Degree in Biomedical Laboratory Techniques

COURSE : ANATOMIC PATHOLOGY II
SSD : MED 08, MED 46
CFU : 5
COORDINATOR : Prof. Giuseppe Fattore Santeusanio
EMAIL: giuseppe.santeusanio@unicamillus.org

SUBJECT: **FUNDAMENTALS OF CYTOPATHOLOGY**
SSD : MED 08
CFU : **1**
PROFESSOR : **ELENA BONANNO** EMAIL : elena.bonanno@unicamillus.org

SUBJECT : **FUNDAMENTALS OF HISTOPATHOLOGY**
SSD : MED 08
CFU : **1**
PROFESSOR : **LUCIA ANEMONA** EMAIL : lucia.anemona@unicamillus.org

SUBJECT : **PRINCIPLES OF AUTOPSY TECHNIQUE**
SSD : MED 08
CFU : **1**
PROFESSOR : **ALESSANDRO MAURIELLO** EMAIL : alessandro.mauriello@unicamillus.org

SUBJECT: **AUTOPSY AND CLINICAL DIAGNOSIS – ELEMENTS OF DIGITAL PATHOLOGY**
SSD : MED 08
CFU : **1**
PROFESSOR: **GIUSEPPE FATTORE SANTEUSANIO** EMAIL : giuseppe.santeusanio@unicamillus.org

SUBJECT : **MOLECULAR PATHOLOGY TECHNIQUES**
SSD : MED 46
CFU : **1**
PROFESSOR: **MARTINA D'ANGELO** EMAIL : martina.dangelo@unicamillus.org

FREQUENCY:
MANDATORY WITH AT LEAST 75% OF ATTENDANCE EVALUATED FOR THE WHOLE INTEGRATED COURSE

PREREQUISITES
Knowledge of basic elements of biology, anatomy, histology, general pathology and Histo-Cytopathology Techniques

LEARNING OBJECTIVES
The Anatomic pathology II course aims to provide the main notions of Cytopathology, Histopathology, Autopsy Technique, Autopsy And Clinical Diagnosis, Digital Pathology and Molecular Pathology Techniques, as well as the basis of laboratory techniques, research and diagnostics in Anatomic Pathology. Mandatory objectives are the knowledge of the basic principles, organization, methodologies and technical laboratory and cognitive-diagnostic activities carried out in the clinical service of Anatomic Pathology.

The student must learn the basic principles of Cytopathology, Histopathology, Autopsy Technique, Autopsy and Clinical Diagnosis, Digital Pathology and Molecular Pathology Techniques. They must also acquire knowledge and skills in the main technologies (immunohistochemistry, molecular biology, digitization of histological and cytological preparations) to carry out research and diagnostic activities in Anatomic Pathology.
These objectives will be achieved through lectures designed to facilitate learning and improve the ability to solve the main questions of Cytopathology, Histopathology, Autopsy Technique, Autopsy and Clinical Diagnosis, Digital Pathology and Molecular Pathology Techniques and laboratory protocols used in research and in the diagnostic.

EXPECTED RESULTS:
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:

FUNDAMENTALS OF CYTOPATHOLOGY

- Know and explain the different types of cytological examination.
- Know and explain the methods of sampling of cytological material.
- Know and explain the techniques of preparation of cytological samples
- Assess the adequacy of the preparation of cytological samples by microscopic investigation
- Know and explain the "adequacy criteria" for the preparation of the cytological sample.
- Know and explain the concepts of "normal" cellularity; "inflammatory", "neoplastic cell", "dysplastic cell"; "atypical cell".
- Know and explain the main morphological features as well as "Classifications" of "cervicovaginal cytology"; "urinary cytology"; "pulmonary cytology"; "thyroid cytology"; "mammary cytology".
- Know and explain Bethesda's classification and other main classifications.
- Know and explain the application of ancillary techniques to cytopathological diagnostics.
- Know and explain the applications of cytopathological diagnostics in the various care diagnostic processes.
- Know and explain the quality controls.

FUNDAMENTALS OF HISTOPATHOLOGY

- Know and explain the neoplasm classifications
- Know and explain the different immunohistochemical techniques.
- Know and explain the application of immunohistochemical techniques in histopathological diagnostics such as tissue typing and the study of prognostic and predictive biomarkers.
- To know and explain the basic histopathological aspects of the pathology of the hemolymphopoietic apparatus.
- Know and explain the basic histopathological aspects of lung pathology.
- Know and explain the basic histopathological aspects of breast pathology.

- Know and explain the basic histopathological aspects of thyroid pathology.
- Know and explain the basic histopathological aspects of gastrointestinal pathology (esophagus, stomach, bowel, liver).
- Know and explain the basic histopathological aspects of the pathology of the urinary tract (kidney, bladder) and both male (prostate, testicles) and female genital (cervix, uterus and ovary).

