Testi del Syllabus

Resp. Did.	**MERONI GERMANA**	**Matricola: 022803**

Docenti	**MALLAMACI ANTONIO, 3 CFU** **MERONI GERMANA, 3 CFU**

Anno offerta:	**2023/2024**
Insegnamento:	**971SV - DEVELOPMENTAL NEUROGENETICS**
Corso di studio:	**SM75 - NEUROSCIENCE**
Anno regolamento:	**2023**
CFU:	**6**
Settore:	**BIO/18**
Tipo Attività:	**B - Caratterizzante**
Anno corso:	**1**
Periodo:	**Secondo Semestre**
Sede:	**TRIESTE**

Testi in italiano

Lingua insegnamento	INGLESE
Contenuti (Dipl.Sup.)	The course will address central nervous system embryonic development in vertebrate species, in particular mammals, at genetic, molecular and cellular levels. During the course, the experimental tools necessary for investigating the above topics will be also discussed. The course is given by prof. Germana Meroni and prof. Antonello Mallamaci; the contents of the course are illustrated here below. Early vertebrate development, from cleavage to gastrulation, and body axes specification. Genome editing, forward and reverse genetics, and lineage tracing tools. Neural induction and specification. In vitro modelling of pluripotent state and neural induction: ES cells, somatic reprogramming to iPS cells, SFEBq organoids. Central Nervous System patterning. Neural tube development and closure, neural crest and neural crest cells. Cerebellar histogenesis and development: specification, germinal zones, determination of cerebellar cortex layer neuronal organization and circuits, foliation and sagittal cerebellar compartmentalization. Human genetic disorders of cerebellar development and their mouse models. Rhombo-spinal domains and eye development. Elaboration of positional information along coordinate axes in the anterior brain anlage: general principles and gene effectors. Prosomeric models. Specification of the pallial field. Evolutionary conservation of CNS patterning along the coordinated axes. Neocortical neuronogenesis: generalities, pioneer neurons, glutamatergic neurons of cortical plate, interneurons. Articulation of neocortical glutamatergic neuronogenesis in rodents: proliferative layers, clonal compartments and gene machineries modulating its progression. Evolution of neocortical glutamatergic neuronogenesis: marsupials, rodents, carnivores, primates. Neocortical neuronogenesis: introduction to laminar identity specification. Neocortical astrogenesis: timing, clonal articulation, molecular machineries controlling its progression.

Testi di riferimento	Material provided during the course as Lecture presentations and original research articles and reviews. This material will be available on the Microsoft Teams site dedicated to the course. Suggested support book: Developmental Biology, Gilbert, 9th-11th ed.
Obiettivi formativi	The aim of this course is to provide the KNOWLEDGE AND UNDERSTANDING (D1) of the nervous system organization through the study of the major events of brain and spinal cord embryological development, at the genetic, molecular and cellular level. The course provides the instruments to understand the experimental genetic approaches that are necessary to undertake neurodevelopment studies (D2. APPLYING KNOWLEDGE AND UNDERSTANDING). In addition, students are encourage to develop their critical reading of the scientific literature that will be proposed during the course (D3. MAKING JUDGEMENTS) and that will be tested during the final assessment. Teaching will be carried on stimulating the students to interact to improve their scientific language and to defend their ideas. The presence of an oral part in the final assessment is also intended to improve students' Communication skills (D4. COMMUNICATION SKILLS). During the course, the students will be given the instruments to exploit the literature data and background together with experimental information in order to encourage their development as researchers (D5. LEARNING ABILITIES).
Prerequisiti	Basic knowledge of Molecular Biology, Cellular Biology and Genetics
Metodi didattici	Conventional lectures integrated with Journal clubs discussing seminal and recent research papers on neurodevelopmental genetics.
Altre informazioni	Any changes to the methods described here, that may be necessary to guarantee the application of the safety protocols linked to any emergency situations, will be communicated on the Department, Study Program and teaching website.
Modalità di verifica dell'apprendimento	Students will be required to take a final examination that consists of: i) a written part with 20 multiple choice questions concerning the entire programme of the course (in 1:30-hour-time); ii) a 20-30-minute oral interview to discuss both the written test, especially to judge the incorrect or partially incorrect answers (if any), as well as other topics addressed during the course. The final mark is assigned based on the average of the result of the written test and on the discussion during the oral part. To achieve the maximum score (30/30 cum laude), the student must demonstrate that he/she has acquired an excellent knowledge of all the topics covered during the course. The verification methods are also explained by the teacher to the students during the presentation of the course in the first lesson and at the end of the course.
Programma esteso	The course will address central nervous system embryonic development in vertebrate species, in particular mammals, at genetic, molecular and cellular levels. During the course, the experimental tools necessary for investigating the above topics will be also discussed. The course is given by prof. Germana Meroni and prof. Antonello Mallamaci; the contents of the course are illustrated here below. Early vertebrate development, from cleavage to gastrulation, and body axes specification. Genome editing, forward and reverse genetics, and lineage tracing tools. Neural induction and specification. In vitro modelling of pluripotent state and neural induction: ES cells, somatic reprogramming to iPS cells, SFEBq organoids. Central Nervous System patterning. Neural tube development and closure, neural crest and neural crest cells. Cerebellar histogenesis and development: specification, germinal zones, determination of cerebellar cortex layer neuronal organization and circuits, foliation and

	sagittal cerebellar compartmentalization. Human genetic disorders of cerebellar development and their mouse models. Rhombo-spinal domains and eye development. Elaboration of positional information along coordinate axes in the anterior brain anlage: general principles and gene effectors. Prosomeric models. Specification of the pallial field. Evolutionary conservation of CNS patterning along the coordinated axes. Neocortical neuronogenesis: generalities, pioneer neurons, glutamatergic neurons of cortical plate, interneurons. Articulation of neocortical glutamatergic neuronogenesis in rodents: proliferative layers, clonal compartments and gene machineries modulating its progression. Evolution of neocortical glutamatergic neuronogenesis: marsupials, rodents, carnivores, primates. Neocortical neuronogenesis: introduction to laminar identity specification. Neocortical astrogenesis: timing, clonal articulation, molecular machineries controlling its progression.
Obiettivi Agenda 2030 per lo sviluppo sostenibile	This course explores topics closely related to one or more goals of the United Nations 2030 Agenda for Sustainable Development (SDGs). Specifically, N.3 Health and wellbeing N.4 Education of quality

Obiettivi per lo sviluppo sostenibile

Codice	Descrizione
3	Salute e benessere
4	Istruzione di qualità

Testi in inglese

	English
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	Basic knowledge of Molecular Biology, Cellular Biology and Genetics
	Conventional lectures integrated with Journal clubs discussing seminal and recent research papers on neurodevelopmental genetics.
	Any changes to the methods described here, that may be necessary to guarantee the application of the safety protocols linked to any emergency situations, will be communicated on the Department, Study Program and teaching website.
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N.4 Education of quality

Obiettivi per lo sviluppo sostenibile

Codice	Descrizione
3	Good health and well-being
4	Quality education