

# MASTER PROGRAM IN NEUROBIOLOGY 2019-2020

## Classes Calendar

### 1<sup>st</sup> Semester

#### MOLECULAR ARCHITECTURE OF NEURONAL AND GLIAL CELLS

Coordinator: Carlos Reguenga

6 ECTS

**Bibliography:** available for students at MeN-Moodle

#### MODULE 1

##### Fundamentals of Molecular Biology

Coordinator Carlos Reguenga

Introduction to the Unit / Functional Organization of the Cell

Carlos Reguenga - Aula teórica

Data: 23-09-2019 Hora:11:00 - 12:00 Local:Room 2, CIM

Molecular cloning of recombinant DNA

Filipe Monteiro - Aula teórica

Data: 23-09-2019 Hora:14:00 - 15:00 Local:UBEx library

Model organisms and genetic engineering of mice

Filipe Monteiro - Aula teórica

Data: 23-09-2019 Hora:15:00 - 16:00 Local:UBEx library

Essential methods in Molecular Biology

Carlos Reguenga - Aula teórica

Data: 24-09-2019 Hora:10:00 - 12:00 Local:UBEx library

Advanced Methods in Molecular Biology

Carlos Reguenga - Aula teórica

Data: 24-09-2019 Hora:14:00 - 16:00 Local:UBEx library

Transcriptional control of gene expression

Carlos Reguenga - Aula teórica

Data: 25-09-2019 Hora:11:00 - 12:00 Local:UBEx library

Gene silencing and proteotoxicity

Carlos Reguenga - Aula teórica

Data: 25-09-2019 Hora:14:00 - 15:00 Local:UBEx library

Protocol 1: RNA extraction, quantification, cDNA synthesis and gel electrophoresis

Alexandra Gouveia - Aula laboratorial  
Data: 26-09-2019 Hora:10:00 - 18:00 Local:LAIMM (UBEx)

Protocol 1: RT-qPCR  
Alexandra Gouveia - Aula laboratorial  
Data: 27-09-2019 Hora:10:00 - 18:00 Local:LAIMM (UBEx)

Protocol 2: Protein extraction and quantification; Gel casting  
Carlos Reguenga - Aula laboratorial  
Data: 30-09-2019 Hora:10:00 - 18:00 Local:LAIMM (UBEx)

Protocol 2: SDS-PAGE and Western-blotting  
Carlos Reguenga - Aula laboratorial  
Data: 01-10-2019 Hora:10:00 - 18:00 Local:LAIMM (UBEx)

Protocol 2: Immunodetection  
Carlos Reguenga - Aula laboratorial  
Data: 02-10-2019 Hora:10:00 - 12:00 Local:LAIMM (UBEx)

Journal Club  
Carlos Reguenga  
Data: 03-10-2019 Hora:10:00 - 13:00 Local:UBEx library

Written Exam - Fundaments of Molecular Biology & Neurobiology  
Carlos Reguenga  
Data: 04-10-2019 Hora:16:00 - 17:00 Local:UBEx library

## **MODULE 2**

### **The Neuron and the Glial System**

**Coordinator: Fani Neto**

Introduction to Neurobiology  
Vasco Galhardo - Aula teórica  
Data: 16-09-2019 Hora:10:30 - 12:30 Local:UBEx library

Perspective on current neuroscience research  
Vasco Galhardo - Aula teórica  
Data: 16-09-2019 Hora:14:00 - 16:00 Local:UBEx library

The neuronal membrane: structure, transport, ion channels, synaptic transmission and excitability.  
Boris Safronov - Aula teórica  
Data: 17-09-2019 Hora:10:00 - 11:00 Local:i3S Patch Clamp Laboratory

Input transmission: dendrosomatic integration; spatial and temporal summation; action potential; conduction velocity; convergent and divergent transmission; population properties and firing  
Boris Safronov - Aula teórica  
Data: 17-09-2019 Hora:11:00 - 12:00 Local:i3S Patch Clamp Laboratory

Methods in neuroscience research  
Vasco Galhardo - Aula teórica  
Data: 17-09-2019 Hora:14:00 - 16:00 Local:UBEx library

General considerations on the glial system: types, morphology, ultra-structure and basic mechanisms

