UNICAMILLUS

Degree Biomedical Laboratory Techniques
Subject: Anatomy Pathology 2
SSD : MED/08, MED/46
CFU NUMBERS : 5
MED/08 CFU 4 ; MED/46 CFU 1
Teacher: Prof. Maurizio Martini
Email: maurizio.martini@unicamillus.org

MODULO: FONDAMENTI DI ISTOPATOLOGIA E ISTOPATOLOGIA SPECIALE
SSD : MED/08
Numero di CFU : 4
Nome docente : **Prof.** Maurizio Martini EMAIL: maurizio.martini@unicamillus.org

MODULO TECNICHE DI PATOLOGIA MOLECOLARE
CFU: 1
SSD: MED/46
DOCENTE: Prof.ssa Martina D'Angelo EMAIL: martina.dangelo@unicamillus.org

MODULO : FONDAMENTI DI ISTOPATOLOGIA E ISTOPATOLOGIA SPECIALE
SSD : MED/08
Numero di CFU : 4
Nome docente : Prof. Maurizio Martini EMAIL: maurizio.martini@unicamillus.org

PREREQUISITES
Although there is no preparatory training, knowledge of the basic elements of the course is required
chemistry, biology, anatomy, histology, general pathology.

LEARNING OBJECTIVES
The acquisition of basic knowledge about the main safety regulations of the histopathology laboratory, the knowledge of histological techniques from fixation/preservation of the sample to embedding in paraffin and cytological techniques from fixation/preservation of the sample to preparation are essential objectives; the basic techniques relating to autopsy findings; basic histochemical and immunohistochemical techniques; the problems relating to the preparation of histological and cytological samples and ancillary techniques (histochemical and immunohistochemical), principles of optics, optical and electronic microscopy. These objectives will be achieved through lectures and interactive didactic activities as well as laboratory activities, intended to facilitate learning and improve the ability to resolve problems relating to the execution of histocytopathological preparation techniques and in-depth diagnostic and prognostic-therapeutic and molecular pathology.

EXPECTED 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 teaching the student should know:
• Know the main methods of histological and cytological fixation
• Know the main methods of preparing histological samples in paraffin, including histological macroreduction
• Know the main methods for preparing cytological samples
• Know the main methods of preparing fresh specimens
• Know the basic and classification techniques in autopsy findings in pathological anatomy
• Know the main histochemical stains of tissues
• Know the principles of immunohistochemical techniques
• Learn and recognize the main artefacts related to sample preparation
histological, cytological and ancillary techniques (histochemical and immunohistochemical 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 relating to the techniques used
• Know and explain the principles of cellular 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 how electron microscopes work
• Know and explain the techniques for preparing histological preparations for molecular pathology analyses

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 independent study of aspects relating to the field of anatomical pathological diagnostics, including autopsy, to which the student will dedicate himself as part of his professional activity. For this purpose, exercises and "case studies" will be proposed which the student will be asked to solve/discuss individually and through group collaboration. The documents produced by the student, the ongoing proficiency tests and the final proficiency 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 pathology laboratory
• Present the topics orally in an organized and coherent way
• Use of appropriate scientific language consistent with the topic of discussion.

Autonomy of judgement
At the end of the course the student must know:
• carry out general assessments relating to the topics covered
• distinguish the applications of Pathological Anatomy in scientific literature articles

• Recognize the importance of in-depth knowledge of the topics consistent with adequate medical education
• Identify the fundamental role of correct theoretical knowledge of the subject in clinical practice

PROGRAM/COURSE SYLLABUS

BASIC HISTOLOGICAL AND CYTOLOGICAL TECHNIQUES:
o Main techniques for fixation and preparation of histological samples
o Main techniques of fixation and preparation of biological liquids
o Paraffin embedding techniques for histological samples
o Paraffin embedding and cutting techniques
o Techniques for preparing fresh samples
o Artifacts from technical setup
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 Notes on electron microscopy techniques
AUTOPTICAL HISTOLOGICAL AND CYTOLOGICAL TECHNIQUES:
o Main techniques in performing diagnostic testing
o Main organ removal and sampling techniques in autopsy diagnostic findings
CELLULAR RESPONSE TO DAMAGE:
o Cellular response to ischemia (definition of ischemia and hypoxia, types of hypoxia; hypooxic, anemic, stagnant, ischemic, histotoxic)
o Warm ischemia and cold ischemia
o Ischemia times and cellular susceptibility
o Ischemic cell damage, hydropic 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
o Converging and diverging lenses
o Chromatic Aberrations
o Image formation
MICROSCOPY:
o Principles of optical microscopy
o Bright field microscope
o Dark field microscopy
o Fluorescence Microscope
ELECTRON MICROSCOPY:
o Principles of electron microscopy
o Ultrastructural microscopy applications

