

Màj 10/06/2022

**UE 1.3. Disciplinaire thématique**

**12 ECTS**

**EC4 : Molecular neurosciences**

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**Résumé**

Molecular Neuroscience is a course for students interested in neurosciences and needing to stay in close touch with progress at the forefront of molecular brain research today. Basics of stress and early life programming will be provided with the help of animal models. Reactive and predictive adaptation will be introduced with particular emphasis on circadian rhythms, sleep-wake cycle and behaviors. Molecular aspects will cover pharmacological and epigenetic approaches. All the teaching will be in English.

**Objectifs pédagogiques :**

To gain skills in the understanding of the complexity of integrated systems of the brain-body interaction. Read and present scientific papers by oral communications. A final written examination (70 % of final required scores) and an intermediate examination corresponding to a personal writing dissertation (this corresponds to 30 % of final required scores).

**Bloc de Compétences et de Connaissances-BCC 1 : Connaitre les concepts de base en Biologie Santé**

**Compétences acquises** (directes/indirectes) :

Cet enseignement contribue à fournir les compétences pour contribuer à une activité de recherche en Biologie-Santé (BC1), en préparant les étudiants à :

- cerner les enjeux de la recherche en Biologie-Santé ;
- organiser une veille bibliographique de la littérature scientifique internationale ;
- fonder des hypothèses sur les concepts les plus récents en recherche Biologie-Santé.

**Prérequis :**

Basic knowledge of the anatomy and functioning of nervous system and neurotransmission and neuroendocrinology

**Program in brief:**

Stress concept and historical background

Molecular aspects of response to stress: post-transcriptional (regulation of gene expression) and post-translational effects (modulation of proteins activity)

Epigenetic programming by maternal behavior

Circadian rhythms and sleep: molecular and physiological regulation

Stress related disorders: The molecular basis of anxiety and mood disorders.

Neuropeptides and their receptors: CRH, ACTH, vasopressin, oxytocin and their receptors;

The glutamatergic synapse and interaction with stress: G-protein coupled receptors (metabotropic glutamate receptors)

Ionotropic receptors (AMPA, NMDA, and kainate receptors)

Molecular and cellular basis of striatal and cerebellar motor learning.

Network oscillations and molecular basis of perception disorders.

Molecular and cellular basis of drug addiction.

Neurogenesis and cellular aging

Molecular mechanisms of neuronal death related to neurodegenerative disorders

Pharmacology of addiction and depression

**Contrôle des connaissances** : contrôle continu 30% - terminal écrit 70%