Fani Neto - Aula teórica

Data: 18-09-2019 Hora:11:00 - 12:00 Local:UBEx library

Neuron-glia interaction

Fani Neto - Aula teórica

Data: 18-09-2019 Hora:14:00 - 16:00 Local:UBEx library

Neuron-glia interaction: role of glial cells in the pathophysiology of pain

João Relvas - Aula teórica

Data: 19-09-2019 Hora:14:00 - 15:00 Local:i3S

Glial cells and myelination

João Relvas - Aula teórica

Data: 19-09-2019 Hora:15:00 - 16:00 Local:i3S

Glial cells and disease

João Relvas - Aula teórica

Data: 20-09-2019 Hora:14:00 - 15:00 Local:i3S

Microglia

João Relvas - Aula teórica

Data: 20-09-2019 Hora:15:00 - 16:00 Local:i3S

# **ORGANIZATION & DEVELOPMENT OF THE NERVOUS SYSTEM**

**Coordinator: Vasco Galhardo**

**6 ECTS**

**Bibliography:** available for students at MeN-Moodle

## **MODULE 1**

**Anatomy of the peripheral and central nervous system**

**Coordinator: Dulce Madeira**

Overview of the CNS. Neuron

Dulce Madeira - Aula teórica

Data: 07-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

Neural circuits

Alberto Paulo Costa - Aula teórica

Data: 07-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

Cytology of the nervous system

Alberto Paulo Costa - Aula laboratorial

Data: 07-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

Spinal Cord: segmental organization; introduction to long pathways

Susana Maria Silva - Aula teórica

Data: 08-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

Somatic reflex

Susana Maria Silva - Aula teórica

Data: 08-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

General organization of the CNS. Spinal cord and spinal nerves

Susana Maria Silva - Aula laboratorial

Data: 08-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

Brainstem. Cranial nerve nuclei

Susana Maria Silva - Aula teórica

Data: 09-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

Cerebellum

Susana Maria Silva - Aula teórica

Data: 09-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

Brainstem and cerebellum

Susana Maria Silva - Aula laboratorial

Data: 09-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

Thalamus and internal capsule

Susana Maria Silva - Aula teórica

Data: 10-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

Epithalamus. Hypothalamus. Metathalamus

Susana Maria Silva - Aula teórica

Data: 10-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

#### Diencephalon

Susana Maria Silva - Aula laboratorial

Data: 10-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

#### Cerebral cortex

Susana Maria Silva - Aula teórica

Data: 14-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

#### Cortical functional localization

Susana Maria Silva - Aula teórica

Data: 14-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

#### Telencephalon

Susana Maria Silva - Aula laboratorial

Data: 14-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

#### Basal Ganglia

Susana Maria Silva - Aula teórica

Data: 15-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

#### Internal structure of the cerebral hemispheres. Brain sections

Susana Maria Silva - Aula laboratorial

Data: 15-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

#### Lymbic system

Susana Maria Silva - Aula teórica

Data: 16-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

#### Autonomic nervous system

Susana Maria Silva - Aula teórica

Data: 16-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

#### Museum (visit)

Susana Maria Silva - Aula laboratorial

Data: 16-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

#### Vascular supply of the brain and spinal cord

Susana Maria Silva - Aula teórica

Data: 17-10-2019 Hora:14:30 - 15:30 Local:UAnatomy

#### Ventricular system. Circumventricular organs

Susana Maria Silva - Aula teórica

Data: 17-10-2019 Hora:15:30 - 16:30 Local:UAnatomy

#### Meninges

Susana Maria Silva - Aula laboratorial

Data: 17-10-2019 Hora:16:30 - 17:30 Local:UAnatomy

#### Written Exam - Neuroanatomy and Development

Dulce Madeira

Data: 15-01-2020 Hora:11:00 - 12:00 Local:UAnatomy

#### Ascending sensory pathways

Dulce Madeira - Aula teórica

Data: 21-10-2019 Hora:14:00 - 15:00 Local:UAnatomy

Descending motor pathways  
Alberto Paulo Costa - Aula teórica  
Data: 21-10-2019 Hora:15:00 - 16:00 Local:UAnatomy

Overview of the cranial nerves.  
Susana Maria Silva - Aula teórica  
Data: 22-10-2019 Hora:14:00 - 15:00 Local:UAnatomy

Gustatory and olfactory systems.  
Susana Maria Silva - Aula teórica  
Data: 22-10-2019 Hora:15:00 - 16:00 Local:UAnatomy

Eye. Visual system. Visual cortex.  
Susana Maria Silva - Aula teórica  
Data: 23-10-2019 Hora:14:00 - 16:00 Local:UAnatomy

Ear. Auditory system. Auditory cortex.  
Susana Maria Silva - Aula teórica  
Data: 24-10-2019 Hora:14:00 - 16:00 Local:UAnatomy

## **MODULE 2**

### **Neurodevelopment**

**Coordinator: Sandra Rebelo**

General embryology  
Sandra Rebelo - Aula teórica  
Data: 15-10-2019 Hora:16:00 - 20:00 Local:UBEx library

Differentiation of the nervous system  
Sandra Rebelo - Aula teórica  
Data: 16-10-2019 Hora:10:00 - 12:00 Local:UBEx library

Cell migration and axon guidance  
Sandra Rebelo - Aula teórica  
Data: 17-10-2019 Hora:10:00 - 12:00 Local:UBEx library

Cortical development  
Sandra Rebelo - Aula teórica  
Data: 18-10-2019 Hora:10:00 - 12:00 Local:UBEx library

# NEURONAL EXCITABILITY AND NEUROTRANSMISSION

Coordinator: Albino Teixeira

6 ECTS

**Bibliography:** available for students at MeN-Moodle

Course presentation

Albino Teixeira - Aula teórica

Data: 11-10-2019 Hora:14:00 - 14:30 Local:UPharm - CIM 3rd Floor

Pharmacological modulation of neurotransmitter release. Experimental design to study molecular interventions on release and actions of neurotransmitters

Teresa Sousa - Aula teórica

Data: 11-10-2019 Hora:14:30 - 16:30 Local:UPharm - CIM 3rd Floor

Dopamine and serotonin receptors

Patrício Soares da Silva - Aula teórica

Data: 11-10-2019 Hora:17:00 - 19:00 Local:UPharm - CIM 3rd Floor

Presynaptic adenosine receptors

Jorge Gonçalves - Aula teórica

Data: 18-10-2019 Hora:14:30 - 16:30 Local:UPharm - CIM 3rd Floor

Presynaptic modulation of endocannabinoids

Augusta Vieira Coelho - Aula teórica

Data: 18-10-2019 Hora:17:00 - 19:00 Local:UPharm - CIM 3rd Floor

Presynaptic ATP receptors

Paulo Correia de Sá - Aula teórica

Data: 25-10-2019 Hora:14:30 - 16:30 Local:UPharm - CIM 3rd Floor

Presynaptic acetylcholine receptor

Paulo Correia de Sá - Aula teórica

Data: 25-10-2019 Hora:17:00 - 19:00 Local:UPharm - CIM 3rd Floor

Journal Club

Albino Teixeira

Data: 26-10-2019 Hora:09:00 - 10:30 Local:UPharm - CIM 3rd Floor

Evaluation

Albino Teixeira

Data: 26-10-2019 Hora:11:00 - 13:00 Local:UPharm - CIM 3rd Floor

# NEURONAL PLASTICITY AND COGNITION

Coordinator: Célia Cruz

6 ECTS

**Bibliography:** available for students at MeN-Moodle

## MODULE 1

### Neural Plasticity

Coordinator: Vasco Galhardo

Molecular mechanisms of synaptic plasticity – part 1

Vasco Galhardo - Aula teórica

Data: 28-10-2019 Hora:16:00 - 17:30 Local:Sala 12, Piso 1, CIM

Molecular mechanisms of synaptic plasticity – part 2

Vasco Galhardo - Aula teórica

Data: 29-10-2019 Hora:16:00 - 17:30 Local:UBEx library

Long term memory

Vasco Galhardo - Aula teórica

Data: 30-10-2019 Hora:14:00 - 17:30 Local:UBEx library

Short term memory

Vasco Galhardo - Aula teórica

Data: 04-11-2019 Hora:16:00 - 17:30 Local:UBEx library

Mechanisms of attention

Vasco Galhardo - Aula teórica

Data: 05-11-2019 Hora:16:00 - 17:30 Local:UBEx library

Dynamic reorganization of neural circuits

Vasco Galhardo - Aula teórica

Data: 06-11-2019 Hora:14:00 - 17:30 Local:UBEx library

Written Exam - Plasticity and Cognition

Vasco Galhardo

Data: 20-01-2020 Hora:11:00 - 12:00 Local:UBEx library



## **MODULE 2**

### **Neuroscience of Decision and Choice**

**Coordinator: José Paulo Santos**

Presentation of the module, Moodle, coursework, seminar, assessment, and... a bit on Ethics

