

Degree Course in Biomedical Laboratory Techniques

Teaching: Pathological Anatomy

SSD: MED / 08, MED / 46

Number of ECTS: 5

Number of CFUs: MED / 08 CFU 4; MED / 46 CFU 1

Director of the course: Prof. Luigi Maria Larocca

Email: luigimaria.larocca@unicamillus.org

MODULE: FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY

SSD: MED / 08

Number of ECTS: 3

Teacher name: Prof. Maurizio Martini EMAIL: maurizio.martini@unicamillus.org

MODULE: FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY

SSD: MED / 08

Number of ECTS: 1

Teacher name: Prof. Luigi Maria Larocca EMAIL: luigimaria.larocca@unicamillus.org

MODULE: TECHNICAL SCIENCES OF MOLECULAR PATHOLOGY

SSD: MED / 46

Number of ECTS: 1

Teacher name: D'Angelo Martina, EMAIL: martina.dangelo@unicamillus.org

METHOD OF ATTENDANCE: MANDATORY WITH AT LEAST 75% ATTENDANCE
INTEGRATED TEACHING

PREREQUISITES

Although there is no prerequisite, knowledge of basic elements of chemistry, biology, anatomy, histology, general pathology

LEARNING OBJECTIVES

The essential objectives are the acquisition of basic knowledge about the main safety standards of the histopathology laboratory, the knowledge of the histological techniques of fixation / conservation of the sample to the inclusion in paraffin and cytology from the fixation / conservation of the sample to the preparation; the basic techniques related to the execution of an autopsy check; basic histochemical and immunohistochemical techniques; problems relating to the preparation of histological and cytological samples and ancillary techniques (histochemical and immunohistochemical), principles of optics, optical and electron microscopy. Furthermore, the acquisition of basic knowledge about the main techniques used in the molecular pathology laboratory for the extraction of nucleic acids, PCR and F.I.S.H. as a tool for diagnosis, prognosis and in relation to associated therapies. These objectives will be achieved through lectures and interactive teaching activities as well as laboratory activities, designed to facilitate learning and improve the ability to solve problems related to the execution of histocytopathological preparation techniques and in-depth diagnostic and prognostic-therapeutic and molecular pathology.

EXPECTED LEARNING OUTCOMES / LEARNING OUTCOMES

The expected learning outcomes are consistent with the general provisions of the Bologna Process and the specific provisions of Directive 2005/36 / EC. They are found within the European Qualifications Framework (Dublin descriptors) as follows:

Knowledge and understanding

At the end of this course the student will have to know:

- Know the main methods of histological and cytological fixation
 - Know the main methods of preparation of histological paraffin samples, including histological macro-reduction
 - Know the main methods of preparation of cytological samples
 - Know the main methods of preparation of fresh samples
 - To know the basic and classification techniques in autopsy findings in pathological anatomy
 - Know the main histochemical colorations of the tissues
 - Know the principles of immunohistochemical techniques
 - Learn and recognize the main artifacts related to the preparation of the samples
- histological, cytological and ancillary techniques (histochemical and immunistochemical and molecular pathology)
- Learn the operating principles of the instruments dedicated to the preparation of histological and cytological samples and the related ancillary techniques
 - Know the main chemical and biological risks related to the techniques used
 - Know and explain the principles of cell and tissue pathology
 - Know and explain the concept of ischemia
 - Know and explain the main subcellular modifications
 - Know and explain the concept of cell death
 - Know and explain the basic principles of microscopic optics
 - Know and explain the basic principles of the operation of electron microscopes
 - Know and explain the techniques for setting up histological preparations for molecular pathology analyzes
 - Know and explain the techniques of in situ hybridization and FISH
 - Know and explain the applications of histo-pathological techniques in the pathological practice
 - Know and explain the preparation techniques of preparations for molecular pathology analyzes
 - Know and explain the applications of molecular pathology techniques in pathological practice
 - Ability to properly perform analytical procedures and minimize the possibility of error

Ability to apply knowledge and understanding

At the end of the course, the student will be able to:

- Use the theoretical and laboratory knowledge acquired for the autonomous study of aspects relating to the field of pathological diagnostics, including autopsy, to which the student will dedicate himself in the context of his professional activity. For this purpose, exercises and case studies will be proposed that the student will be asked to solve / discuss individually and through group collaboration. The documents produced by the student, the ongoing profit tests and the final profit test will constitute elements of evaluation and verification of the skills acquired.

Communication skills

At the end of the course, the student must know:

- Use industry-specific scientific terminology in a manner consistent with the various contexts of the pathological anatomy laboratory
- Present the arguments orally in an organized and coherent way
- Use of an adequate scientific language that conforms to the topic of the discussion.

