



## BIOMEDICAL LABORATORY TECHNIQUES DEGREE

**INSEGNAMENTO INTEGRATO : Anatomic Pathology**

**SSD : MED/08, MED/46**

**CFU : 5**

**COORDINATOR : MANUEL SCIMECA**

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SUBJECT: FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY

SSD : MED/08

CFU : 2

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SUBJECT: FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY

SSD : MED/08

CFU : 2

Professor : [Carlino Angela](#)

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SUBJECT: Technical Sciences of Laboratory Medicine in Biomedical – HISTO-CYTOPATHOLOGY

SSD : MED/46

CFU : 1

PROFESSOR: [Roberto Virgili](#)

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### **PREREQUISITES**

Knowledge of basic elements of chemistry, biology, anatomy, histology, general pathology

### **OBIETTIVI FORMATIVI**

Are essential objectives: the acquisition of basic knowledge about the main safety standards of the histopathology laboratory, the acquisition of knowledge of the preparation of histological samples for optical and electronic microscopy.

These objectives will be achieved through lectures and interactive teaching activities, designed to facilitate learning and improve the ability to solve problems related to the execution of histocytological preparation techniques.

### **DELIVERABLES**

The expected outcomes are consistent with the general provisions of the Bologna Process and the specific provisions of Directive 2005/36 / EC. They can be 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 histological and cytological fixation methods
- Know the main methods of tissue paraffin embedding
- Know the main methods for cytological analysis



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- Know the main preparation methods for extemporaneous examination
- Know the main histochemical staining of tissues
- Know the principles of immunohistochemistry
- Learn the operating principles of the instrumentation dedicated to the preparation of histological and cytological samples as well as the ancillary techniques (histochemistry/immunohistochemistry)
- Know the main chemical and biological risks related to the anatomic pathology techniques
- Know and explain the principles of cellular and tissue pathology
- Knowing and explaining the concept of ischemia
- Know and explain the main sub-cellular modifications
- Know and explain the concept of cell death
- Know and explain the concept of oncosis
- Know and explain the basic principles of microscopic optics
- Know and explain the basic principles of electron microscopy
- Know the principles and applications of "digital pathology"
- Know and explain the main histological techniques for molecular pathology analysis
- Know and explain the *in situ* hybridization techniques
- Know and explain the applications of histo-pathological techniques in anatomic pathology practice

#### **ABILITY TO APPLY KNOWLEDGE AND UNDERSTANDING:**

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

use the theoretical and laboratory knowledge for the independent study of all aspects related to the field of anatomic pathology.

For this purpose, exercises and "case studies" will be proposed. The documents produced by the student, the ongoing profit tests and the final profit test will be elements of evaluation and verification of the acquired skills.

#### **Communication skills**

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

- Use appropriate scientific terminology in the field of anatomic pathology
- Expose the arguments in an organized and consistent manner
- Use of appropriate scientific language consistent with the subject matter of the discussion

#### **Self-judgment**

- At the end of the course, the student must know:
- make general assessments of the specific topics of the course
- in the scientific literature, identify articles concerning technical applications of anatomic pathology
- Identify the fundamental role of correct theoretical knowledge of the Anatomic Pathology in clinical practice

**These expected outcomes will be measurable with the final exam.**

#### **PROGRAM**

##### **HISTOLOGICAL AND CYTOLOGICAL BASIC TECHNIQUES:**

- Main techniques for fixing and preparation of histological samples
- Main techniques for fixing and preparation of biological fluids

- Paraffin embedding techniques of histological samples
- Paraffin embedding and cutting techniques
- Extemporaneous examination
- Technical artifacts
- Operating principles of the instrumentation dedicated to the preparation of histological and cytological samples
- Safety in Anatomic Pathology laboratory

**HISTOLOGICAL AND CYTOLOGICAL ANCILLARY TECHNIQUES :**

- Histochemical staining techniques
- Immunohistochemistry
- immunofluorescence
- Electron microscopy techniques