Ofélia Carvalho & José Santos - Aula teórica

Data: 21-10-2019 Hora:11:00 - 12:30 Local:UBEx library

1.1 System 1 & System 2 (intuition vs. deliberation); 1.2 Bounded rationality & Non-rational theories (heuristics)

Ofélia Carvalho & José Santos - Aula teórica

Data: 28-10-2019 Hora:09:30 - 10:30 Local:UBEx library

1.3 Risk aversion; 1.4 Intertemporal choice (delayed vs. instant gratification)

Ofélia Carvalho & José Santos - Aula teórica

Data: 28-10-2019 Hora:11:00 - 12:00 Local:UBEx library

1.5 Emotions and feelings

Ofélia Carvalho & José Santos - Aula teórica

Data: 29-10-2019 Hora:09:30 - 10:30 Local:UBEx library

2.1 Social conformity (Asch effect) and the illusion of free will

Ofélia Carvalho & José Santos - Aula teórica

Data: 29-10-2019 Hora:11:00 - 12:00 Local:UBEx library

2.2 The (postmodern) environmental conditioning; 2.3 The alternative: System 3 - imitation

Ofélia Carvalho & José Santos - Aula teórica

Data: 30-10-2019 Hora:09:30 - 10:30 Local:UBEx library

2.4 Theory of Mind and Empathy; 2.5 Informational cascades

Ofélia Carvalho & José Santos - Aula teórica

Data: 30-10-2019 Hora:11:00 - 12:00 Local:UBEx library

2.5 Informational cascades (cont.);

Ofélia Carvalho & José Santos - Aula teórica

Data: 31-10-2019 Hora:09:30 - 10:30 Local:UBEx library

3.1 Game Theory

Ofélia Carvalho & José Santos - Aula teórica

Data: 31-10-2019 Hora:11:00 - 12:00 Local:UBEx library

3.1 Game Theory (cont.)

Ofélia Carvalho & José Santos - Aula teórica

Data: 31-10-2019 Hora:15:00 - 16:00 Local:UBEx library

Written Exam - Plasticity and Cognition

Ofélia Carvalho & José Santos

Data: 20-01-2020 Hora:09:00 - 10:30 Local:UBEx library

## **MODULE 3**

### **Cognitive and Affective Neurosciences**

**Coordinator: João Marques Teixeira**

Research Methods in Cognitive & Affective Neuropsychophysiology

Fernando Barbosa - Aula teórica

Data: 06-11-2019 Hora:10:00 - 13:00 Local:Laboratory of Neuropsychophysiology (FPCE-UP)

Cognitive, Affective & Social Neurosciences

Fernando Ferreira-Santos - Aula teórica

Data: 07-11-2019 Hora:10:00 - 13:00 Local:Laboratory of Neuropsychophysiology (FPCE-UP)

Neurosciences & Cognitive and Affective impairments in Schizophrenia

João Marques Teixeira - Aula teórica

Data: 07-11-2019 Hora:14:00 - 18:00 Local:Laboratory of Neuropsychophysiology (FPCE-UP)

Lab Practices

Fernando Ferreira-Santos - Aula prática

Data: 08-11-2019 Hora:10:00 - 13:00 Local:Laboratory of Neuropsychophysiology (FPCE-UP)

Lab Practices

Fernando Ferreira-Santos - Aula prática

Data: 08-11-2019 Hora:14:00 - 18:00 Local:Laboratory of Neuropsychophysiology (FPCE-UP)

# NEUROBIOLOGY OF AGING AND DISEASE

Coordinator: Célia Cruz

6 ECTS

**Bibliography:** available for students at MeN-Moodle

## Module 1

### Neurotoxicology

**Teresa Summavielle**

Mechanisms of neurotoxicology

Teresa Summavielle - Aula teórica

Data: 11-11-2019 Hora:09:00 - 12:00 Local:i3S

Developmental neurotoxicology

MA Ferreira - Aula teórica

Data: 12-11-2019 Hora:09:00 - 11:00 Local:FMUP

Protective strategies in neurotoxicology

Teresa Summavielle - Aula teórica

Data: 13-11-2019 Hora:09:00 - 11:00 Local:i3S

Environmental neurotoxicants

Teresa Summavielle - Aula teórica

Data: 18-11-2019 Hora:09:00 - 11:00 Local:i3S

Behavioral studies in neurotoxicology

Ana Magalhães - Aula teórica

Data: 18-11-2019 Hora:14:00 - 16:00 Local:i3S

EVALUATION: Student presentations

Teresa Summavielle

Data: 22-11-2019 Hora:09:00 - 12:00 Local:i3S

## MODULE 2

### Neurodegeneration and Aging

**Coordinator: Isabel Cardoso**

Molecular Basis of neurodegenerative disorders related to protein misfolding -examples

Isabel Cardoso - Aula teórica

Data: 11-11-2019 Hora:14:00 - 16:00 Local:Sala B, Piso 1, I3S

Molecular basis of neurodegeneration of Alzheimer's Disease (AD)

Isabel Cardoso - Aula teórica

Data: 11-11-2019 Hora:16:00 - 18:00 Local:Sala B, Piso 1, I3S

Neurodegeneration in the central nervous system: examples from of non-AD diseases