Autonomy of judgment

At the end of the course, the student must know:

- carry out general assessments relating to the topics covered
- distinguish the specific applications of Pathological Anatomy in articles of scientific literature
- Recognize the importance of a thorough understanding of the topics consistent with adequate medical education
- Identify the fundamental role of correct theoretical knowledge of the subject in clinical practice

COURSE SYLLABUS

BASIC HISTOLOGICAL AND CYTOLOGICAL TECHNIQUES:

- o Main techniques of fixation and preparation of histological samples
- o Main techniques of fixation and preparation of biological fluids
- o Techniques of paraffin inclusion of histological samples
- o Embedding and paraffin cutting techniques
- o Preparation techniques for fresh samples
- o Artifacts from technical set-up
- o Principles of operation and use of the instruments
- o Safety in the Pathological Anatomy laboratory

ANCILLARY HISTOLOGICAL AND CYTOLOGICAL TECHNIQUES:

- o Histochemical staining techniques
- o Immunohistochemical investigation techniques
- o Immunofluorescence techniques (direct and indirect)
- o Outlines of electron microscopy techniques

AUTOPTIC HISTOLOGICAL AND CYTOLOGICAL TECHNIQUES:

- o Main techniques in the execution of the diagnostic check
- o Main techniques of organ harvesting and sampling in the autopsy diagnosis

MOBILE RESPONSE TO DAMAGE:

- o Cellular response to ischemia (definition of ischemia and hypoxia, types of hypoxia; hypoxic, anemic, stagnant, ischemic, histotoxic)
- o Hot ischemia and cold ischemia
- o Times of ischemia and cell susceptibility
- o Ischemic cell damage, dropsy degeneration, vacuolar degeneration, cloudy swelling
- o Reversible and irreversible subcellular changes associated with hydropic swelling
- o Microscopic aspects of cell death, Concept of oncosis, Coagulative necrosis, necrosis colliquative and apoptosis

PRINCIPLES OF OPTICS:

- o Principles of optics
- Converging and diverging lenses
- o Chromatic Aberrations
- o Image formation

MICROSCOPY:

- o Principles of optical microscopy
- o Brightfield microscope

- o Darkfield microscopy
- o Fluorescence microscope

ELECTRON MICROSCOPY:

- o Principles of electron microscopy
- o Ultrastructural microscopy applications

APPLICATIONS FOR ANATOMATIC-PATHOLOGICAL MOLECULAR DIAGNOSTICS

- o Main methods of nucleic acid extraction: from the pre-analytical phase to the evaluation of the extract
- o PCR preparation techniques and applications in molecular pathology
- o F.I.S.H. method: process and sector applications

COURSE STRUCTURE

The teaching is structured in 50 hours of frontal and laboratory teaching, divided into lessons of 2 or 3 hours based on the academic calendar. The lectures include theoretical lessons with interaction and the projection of videos on the topics covered. At the beginning of each lesson there will be a summary of the previous lesson in order to verify the correct understanding by the students. The laboratory part will be carried out in a laboratory of Pathological Anatomy and Molecular Pathology, so that students can practically follow the main laboratory activities related to Pathological Anatomy

Self-check

MODULE: FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY (40 hours)

MODULE: TECHNICAL SCIENCES OF MOLECULAR PATHOLOGY (10 hours)

COURSE GRADE DETERMINATION

The integrated teaching exam consists of an oral and write exam, during which the commission will assess the student's ability to apply the knowledge learned and will ensure that the skills are adequate to solve the problems that arise in the specific disciplinary field and taking I also take into account the objectives of the teaching. The exam can be passed with a grade of 18/30. The student's learning ability, judgment ability and communication skills will be assessed. In the evaluation, knowledge and understanding have a weight of 50%, knowledge and understanding of 20% and autonomy of judgment of 30%.

The student can take the exam in a single session in the recovery session (September / January), while the exam can be taken in two separate sessions in the ordinary sessions (February / July)

The assessments can be carried out both in progress and at the end of the integrated course. The methodology will be communicated at the beginning of the lessons together with the bibliography and / or teaching materials necessary for the preparation for the final evaluation.

- Oral exam: It will focus on questions concerning the study programs. It will evaluate the student's ability to have acquired the knowledge related to the contents of the courses and their integrations, and will ascertain the appropriate use of terminology.
- Written test: It will focus on the programmed topics of the courses that make up the integrated course.

The exam will be assessed according to the following criteria:

Not suitable: Poor or lacking knowledge and understanding of the topics; limited capacity for analysis and synthesis, frequent generalizations of the requested contents; inability to use technical language.

18-20: Just enough knowledge and understanding of the topics, with obvious imperfections; just sufficient capacity for analysis, synthesis and autonomy of judgment; poor ability to use technical language.

21-23: Sufficient knowledge and understanding of the topics; sufficient ability to analyze and synthesize with the ability to reason with logic and coherence the required contents; sufficient ability to use technical language.

24-26: Fair knowledge and understanding of the topics; discrete ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.

27-29: Good knowledge and understanding of the required contents; good ability to analyze and synthesize with the ability to rigorously argue the required contents; good ability to use technical language.

30-30L: Excellent level of knowledge and understanding of the required content with an excellent ability to analyze and synthesize with the ability to argue the required content in a rigorous, innovative and original way; excellent ability to use technical language.

OPTIONAL ACTIVITIES

In addition to the teaching activity, the student will be given the opportunity to participate in practical technical activities, under tutoring, related to the teaching topics covered. These activities are not subject to scrutiny. The acquisition of the assigned hours takes place only with a mandatory frequency of 100%.

READING MATERIALS

Title: Pathological Anatomy The basics Author Aldo Scarpa, Luigi Ruco Publisher Edra year 2007
Dr. D'Angelo will provide the student with educational material, such as handouts, presentations and scientific articles

RESPONSIBLE AVAILABILITY

Students are received by appointment by writing or calling the following contact details:

Prof. Luigi Maria Larocca

Email: luigimaria.larocca@unicamillus.org