

COURSE FOR POSTGRADUATE STUDENTS

FEDERAL UNIVERSITY OF SÃO PAULO – UNIFESP

PAULISTA SCHOOL OF MEDICINE – BRAZIL

Department of Physiology / Neurophysiology lab

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**HISTOLOGICAL, HISTOCHEMICAL, IMMUNOHISTOCHEMICAL METHODS AND TRANSMISSION
ELECTRON MICROSCOPY APPLIED TO STEREOLOGY**

PEDAGOGICAL-DIDATIC PLAN

Total time load: 80 hours, divided into 4 modules - 20 hours each.

Introduction: Syllabus: Enable researchers and students to choose the right methodologies to be used in projects which require the quantifications of structures and/or cell and tissue processes. It proposes a post-course follow-up, when requested, to the students who apply the knowledge acquired. This course aims at developing high accuracy lab skills in the development of jobs that require stereological quantification of structures, cells and tissues in physiological and/or pathological processes, based on morphology, histochemistry, immunochemistry and ultrastructures. Provide skills to improve resources in the lab, in order to develop quality the most, with minimal cost and time. Develop critical sense on the methodologies mentioned in scientific articles.

General Objectives: Provide accurate skills regarding lab scientific procedures, capable to assure productivity and quantification of structures and biological processes, in order to establish the reliability of the obtained results for stereological quantification. Stimulate the development of a new reflexive-critical scientific posture on the researcher's action and the use of financial resources and time, in the modernization and competitiveness context. Create opportunities for interdisciplinary and transdisciplinary discussions among students relating to the theme.

Specific Objectives: It is expected, after attending this course, that the students be able to: choose and perform methodologies appropriate to their research areas; obtain exact results through the applied methodology, aiming at stereological quantification; identify their own main difficulties and those that are common to other students and researchers; identify the ways to optimize financial and time resources; recognize the importance of developing their lab skills, raising awareness that "doing with perfection does not mean to spend more time"; increase the knowledge through learning new lab methodologies.

Optional: Prepare a reflexive text about the individual's own lab experience and perform a self-evaluation, highlighting the improvement reached through this course.

Program Content:

Module 1: General histological technique - Introduction to cell and tissue microtechnique; chemical and physical fixation methods; perfusion, immersion and freezing; decalcification, dehydration and clarification; paraffin, agar, gelatin and resin embedding; microtomy; staining; special staining; vital staining and metal impregnations. Basics of light microscopy. Principles of stereology.

Module 2: Histochemistry - General considerations; protein histochemistry, lipid, carbohydrates and inorganic ions. Enzyme histochemistry. Hydrolytic enzymes and oxidoreductases.

Module 3: Immunohistochemistry - Core principles; antigens and antibodies, antibody molecules; antigen-antibody complexes; direct fluorescent method; indirect fluorescent method; enzymatic methods and polymers; avidin-biotin method; blocking of non-specific background staining; antibody dilution; quality control and standardization; protocol validation; antigen retrieval.

Module 4: Transmission electron microscopy (TEM) - Basic principles; history, applicability; fixation of biological systems; buffer solutions, dehydration, embedding, sectioning, obtaining and staining of semi-fine cuts; positive staining, negative staining; TEM in a nanotechnological science.

Methodology/Teaching-learning strategies

Interactive classes; readings, discussions; use of audiovisual resources (video, datashow, etc.); lab practice and individual after-course guidance, self-evaluation.

Evaluation: attendance and participation in the classroom; individual papers related to the personal area of research.

Evaluation criteria: participation and attendance - 5.0; individual paper - 5.0

All individual papers must be delivered in the last class.

Periods in 2021:

Module 1: November 08 and 09 from 8 am to 12 pm/1 pm to 5 pm - November 10 from 8 am to 12 pm. **Module 2:** November 10, 2021, from 1 pm to 5 pm and November 11 and 12, 2021, from 8 am to 12 pm /1 pm to 5 pm. **Modules 3 and 4** will take place in 2022.

Note: Individual consulting on the research projects is part of the course.

Venue: UNIFESP – Campus São Paulo labs and online classes to be disclosed after registration.