Isabel Alonso - Aula teórica

Data: 12-11-2019 Hora:14:00 - 16:00 Local:Sala B, Piso 1, I3S

Neurodegeneration in the peripheral nervous system

Maria João Saraiva - Aula teórica

Data: 12-11-2019 Hora:16:00 - 18:00 Local:Sala B, Piso 1, I3S

EVALUATION: Journal Club

Isabel Cardoso

Data: 21-11-2019 Hora:14:00 - 18:00 Local:Sala B, Piso 1, I3S

## **MODULE 3**

### **Mechanisms of Regeneration**

**Coordinator: Mónica M Sousa**

Axon (re)growth during development and regeneration

Monica Sousa - Aula teórica

Data: 14-11-2019 Hora:09:30 - 11:00 Local:i3S

The intriguing nature of DRG neurons

Ana Nascimento - Aula teórica

Data: 14-11-2019 Hora:11:30 - 13:00 Local:i3S

The importance of actin dynamics in axon growth and regeneration

Rita Pinto Costa - Aula teórica

Data: 14-11-2019 Hora:14:00 - 15:30 Local:i3S

The membrane periodic skeleton

Rita Leitão Costa - Aula teórica

Data: 14-11-2019 Hora:15:30 - 17:00 Local:i3S

Microtubule remodeling during axon growth and regeneration

Márcia Liz - Aula teórica

Data: 15-11-2019 Hora:09:30 - 11:00 Local:i3S

The role of (phospho)lipids in myelination and axon regeneration

Pedro Brites - Aula teórica

Data: 15-11-2019 Hora:11:30 - 13:00 Local:i3S

Acomys- the regenerating mammal

Joana Rodrigues - Aula teórica

Data: 15-11-2019 Hora:14:00 - 15:30 Local:i3S

EVALUATION: Journal Club

Monica Sousa

Data: 20-11-2019 Hora:15:30 - 17:00 Local:i3S

## **MODULE 4**

### **Physiopathology of Pain**

**Coordinator: José Castro Lopes**

Physiopathology of the nociceptive system

José Castro Lopes - Aula teórica

Data: 25-11-2019 Hora:14:00 - 17:00 Local:UBEx library

Pain psychobiology

Margarida Braga - Aula teórica

Data: 26-11-2019 Hora:14:00 - 17:00 Local:UBEx library

Endogenous pain control system

Isaura Tavares - Aula teórica

Data: 27-11-2019 Hora:14:00 - 17:00 Local:UBEx library

Experimental research in pain

Isaura Tavares - Aula teórica

Data: 28-11-2019 Hora:12:00 - 13:00 Local:UBEx library

Pain imaging

Daniela Seixas - Aula teórica

Data: 28-11-2019 Hora:14:00 - 15:00 Local:UBEx library

Cognitive and emotional aspects of pain – current research

Vasco Galhardo - Aula teórica

Data: 28-11-2019 Hora:15:30 - 16:30 Local:UBEx library

EVALUATION

José Castro Lopes

Data: 25-01-2020 Hora:15:00 - 16:00 Local:UBEx library

## **MODULE 5**

### **Clinical Neurology**

**Coordinator: Carolina Garrett**

Dementia

Carolina Garrett - Aula teórica

Data: 02-12-2019 Hora:08:30 - 10:30 Local:Sala aulas Neurologia

Cerebrovascular disorders

Elsa Azevedo - Aula teórica

Data: 02-12-2019 Hora:11:00 - 13:00 Local:Sala aulas Neurologia

Headaches

Joana Guimarães - Aula teórica

Data: 03-12-2019 Hora:09:00 - 13:00 Local:Sala aulas Neurologia

Neuromuscular Disorders

Pedro Abreu - Aula teórica

Data: 04-12-2019 Hora:09:00 - 11:00 Local:Sala aulas Neurologia

Epilepsy

Marta Carvalho - Aula teórica

Data: 04-12-2019 Hora:11:30 - 13:00 Local:Sala aulas Neurologia

Neuromuscular Disorders (Possibilidade de assistir a consulta de Neuromusculares - apenas alunos PDN)

Pedro Abreu - Aula prática

Data: 04-12-2019 Hora:14:00 - 16:00 Local:Consulta de Neurologia

Dementia (Possibilidade de assistir a consulta de Neuromusculares - apenas alunos PDN)

Carolina Garrett - Aula prática

Data: 06-12-2019 Hora:14:00 - 16:00 Local:Consulta de Neurologia

Degenerative disorders of the CNS: neuroprotection vs disease modifiers.

Carolina Garrett (FMUP) - Aula teórica

Data: 13-01-2020 Hora:09:00 - 11:00 Local:Sala aulas Neurologia

Myelin as an important issue in nervous system disorders. Value of re-myelination and examples of experimental models

João Relvas (IBMC) - Aula teórica

Data: 13-01-2020 Hora:14:00 - 16:00 Local:i3S

Dismyelinative disorders and disease modifiers treatments

Joana Guimarães (FMUP) - Aula teórica

Data: 14-01-2020 Hora:09:00 - 12:00 Local:Sala aulas Neurologia

Cerebrovascular disorders: treatment as a protector of CNS. Value of Doppler ultrasound in clinical and investigation studies

Elsa Azevedo (FMUP) - Aula teórica

Data: 14-01-2020 Hora:14:00 - 18:00 Local:Sala aulas Neurologia

## 2<sup>nd</sup> Semester

### DEPICTING NEURONAL CIRCUITS

**Coordinator: Isaura Tavares**

6 ECTS

**Bibliography:** available for students at MeN-Moodle

#### MODULE 1

##### Stereotaxic Surgery and Microsurgery

**Coordinator: Fani Neto**

Introduction to stereotaxic surgery and microsurgery

Fani Neto - Aula prática

Data: 10-02-2020 Hora:09:00 - 10:00 Local:UBEx library, CIM, 5th floor

Group 1 - Cannulation of the subarachnoid space

Célia Cruz - Aula laboratorial

Data: 10-02-2020 Hora:10:30 - 12:00 Local:UBEx animal facilities, CIM, 5th floor

Group 2 - Cannulation of the subarachnoid space

Célia Cruz - Aula laboratorial

Data: 10-02-2020 Hora:14:30 - 16:00 Local:UBEx animal facilities, CIM, 5th floor

Stereotaxic techniques in humans

Paulo Linhares

Data: 11-02-2020 Hora:08:30 - 09:30 Local:Serviço de Neurocirurgia- Hospital S. João (to confirm)

Group 1 - Targeted lesion of central nervous system/microinjection of neurotracer

Fani Neto / Daniel Pozza - Aula laboratorial

Data: 11-02-2020 Hora:10:30 - 12:00 Local:UBEx animal facilities, CIM, 5th floor

Group 2 - Targeted lesion of central nervous system/microinjection of neurotracer

Fani Neto / Daniel Pozza - Aula laboratorial

Data: 11-02-2020 Hora:14:30 - 16:00 Local:UBEx animal facilities, CIM, 5th floor

Group 1 - Chronic cannulation of the brain

Fani Neto / Daniel Pozza - Aula laboratorial

Data: 12-02-2020 Hora:09:30 - 11:00 Local:UBEx animal facilities, CIM, 5th floor

Group 2 - Chronic cannulation of the brain

Fani Neto / Daniel Pozza - Aula laboratorial

Data: 12-02-2020 Hora:11:00 - 12:30 Local:UBEx animal facilities, CIM, 5th floor

Group 1 - Microdissection of nerves in vivo – the sciatic nerve; the trigeminal nerve

Daniel Pozza - Aula laboratorial

Data: 13-02-2020 Hora:09:30 - 11:00 Local:UBEx animal facilities, CIM, 5th floor

Group 2 - Microdissection of nerves in vivo – the sciatic nerve; the trigeminal nerve

Daniel Pozza - Aula laboratorial

Data: 13-02-2020 Hora:11:00 - 12:30 Local:UBEx animal facilities, CIM, 5th floor

EVALUATION: written test and presentation of scientific articles by the students

Fani Neto - Aula prática

Data: 14-02-2020 Hora:11:00 - 12:00 Local:UBEx library, CIM, 5th floor

## **MODULE 2**

### **Tract-Tracing Techniques**

**Coordinator: Isaura Tavares**

General concepts related to tract-tracing methods. Main types and applications of tracers.

