CoPGr CURRICULAR CHAMBER
SUBJECTS PRESENTATION FORM

SUBJECT'S ACRONYM: **RNP5780**

SUBJECT'S NAME: Fundamentals of Electrophysics A Theoretic-Practical View

CURRICULUM/AREA: Neurology/17140

FOCAL AREA: Neurosciences

INITIAL VALIDITY (Year/Semester):

N. OF CREDITS: 04

Theoretical Classes: 12 Practical Classes, Seminars and Others: 12 Hours of Study: 06
DURATION IN WEEKS: 02

PROFESSOR(S) IN CHARGE:

USP Professor, n. 2783710 – Norberto Garcia Cairasco
External Professor, n. USP 5017877 – Simone Saldanha Marroni

ACTUAL COSTS OF THE SUBJECT: BRL

(Presenting, if applicable, the budget foreseen for the year, as an attachment)

PROGRAM

OBJECTIVES:
Instructing Graduation students on basic and multidisciplinary knowledges such as: electricity, bioeletromagnetism, biophysics, basic electronics, biomedical instrumentation, IT, among others, for the theoretical and technical mastery of the in vivo and in vitro electrophysics of the nervous system, from the electrodes implantation surgery to the signal's processing. Performing the initial practical training of the students on electrophysiology specification, assembly and set up test , as well as on the performance of experiments. Training the students on the understanding and critical appraisal of the scientific literature of the area, as well as on the drawing of electrophysiology experiments for investigating pertinent questions to their lines of research.

JUSTIFICATION:
The understanding of the basic mechanisms involved on the physiology of the sleep-wake cycle physiology and potentially in diseases at the encephalon, among them the epilepsies, has been elucidated by neurophysiologic methods which assess the functions of the central nervous system relating structure and function. Electrophysics is an important method for qualitatively and quantitatively analyzing the cerebral structures involved under normal and pathological conditions enabling advances in the field of neurosciences.

CONTENT (SYLLABUS):

1. Review of the fundamentals of bioelectrogenesis: cell membrane, elements transportation by the membrane, ion channels, Nernst equation, membrane's resting potential, action potential, conduction of the action potential, electrical models of the membrane, chemical and electrical synapses; 2. Electroencephalogram neurophysics (EEG): eletrotonic and postsynaptic potentials, synaptic integration, field potentials, neural tissue volume conductor; the human EEG; brain rhythms: the sleep-wake cycle, the EGG spectrum, alpha, beta, delta, theta and gamma waves, slow waves, fuses and ripples, high frequency oscillations (HFO), ponto-geniculate-occipital (PGO) activity, pathological

rhythms, epilepsies EEG; 3. Electrophysics setup; fundamentals of electricity and electronics, electrodes/chimetrodes, the electrode-electrolyte interface, headstage, amplifier, analogical filters, analogical-digital conversion, control and acquisition software; setups construction: commercial specification, assembly; testing the setup: instruments, measures, electronic devices, tricks or tips, noises and their solutions; 4. Experimental methods and protocols in electrophysics: implantation surgery, electrocorticogram, local field potentials (LFP), multi-single register, EEG-video; acute and chronic registers, post-discharge register, evoked potentials; 5. Biological signals processing: analysis of the time domain, linear and non-linear, analysis of the frequency domain, status map; Matlab: data structures, basic commands, mathematic functions, plotting commands, files handling. 6. Complexity Concept and Emerging Functions.

EVALUATION METHOD:

Short report with critical comments w/o the entire Subject's content: 80% of the grade. Participation in Classes and Seminars: 20% of the grade.

NOTES: