Books, electronic devises or scripts are not allowed during the test. The test is subdivided into 11 “short questions” and 4 “open questions”. - Short questions can be multiple choice questions, questions that require a short answer, a description of an image or the drawing of schemes - all questions are related to topics addressed during the lecture. For each correct answer 1 point will be assigned. - Open questions: a more complex discussion of a broader topic addressed during the lecture. Answers should have the length of ca 30 lines. A classic “open” question can be replaced by questions that require the explanation of an experimental strategy or the solution of a scientific problem. A maximum of 5 points can per assigned per open question. After completion of the correction of the test, students will be contacted per e-mail to announce that the results are available on the platform Moodle federato. It is possible to refute the result of the test within 1 week after the announcement of the results. Instructions on how to refute the mark will be included into the e-mail to the students.
Programma esteso	1. Introduction into Epigenetics: history of epigenetics, key examples of epigenetic regulation 2. Discussion of various types of chromatin marks and DNA methylation: histone methylation, histone acetylation, DNA methylation and reversion of these modifications; biochemical mechanisms 3. Major model systems of epigenetic gene regulation: Position effect variegation, Telomere position effect, RNAi induced heterochromatin formation 4. Epigenetic complexes (writers and readers): HATs, HDACS, HMTases, De-methylases, DNMTs, Nucleosome assembly factors, Bormodomain proteins, Chromodomain proteins, etc 5. RNAi mediated chromatin regulation: Heterochromatin formation in S. pombe at centromeres, collaborative mechanism of various molecular

processes; impact on genomic stability
6. Chromatin landscape of expressed and repressed genes: Chip seq, epigenetic signatures, impact on gene regulation
7. Interaction between epigenetic pathways: cross-talk between different epigenetic pathways (histone methylation – DNA –methylation – histone acetylation)
8. Histone variants: Histone variants, their use and regulation in physiology and pathology
9. Genomic stability and epigenetics: epigenetics and DNA damage response, genomic stability, regulation of DNA damage repair genes
10. Cancer epigenetics: DNA methylation in cancer, epigenetic processes leading to the altered expression of tumor suppressors and oncogenes; key examples of human cancer; original experimental data will be shown.
11. Genetic syndromes related to epigenetic gene regulation: Examples how epigenetic regulation impacts on genetic disease. Examples: Ret syndrome, ICF, etc); original experimental data will be shown.
12. Therapeutic approaches based on epigenetic drugs: examples on the development and relevance of epigenetic drugs in human cancer and genetic disease.

Testi in inglese

	English
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