Isaura Tavares

Data: 17-02-2020 Hora:14:00 - 15:00 Local:UBEx library, CIM, 5th floor

Stereotaxic injection of a tracer into the central nervous system.

Isaura Tavares / Isabel Martins - Aula laboratorial

Data: 18-02-2020 Hora:10:00 - 12:00 Local:UBEx laboratory

Identification of the neurotracer by immunocytochemistry.

Isaura Tavares / Isabel Martins - Aula laboratorial

Data: 18-02-2020 Hora:14:00 - 16:00 Local:UBEx laboratory

Identification of the neurotracer by immunocytochemistry (conclusion).

Isabel Martins - Aula laboratorial

Data: 19-02-2020 Hora:10:00 - 12:00 Local:UBEx laboratory

Observation of the results.

Isabel Martins - Aula laboratorial

Data: 19-02-2020 Hora:14:00 - 16:00 Local:UBEx laboratory

EVALUATION: Presentation and discussion of results

Isaura Tavares / Isabel Martins - Aula prática

Data: 28-02-2020 Hora:14:00 - 16:00 Local:UBEx library, CIM, 5th floor



## **MODULE 3**

### **In vivo microdialysis**

**Coordinator: Isabel Martins**

Principles and applications of microdialysis. Analytical methods of microdialysates.

Isabel Martins - Aula teórica

Data: 17-02-2020 Hora:15:30 - 17:00 Local: UBEx library

Implantation of microdialysis probes / In vivo microdialysis in pain modulatory areas during noxious stimulation (Group I, 5 students max)

Isabel Martins - Aula laboratorial

Data: 20-02-2020 Hora:09:00 - 12:00 Local:DBE - Microdialysis lab

Implantation of microdialysis probes / In vivo microdialysis in pain modulatory areas during noxious stimulation (Group II, 5 students max)

Isabel Martins - Aula laboratorial

Data: 20-02-2020 Hora:14:00 - 17:00 Local:DBE - Microdialysis lab

Principles of HPLC

Dora Pinho - Aula laboratorial

Data: 21-02-2020 Hora:10:00 - 11:00 Local: UBEx library

Detection of microdialysates by HPLC

Paula Serrão - Aula laboratorial

Data: 21-02-2020 Hora:11:00 - 12:30 Local:HPLC lab

Detection of microdialysates by HPLC - Group I (5 students maximum)

Paula Serrão - Aula laboratorial

Data: 21-02-2020 Hora:14:00 - 15:00 Local:HPLC lab

Detection of microdialysates by HPLC - Group II (5 students maximum)

Paula Serrão - Aula laboratorial

Data: 21-02-2020 Hora:15:00 - 16:00 Local:HPLC lab

EVALUATION: Discussion of the results

Isabel Martins/Isaura Tavares/Dora Pinho/Paula Serrão

Data: 28-02-2020 Hora:14:00 - 16:00 Local: UBEx library

## **MODULE 4**

### **Electrophysiology**

**Coordinator: Vasco Galhardo**

Methods of in vivo extracellular recording and analysis

Vasco Galhardo - Aula teórica

Data: 24-02-2020 Hora:10:00 - 13:00 Local: UBEx library

Online and offline analysis of multielectrode recordings – I

Helder Cardoso-Cruz - Aula teórica

Data: 24-02-2020 Hora:14:00 - 18:00 Local: UBEx library

Online and offline analysis of multielectrode recordings – II

Vasco Galhardo - Aula teórica

Data: 26-02-2020 Hora:10:00 - 12:00 Local: UBEx library

Online and offline analysis of multielectrode recordings – III

Vasco Galhardo - Aula teórica

Data: 27-02-2020 Hora:08:30 - 11:30 Local: UBEx library

In vitro patch clamp recording of electrical neuronal behaviour

Boris Safronov - Aula prática

Data: 27-02-2020 Hora:14:00 - 18:00 Local:i3S Patch Clamp Laboratory

Evaluation

Vasco Galhardo

Data: 28-02-2020 Hora:14:00 - 16:00 Local: UBEx library

# Imaging the Nervous System

**Coordinator: Antonio Avelino**

6 ECTS

**Bibliography:** available for students at MeN-Moodle

## MODULE 1

### Microscopic Analysis

**Coordinator: António Avelino**

Course presentation: Microscopy. Types of microscopes.

António Avelino - Aula prática

Data: 02-03-2020 Hora:10:00 - 12:00 Local: UBEx library

Fixatives and methods of fixation

António Avelino, Fani Neto - Aula laboratorial

Data: 02-03-2020 Hora:14:00 - 16:00 Local:UBEx laboratory

Specimen preparation and sectioning

António Avelino - Aula prática

Data: 03-03-2020 Hora:10:00 - 12:00 Local: UBEx library

Sectioning methods

António Avelino, Fani Neto - Aula laboratorial

Data: 03-03-2020 Hora:14:00 - 16:00 Local:UBEx laboratory

Optical microscopy

António Avelino - Aula laboratorial

Data: 03-03-2020 Hora:16:00 - 17:00 Local: UBEx library

Immunohistochemistry

António Avelino - Aula laboratorial

Data: 03-03-2020 Hora:17:00 - 18:00 Local:UBEx laboratory

Optic sectioning; Confocal microscopy

António Avelino, Carlos Reguenga - Aula prática

Data: 04-03-2020 Hora:10:00 - 12:00 Local:UBEx laboratory

Image analysis

Fani Neto - Aula prática

Data: 04-03-2020 Hora:14:00 - 16:00 Local:UBEx laboratory

Electron Microscopy

António Avelino - Aula prática

Data: 04-03-2020 Hora:16:00 - 18:00 Local:UBEx laboratory

EVALUATION: Student presentations

António Avelino, Fani Neto, Carlos Reguenga

Data: 05-03-2020 Hora:14:00 - 18:00 Local: UBEx library

## **MODULE 2**

### **Stereological Methods**

**Coordinator: Dulce Madeira**

Brief introduction to stereology. The Cavalieri principle.

