Testi del Syllabus

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

Docenti	**MALLAMACI ANTONIO, 3 CFU** **MERONI GERMANA, 3 CFU**
Anno offerta:	**2022/2023**
Insegnamento:	**971SV - DEVELOPMENTAL NEUROGENETICS**
Corso di studio:	**SM54 - NEUROSCIENZE**
Anno regolamento:	**2022**
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. Suggested support book: Developmental Biology, Gilbert, 9th-11th ed.
Obiettivi formativi	The aim of this course is to provide the knowledge and understanding 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 (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 (Making judgements) and that will be tested during the final assessment. 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 (Learning abilities). The presence of an oral part in the final assessment is also intended to improve students' Communication skills.
Prerequisiti	Basic knowledge of Molecular Biology, Cellular Biology and Genetics
Metodi didattici	Traditional lectures integrated with Journal clubs discussing seminal research papers on neurodevelopmental genetics.
Altre informazioni	Any necessary change in the course modalities due to COVID19 emergency will be published at the Department, Master Programme and Course websites."
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 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 result of the written test and on the discussion during the oral part.
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	

Obiettivi per lo sviluppo sostenibile

Codice	Descrizione
3	Salute e benessere

Testi in inglese

	English
	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.
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	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 (Learning abilities). The presence of an oral part in the final assessment is also intended to improve students' Communication skills.
	Basic knowledge of Molecular Biology, Cellular Biology and Genetics
	Traditional lectures integrated with Journal clubs discussing seminal research papers on neurodevelopmental genetics.
	Any necessary change in the course modalities due to COVID19 emergency will be published at the Department, Master Programme and Course websites."
	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 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 result of the written test and on the discussion during the oral part.
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Obiettivi per lo sviluppo sostenibile

Codice	Descrizione
3	Good health and well-being