**CELLULAR RESPONSE TO INJURY:**

- Cellular response to ischemia (definition of ischemia and hypoxia, types of hypoxia; hypoxic, anaemic, stagnant, histotoxic)
- Warm and cold ischemia
- Time of ischemia and cellular susceptibility
- Ischemic cell damage, hydropic degeneration, vacuolar degeneration, turbid swelling
- Reversible and irreversible subcellular modifications associated with hydropic swelling
- Microscopic aspects of cell death, Concept of oncosis, Coagulative necrosis, colliquative necrosis and apoptosis

**PRINCIPLES OF OPTICS:**

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

**MICROSCOPY:**

- Principles of optical microscopy
- Light field microscope
- Dark field microscopy
- Fluorescence Microscope
- Applications of digital pathology

**ELECTRON MICROSCOPY:**

- Principles of electron microscopy
- Ultrastructural analysis

**MOLECULAR DIAGNOSTICS IN ANATOMIC PATHOLOGY**

- FISH and SISH.

### **COURSE STRUCTURE**

Teaching is structured in 50 hours of frontal teaching, divided into lessons of 2 or 3 hours according to the academic calendar. The frontal didactics 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.

Interactive lessons with test (50 hours)  
discussion on selected topics  
Self-inspection

SUBJECT: FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY (40 ore)  
SUBJECT: Technical Sciences of Laboratory Medicine in Biomedical – HISTO-CYTOPATHOLOGY (10 ore)

### **COURSE GRADE DETERMINATION**

Exam of FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY  
FONDAMENTI DI ISTOPATOLOGIA E ISTOPATOLOGIA SPECIALE

To verify the preparation of the students both written and oral exams will be performed. The written test will consist of 30 questions with multiple-choice answers. To be eligible for the oral examination, the student must have obtained at least 16 points at the written test. During the oral test, the Examination Committee will assess the student's ability to apply knowledge and will ensure that the skills are adequate to know and correctly apply histocytological techniques. The following ability will also be assessed: making judgements, communication skills and learning skills as indicated in the Dublin descriptors.

Exam of Technical Sciences of Laboratory Medicine in Biomedical – HISTO-CYTOPATHOLOGY

To verify the preparation of the students both written and oral exams will be performed. The written test will consist of 10 questions with multiple-choice answers. To be eligible for the oral examination, the student must have obtained at least 6 points at the written test. During the oral test, the Examination Committee will assess the student's ability to apply knowledge and will ensure that the skills are adequate to know and correctly apply histo-cytological techniques. The final grade is derived from the weighted average of the various modules, and the examination may be passed with a mark of 18/30.

The examination will be graded overall according to the following criteria:

Unsuitable: major deficiencies and/or inaccuracies in knowledge and understanding of topics; limited analytical and synthesis skills, frequent generalizations

18-20: barely sufficient knowledge and understanding of topics, with possible imperfections; sufficient skills of analysis, synthesis and independent judgment.

21-23: routinized knowledge and understanding of topics; correct analysis and synthesis skills with coherent logical argumentation.



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24-26: fair knowledge and understanding of topics; good analytical and synthesis skills with rigorously expressed arguments.

27-29: complete knowledge and understanding of topics; remarkable skills of analysis, synthesis. Good autonomy of judgment.

30-30L: excellent level of knowledge and understanding of topics. Remarkable analytical and synthesis skills and autonomy of judgment. Arguments expressed in an original way

### **OPTIONAL ACTIVITIES**

In addition to the teaching activities, the student will have the opportunity to participate in practical technical training related to the teaching topics. These activities will not be evaluated during the final examination.

### **READING MATERIALS**

Scientific articles and handouts from the teacher

Free book Practical Histopathology 1st Edition Shafie Abulkadir Hassan

Title : Laboratory methods in histotechnology

Authors Edna B. Prophet, Armed Forces Institute of Pathology (U.S.)

Eds Editore American Registry of Pathology, 1992

Title : Advanced Laboratory Methods in Histology and Pathology

Author Ulrika V. Mikel

Eds Armed Forces Institute of Pathology, American Registry of Pathology, 1994