Dulce Madeira - Aula teórica

Data: 09-03-2020 Hora:10:00 - 10:30 Local:UAnatomy

Embedding and slicing of organs. Sampling. Volume estimation.

Armando Cardoso - Aula laboratorial

Data: 09-03-2020 Hora:10:30 - 12:00 Local:UAnatomy

The disector. The fractionator principle (systematic sampling)

Armando Cardoso - Aula teórica

Data: 10-03-2020 Hora:10:00 - 10:30 Local:UAnatomy

Number estimation

Pedro Pereira, Armando Cardoso - Aula laboratorial

Data: 10-03-2020 Hora:10:30 - 12:00 Local:UAnatomy

Sampling and sizing of particles.

Pedro Pereira - Aula teórica

Data: 11-03-2020 Hora:10:00 - 10:30 Local:UAnatomy

The nucleator. The rotator. Point sampled intercepts.

Pedro Pereira, Armando Cardoso - Aula laboratorial

Data: 11-03-2020 Hora:10:30 - 12:00 Local:UAnatomy

Surface estimation. Ratios. Reference trap. Multilevel sampling design

Armando Cardoso - Aula teórica

Data: 12-03-2020 Hora:10:00 - 10:30 Local:UAnatomy

Surface area. Areal and numerical densities.

Pedro Pereira - Aula laboratorial

Data: 12-03-2020 Hora:10:30 - 12:00 Local:UAnatomy

#### **EVALUATION**

Dulce Madeira

Data: 20-03-2020 Hora:15:00 - 16:00 Local:UAnatomy

## **MODULE 3**

### **Live Cell Imaging**

**Coordinator: Paulo Correia de Sá**

High-resolution fluorescence-based imaging (epifluorescence vs confocal microscopy). Instrumentation and detection for live cell imaging.

Fátima Ferreirinha - Aula teórica

Data: 16-03-2020 Hora:10:00 - 12:00 Local:Laboratory of Pharmacology and Neurobiology, ICBAS

“Hands-on” confocal: Fluorescence protein tracking and detection; monitoring protein dynamics (FRET); analysis of live cell data.

Fátima Ferreirinha - Aula laboratorial

Data: 16-03-2020 Hora:14:00 - 18:00 Local:Laboratory of Pharmacology and Neurobiology, ICBAS

Image capture with increased speed during time-lapse observations while maintaining living cells in the imaging setup

José Bernardo Noronha-Matos - Aula teórica

Data: 17-03-2020 Hora:10:00 - 12:00 Local:Laboratory of Pharmacology and Neurobiology, ICBAS

Live cell imaging: high-speed compound application vs photoactivation of caged biomolecules; photobleaching techniques; tracking dynamic cell movements and vesicle exocytosis

José Bernardo Noronha-Matos - Aula laboratorial

Data: 17-03-2020 Hora:14:00 - 18:00 Local:Laboratory of Pharmacology and Neurobiology, ICBAS

Laser-capture microdissection of neuronal cells from brain slices and culture dishes.

Paulo Correia de Sá - Aula teórica

Data: 18-03-2020 Hora:10:00 - 12:00 Local:Laboratory of Pharmacology and Neurobiology, ICBAS

Live cell imaging: Single-cell calcium imaging, imaging of voltage-sensitive dyes, real-time synaptic vesicle dynamics using styryl dyes

Paulo Correia de Sá - Aula laboratorial

Data: 18-03-2020 Hora:14:00 - 18:00 Local:Laboratory of Pharmacology and Neurobiology, ICBAS

## **MODULE 4**

### **Bioimaging Analysis**

**Coordinator: Mafalda Sousa**

Methods in automated analysis of microscopy

Mafalda Sousa - Aula prática

Data: 09-03-2020 Hora:14:00 - 17:30 Local:Informatics room, 1st Floor CIM

Introduction to Fiji

Mafalda Sousa - Aula prática

Data: 10-03-2020 Hora:14:00 - 17:30 Local:Informatics room, 1st Floor CIM

Fiji image analysis; Practical exercises

Mafalda Sousa - Aula prática

Data: 11-03-2020 Hora:14:00 - 17:30 Local:Informatics room, 1st Floor CIM

## **EVALUATION**

Mafalda Sousa - Aula prática

Data: 20-03-2020 Hora:09:00 - 12:30 Local:Informatics room, 1st Floor CIM

# EXPERIMENTAL MODELS IN NEUROSCIENCE

**Coordinator: Fani Neto**

6 ECTS

**Bibliography:** available for students at MeN-Moodle

## MODULE 1

**Coordinator: Production and Validation of Animal Models**

**Coordinator: Fani Neto**

Introduction to the production and validation of animal models.

Fani Neto - Aula prática

Data: 26-03-2020 Hora:09:00 - 09:30 Local: UBEx library

Models of inflammatory diseases.

António Avelino - Aula prática

Data: 26-03-2020 Hora:09:30 - 10:30 Local: UBEx library

Models of metabolic diseases. The example of diabetic neuropathy

Isaura Tavares - Aula prática

Data: 26-03-2020 Hora:11:00 - 12:00 Local: UBEx library

Models of degenerative diseases

Fani Neto - Aula prática

Data: 26-03-2020 Hora:14:00 - 15:00 Local: UBEx library

Validation of animal models

Joana Ferreira-Gomes - Aula prática

Data: 26-03-2020 Hora:15:00 - 16:00 Local: UBEx library

Models of inflammatory diseases: i) Monoarthritis; ii) Osteoarthritis - Group 1

Fani Neto / Joana Gomes - Aula laboratorial

Data: 27-03-2020 Hora:09:00 - 10:30 Local:UBEx animal facilities, CIM, 5th floor

Models of inflammatory diseases: i) Monoarthritis; ii) Osteoarthritis - Group 2

Fani Neto / Joana Gomes - Aula laboratorial

Data: 27-03-2020 Hora:10:30 - 12:00 Local:UBEx animal facilities, CIM, 5th floor

Models of inflammatory diseases: i) Monoarthritis; ii) Osteoarthritis - Group 3

Fani Neto / Joana Gomes - Aula laboratorial

Data: 27-03-2020 Hora:12:00 - 13:30 Local:UBEx animal facilities, CIM, 5th floor

Models of traumatic diseases - nervous lesions: i) SNI - face; ii) SNI - sciatic; iii) CCI; iv) Spinal cord injury - Group 1