TEACHING MODE/COURSE STRUCTURE
The teaching is structured in 40 hours of frontal and laboratory teaching, divided into 2 or 3 hour lessons based on the academic calendar. The frontal teaching includes 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 correct understanding by the students. The laboratory part will be carried out in a Pathological Anatomy and Molecular Pathology laboratory, so that students can practically follow the main laboratory activities related to Pathological Anatomy
Self-check

MODULO : FONDAMENTI DI ISTOPATOLOGIA E ISTOPATOLOGIA SPECIALE (40 ore)

MODULO TECNICHE DI PATOLOGIA MOLECOLARE
CFU: 1
SSD: MED/46
DOCENTE: Prof.ssa D'ANGELO MARTINA
EMAIL: martina.dangelo@unicamillus.org

PREREQUISITES
Although there is no preparatory qualification, knowledge of basic elements of pathological anatomy, histo-cytopathology techniques, molecular biology and notions of medical genetics are required

LEARNING OBJECTIVES
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. are essential objectives. as a tool for diagnosis, prognosis and in relation to associated therapies. These objectives will be achieved through lectures and interactive teaching activities, intended to facilitate learning and improve the ability to resolve problems relating to the execution of molecular pathology techniques.

EXPECTED 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
o Know and explain the techniques for preparing preparations for molecular pathology analyses
o Know and explain the applications of molecular pathology techniques in pathological practice
o Ability to correctly carry out 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:
o Use the knowledge acquired for the independent study of aspects relating to the field of Biomedical Laboratory Techniques to which he will dedicate himself as part of his professional activity
The acquisition of the desired knowledge and understanding is checked, at the end of the course, by means of an appropriately organized final exam.

Communication skills
At the end of the course the student must know:
o Use specific scientific terminology appropriately.
o Present the topics orally in an organized and coherent way.
o Use appropriate scientific language that is consistent with the topic of discussion.

Making judgments
At the end of the course the student must know:
o Carry out general assessments relating to the topics covered in the MOLECULAR PATHOLOGY TECHNIQUES module
o Distinguish the applications of Pathological Anatomy in scientific literature articles

MOLECULAR PATHOLOGY TECHNIQUES PROGRAM
o Main nucleic acid extraction methods: 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

TEACHING MODE/COURSE STRUCTURE
The MOLECULAR PATHOLOGY TECHNIQUES module consists of 1 CFU, structured in 10 hours of frontal teaching and exercises.
Teaching will be carried out through lectures, exercises and practical activities.
The frontal teaching will be carried out with theoretical lessons with the possible projection of videos on the topics covered, with lessons divided into 2 or 3 hours based on the academic calendar. At the beginning of each lesson there will be a summary of the previous lesson in order to verify correct understanding by the students. At the end of the theory relating to each topic, theoretical-practical examples will follow which will illustrate its application in practice.

COURSE GRADE DETERMINATION
Evaluation test of FUNDAMENTALS OF HISTOPATHOLOGY AND SPECIAL HISTOPATHOLOGY
The students' preparation will be verified with an oral test. During the oral test the examining commission will evaluate the student's ability to apply the knowledge and will ensure that the skills are adequate to know and correctly apply the histocytological techniques. The following will also be assessed: making judgements, ability
communication skills and learning skills second
as indicated in the Dublin descriptors.
The final evaluation derives from the weighted average of the various modules and the exam can be passed with a score of 18/30.

The exam will be overall evaluated according to the following criteria:
Not suitable: significant deficiencies and/or inaccuracies in knowledge and understanding of the topics; limited analysis and synthesis skills, frequent generalizations
18-20: just sufficient knowledge and understanding of the topics, with possible imperfections; sufficient analytical, synthesis and independent judgment skills.
21-23: knowledge and understanding of routine topics; correct analysis and synthesis skills with coherent logical argumentation.

24-26: reasonable knowledge and understanding of the topics; good analytical and synthesis skills with rigorously expressed arguments.
27-29: complete knowledge and understanding of the topics; remarkable analytical and synthesis skills. Good independent judgement.
30-30L: excellent level of knowledge and understanding of the topics. Remarkable analytical and synthesis skills and independent judgement. Arguments expressed in an original way

SUPPORT ACTIVITIES/OPTIONAL ACTIVITIES

In addition to the teaching activity, the student will be given the opportunity to participate in practical technical activities, under tutoring, relating to the teaching topics covered. These activities do not constitute exam subjects. The acquisition of the assigned hours occurs only with a mandatory attendance of 100%. Practical integrative teaching activities, with laboratory exercises, will be communicated and planned during the course.

AVAILABILITY

Student reception takes place by appointment by writing to the following email: martina.dangelo@unicamillus.org, Prof. Martina D'Angelo

RECOMMENDED TEXTS AND BIBLIOGRAPHY/READING MATERIALS

Title: Pathological Anatomy The basics
Author Aldo Scarpa, Luigi Ruco
Publisher Edra 2007
The student will be provided with educational material, such as handouts, presentations and scientific articles.