Daniel Pozza / Célia Cruz - Aula laboratorial

Data: 27-03-2020 Hora:14:30 - 16:00 Local:UBEx animal facilities, CIM, 5th floor

Models of traumatic diseases - nervous lesions: i) SNI - face; ii) SNI - sciatic; iii) CCI; iv) Spinal cord injury - Group 2

Daniel Pozza / Célia Cruz - Aula laboratorial

Data: 27-03-2020 Hora:16:00 - 17:30 Local:UBEx animal facilities, CIM, 5th floor

Models of traumatic diseases - nervous lesions: i) SNI - face; ii) SNI - sciatic; iii) CCI; iv) Spinal cord injury - Group 3

Daniel Pozza / Célia Cruz - Aula laboratorial

Data: 27-03-2020 Hora:17:30 - 19:00 Local:UBEx animal facilities, CIM, 5th floor

EVALUATION: written essay

Fani Neto

Data: 28-03-2020 Hora:18:00 - 18:00 Local: UBEx library

## **MODULE 2**

### **Genetically Manipulated Animal Models**

**Coordinator: Miguel Soares**

Principles of genetic manipulation in mice; Summary of mouse development; Transgenesis and mutagenesis

Miguel Soares - Aula teórica

Data: 23-03-2020 Hora:10:00 - 11:00 Local: UBEx library

Recovery and culture of preimplantation-stage mouse embryos - Group 1

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 23-03-2020 Hora:11:00 - 12:00 Local:UBEX laboratory

Micromanipulation of mouse zygotes: pronuclear injection for transgenesis - Group 1

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 23-03-2020 Hora:14:00 - 16:00 Local:UBEX laboratory

Recovery and culture of preimplantation-stage mouse embryos - Group 2

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 23-03-2020 Hora:12:00 - 13:00 Local:UBEX laboratory

Micromanipulation of mouse zygotes: pronuclear injection for transgenesis - Group 2

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 23-03-2020 Hora:16:00 - 18:00 Local:UBEX laboratory

Strategies for embryonic ES cell-based transgenesis and genome alterations; Introduction of foreign DNA into ES cells

Miguel Soares - Aula teórica

Data: 24-03-2020 Hora:10:00 - 11:00 Local: UBEx library

Recovery and culture of preimplantation-stage mouse embryos - Group 1

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 24-03-2020 Hora:11:00 - 12:00 Local:UBEX laboratory

Micromanipulation of morulae: injection of ES cells - Group 1

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 24-03-2020 Hora:14:00 - 16:00 Local:UBEX laboratory

Recovery and culture of preimplantation-stage mouse embryos - Group 2

Miguel Soares / Daniel Silva - Aula laboratorial

Data: 24-03-2020 Hora:12:00 - 13:00 Local:UBEX laboratory

Micromanipulation of morulae: injection of ES cells - Group 2  
Miguel Soares / Daniel Silva - Aula laboratorial  
Data: 24-03-2020 Hora:16:00 - 18:00 Local:UBEX laboratory

Novel approaches for genome editing; Detection and analysis of mouse genome alterations; Animal models in Neuroscience  
Miguel Soares - Aula teórica  
Data: 25-03-2020 Hora:10:00 - 12:00 Local: UBEx library

Implantation: oviduct and uterine transfer - Group 1  
Miguel Soares / Daniel Silva - Aula laboratorial  
Data: 25-03-2020 Hora:14:00 - 16:00 Local:UBEX laboratory

Implantation: oviduct and uterine transfer - Group 2  
Miguel Soares / Daniel Silva - Aula laboratorial  
Data: 25-03-2020 Hora:16:00 - 18:00 Local:UBEX laboratory

EVALUATION: Journal Club  
Miguel Soares  
Data: 27-03-2020 Hora:14:00 - 16:00 Local: UBEx library

### **MODULE 3**

#### **Neuronal Culture**

**Coordinator: Filipe Monteiro**

Course Presentation and Methodology Applications  
Filipe Monteiro - Aula prática  
Data: 30-03-2020 Hora:09:00 - 10:00 Local: UBEx library

Preparation of neuronal cell line - Group 1  
Filipe Monteiro - Aula laboratorial  
Data: 30-03-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Dorsal Root Ganglia (DRG) dissection and DRG neuron primary culture - Group 2  
Ana Charrua - Aula laboratorial  
Data: 30-03-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Hippocampal slice collection and organotypic culture - Group 3  
Sofia Santos - Aula laboratorial  
Data: 30-03-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Methodology Applications  
Sofia Santos - Aula prática  
Data: 31-03-2020 Hora:09:00 - 10:00 Local: UBEx library

Experiment: Transfection of a Neuronal Cell Line - Group 1  
Filipe Monteiro - Aula laboratorial  
Data: 31-03-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Experiment: Chronic Adrenergic stimulation of DRG Neuron Primary Culture - Group 2  
Ana Charrua - Aula laboratorial  
Data: 31-03-2020 Hora:10:00 - 12:00 Local:UBEX laboratory



Experiment: Neuronal Cell Death Induction of an organotypic culture - Group 3  
Sofia Santos - Aula laboratorial  
Data: 31-03-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Cell extract samples preparation - Group 1  
Filipe Monteiro - Aula laboratorial  
Data: 01-04-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Immunocytochemistry assay - Group 2  
Ana Charrua - Aula laboratorial  
Data: 01-04-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Neuronal Cell Death Labelling Assay - Group 3  
Sofia Santos - Aula laboratorial  
Data: 01-04-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Luciferase and beta-Galactosidase enzymatic assays and data analysis - Group 1  
Filipe Monteiro - Aula laboratorial  
Data: 02-04-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Immunocytochemistry data collection and Analysis - Group 2  
Ana Charrua - Aula laboratorial  
Data: 02-04-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

Fluorescence Confocal Microscopy Analysis - Group 3  
Sofia Santos - Aula laboratorial  
Data: 02-04-2020 Hora:10:00 - 12:00 Local:UBEX laboratory

EVALUATION: student presentations  
Ana Charrua  
Data: 02-04-2020 Hora:15:00 - 16:00 Local: UBEx library

## **MODULE 4**

### **Behavioral Evaluation**

**Coordinator: Nikolay Lukoyanov**

Video-tracking and spatial memory  
Nikolay Lukoyanov - Aula prática  
Data: 14-04-2020 Hora:09:00 - 11:00 Local:UAnatomy

Anxiety and emotional memory, motor deficits  
Gisela Maia - Aula prática  
Data: 14-04-2020 Hora:14:00 - 15:00 Local:UAnatomy

Assessment of higher brain functions  
Clara Monteiro - Aula prática  
Data: 15-04-2020 Hora:09:00 - 11:00 Local:UBEx Library

Behavioral pain assessment  
Joana Gomes - Aula prática  
Data: 15-04-2020 Hora:11:00 - 12:00 Local:UBEx Library

Ethological analysis of behavior

Ana Valentim - Aula prática

Data: 16-04-2020 Hora:10:00 - 11:30 Local:i3S

EVALUATION

Nikolay Lukoyanov, Monteiro, Gomes

Data: 17-04-2020 Hora:09:00 - 11:00 Local:UAnatomy

# IN-SILICO NEUROSCIENCE

**Coordinator: Filipe Monteiro**

6 ECTS

**Bibliography:** available for students at MeN-Moodle

## MODULE 1

### Brain Imaging

**Coordinator: Daniela Seixas**

Overview of neuroimaging techniques focusing on advanced magnetic resonance (MR) modalities

Daniela Seixas - Aula teórica

Data: 20-04-2020 Hora:09:00 - 10:30 Local:DAIPG room 4

Functional magnetic resonance imaging (fMRI)

Paulo Branco - Aula teórica

Data: 20-04-2020 Hora:10:30 - 13:00 Local:DAIPG room 4

Neuroimaging markers of brain connectivity

Paulo Branco - Aula teórica

Data: 20-04-2020 Hora:15:00 - 17:00 Local:DAIPG room 4

Practical session: magnetic resonance imaging

Sofia Brandão - Aula laboratorial

Data: 02-05-2020 Hora:10:00 - 12:00 Local:FMUP; Unidade de Ressonância Magnética do Hospital de São João

## EVALUATION

Daniela Seixas

Data: 13-05-2020 Hora:17:00 - 18:00 Local:UBEx Library

## MODULE 2

### Applied Signal Processing

**Coordinator: Paulo Branco**

Signal processing basics: Fourier transform, filtering, artefact detection, denoising.

Paulo Branco - Aula teórica

Data: 21-04-2020 Hora:09:00 - 11:00 Local:DAIPG room 4

Hands-on session: developing and applying a signal processing pipeline for neuroimaging data.

Paulo Branco - Aula prática

Data: 21-04-2020 Hora:15:00 - 17:00 Local:DAIPG room 4

Univariate and multivariate statistical methods for neuroimaging; Inverse causality, predictive models and functional connectomics.

Paulo Branco - Aula teórica

Data: 22-04-2020 Hora:09:00 - 11:00 Local:DAIPG room 4

Hands-on session: testing the hypothesis using uni- and multivariate approaches and reporting the results. Data visualization and interpretation.

Paulo Branco - Aula prática

Data: 22-04-2020 Hora:15:00 - 17:00 Local:DAIPG room 4

Data analysis in EEG: part 1

Fernando Barbosa - Aula prática

Data: 23-04-2020 Hora:09:00 - 11:00 Local:DAIPG room 4

Data analysis in EEG: part 2

Fernando Barbosa - Aula prática

Data: 24-04-2020 Hora:09:00 - 11:00 Local:DAIPG room 4

Data analysis in multielectrode neurophysiology: part 1

Vasco Galhardo - Aula prática

Data: 27-04-2020 Hora:15:00 - 17:00 Local:DAIPG room 4

Data analysis in multielectrode neurophysiology: part 2

Vasco Galhardo - Aula prática

Data: 28-04-2020 Hora:15:00 - 17:00 Local:DAIPG room 4

Data analysis in multielectrode neurophysiology: part 3

Vasco Galhardo - Aula prática

Data: 29-04-2020 Hora:15:00 - 17:00 Local:DAIPG room 4

EVALUATION

Paulo Branco

Data: 13-05-2020 Hora:09:00 - 10:30 Local:UBEx Library

## **MODULE 3**

### **Biostatistics**

**Coordinator: Rui Magalhães**

Dados biológicos e sua representação gráfica. Estatística descritiva. Conceitos básicos de inferência estatística: Teorema do Limite Central; Intervalos de confiança e testes de hipóteses. Exercícios de aplicação

Rui Magalhães - Aula prática

Data: 27-04-2020 Hora:09:00 - 12:30 Local:FMUP

Inferência sobre médias: Amostras emparelhadas e independentes. Análise de variância a um ou dois factores (ANOVA). Exercícios de aplicação.

Rui Magalhães - Aula prática

Data: 28-04-2020 Hora:09:00 - 12:30 Local:FMUP

Inferências sobre proporções. Uma proporção; comparação de duas proporções em amostras emparelhadas ou amostras independentes; Comparação de mais de duas proporções - teste do qui-quadrado. Exercícios de aplicação.

Rui Magalhães - Aula prática

Data: 29-04-2020 Hora:09:00 - 12:30 Local:FMUP

Correlação e regressão linear: Modelo de regressão - método dos mínimos quadrados; Coeficiente de correlação; Análise de resíduos. Exercícios de aplicação.

Rui Magalhães - Aula prática

Data: 30-04-2020 Hora:09:00 - 12:30 Local:FMUP

## **MODULE 4**

### **Essential Bioinformatics**

**Coordinator: Filipe Monteiro**

Sequence databases: introduction, examples, data retrieval. Practical exercises I.

Filipe Monteiro - Aula prática

Data: 04-05-2020 Hora:14:00 - 18:00 Local:Informatics room, 1st Floor CIM

Sequence comparison: alignment methods, similarity searches, homology, protein motifs and domains. Practical exercises II.

Filipe Monteiro - Aula prática

Data: 05-05-2020 Hora:14:00 - 18:00 Local:Informatics room, 1st Floor CIM

Sequence analysis: prediction of biological properties from DNA, RNA and protein sequences. Primer design for cloning and gene expression analyses and siRNA design. Restriction maps. Practical exercises III.

Filipe Monteiro - Aula prática

Data: 06-05-2020 Hora:14:00 - 18:00 Local:Informatics room, 1st Floor CIM

Gene ontology: retrieving biological insight from high throughput experiments. Gene expression databases. Sequence variation and mutations linked to genetic neurological diseases. Practical exercises IV.

Filipe Monteiro - Aula prática

Data: 07-05-2020 Hora:14:00 - 17:00 Local:Informatics room, 1st Floor CIM

Integration of biological data: comparison of gene data sets and multiple databases query. Practical exercises V.

Filipe Monteiro - Aula prática

Data: 08-05-2020 Hora:14:00 - 17:00 Local:Informatics room, 1st Floor CIM