PRINCIPLES OF AUTOPSY TECHNIQUE

- Use the appropriate scientific terminology
- Understand the theoretical basis of autopsy techniques
- Expose the themes in an organized and consistent manner.
- Use of appropriate scientific language consistent with the topic of the course

AUTOPSY AND CLINICAL DIAGNOSIS – ELEMENTS OF DIGITAL PATHOLOGY

- Know the definition of autopsy
- Know the purpose of the autopsy
- Know the structural requirements of the autopsy room
- Know the workstation for autoptic examination (autopsy table)
- Know the main safety measures to be taken during autopsy examination
- Know the main biosafety standards for the autopsy room
- Knowing the post-mortem phenomena
- Know the characteristics of the "digital slide";
- Know the main technologies for the "digitization" of histological / cytological samples;
- Know the general principles of "Virtual Microscopy";
- Know the role of digital pathology in the diagnostic/assistance process of the Anatomic Pathology service.
- Know the role of "Telepathology";
- Know the privacy policies in the management of data / digital slides

MOLECULAR PATHOLOGY TECHNIQUES

- Know and explain the preparation techniques for molecular pathology analysis
- Knowing and explaining the applications of molecular pathology techniques in anatomical-pathological practice
- Ability to perform analytical procedures and minimize the pre-analytic and analytic errors

ABILITY TO APPLY KNOWLEDGE AND UNDERSTANDING:

At the end of this 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.
- Acquire knowledge, through the support of texts and/or scientific literature, of topics concerning the issues of new technologies applied to Cytopathology, Histopathology, Autopsy Technique, Autopsy and Clinical Diagnosis, Digital and Molecular Pathology Techniques.
- Cooperate with other health care professionals in clinical-diagnostic activities and research projects.

The acquisition of this knowledge will be stimulated and controlled, during the course by *in itinere* profit tests and verified at the end of the course by a final exam.

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

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

- make general assessments of the specific topics of the course
- Make general assessments related to the topics covered in the following modules: Cytopathology, Histopathology, Autopsy Technique, Autopsy and Clinical Diagnosis, Digital and Molecular Pathology Techniques.
- In the scientific literature, identify articles concerning technical applications of anatomic pathology

These expected outcomes will be measurable with the final exam.

PROGRAM

FUNDAMENTALS OF CYTOPATHOLOGY
Purpose of cytological examination
Indications, advantages and limitations of cytological examination
Types of cytological examination: exfoliative and needle aspiration cytology
Preparation of cytological samples: smear, thin layer, cell-block, cytocentrifugation
Fixation and histochemical staining of cytological samples.
Application of special techniques in cytological diagnostics as immunocytochemistry, cytofluorimetry and FISH
Evaluation of cytological samples: criteria of adequacy of sampling and preparation
Evaluation of morphological characteristics of cells: normal, hyperplastic, atypical, neoplastic cells.
Criteria of malignancy.
Bethesda system and other main classifications
Quality control.
Artifacts; false negatives; false positives
Diagnostic cytopathology of the female genital apparatus: PAP test and breast cytology.
Diagnostic thyroid cytopathology
Diagnostic lung cytopathology
Diagnostic of urinary tract cytopathology
Diagnostic cytopathology of effusions

FUNDAMENTALS OF HISTOPATHOLOGY
Histopathological neoplasms classification
Immunohistochemical techniques.
Application of immunohistochemical techniques in histopathological diagnostics as an indispensable tool for the typing of neoplasms, the study of prognostic and predictive biomarkers.
Basic histopathological aspects of the pathology of the hemolymphoproietic apparatus.

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Basic histopathological aspects of lung pathology.
Basic histopathological aspects of breast pathology.
Basic histopathological aspects of thyroid pathology.
Basic histopathological aspects of gastrointestinal pathology (esophagus, stomach, intestine, liver).
Basic histopathological aspects of urinary tract pathology (kidney, bladder).
Basic histopathological aspects of male genital pathology (prostate, testicles)
Basic histopathological aspects of the pathology of the female genital apparatus (cervix, uterus and ovary).

PRINCIPLES OF AUTOPSY TECHNIQUE
External examination of the corpse
Main docimasic tests
Autopsy technique for the opening of the chest cavity and the evisceration of the heart and lungs.
Autopsy technique for the opening of the abdominal cavity and the evisceration of the liver, stomach, large and small intestine and spleen.
Autopsy technique for the evisceration of extra-peritoneal organs: aorta, kidneys, bladder, prostate, uterus and ovary.
Autopsy technique for the opening of the cranial box and the evisceration of the encephalon.
Basic knowledge about macroscopic alterations of some autoptic organs , in particular of the heart, lung, liver, spleen, kidney, bladder, uterus, ovary and brain.

AUTOPSY AND CLINICAL DIAGNOSIS
Definition of autopsy
History and purpose of the autopsy
Autopsy as an instrument for clinical control
Autopsy as a risk management tool
Autopsy as a tool for improving the quality of clinical-assistance pathways
The autopsy rooms
Safety Measures to be taken during autopsy procedures
General standards of biosafety in the autopsy room
The autopsy report as data storage and research support
Post-mortem phenomena

ELEMENTS OF DIGITAL PATHOLOGY
Digital slides
Technologies for digitalization of histological slides
Virtual Microscopy
Role of Digital Pathology in clinical-diagnostic, training and research activities
Digital Pathology in Consultancy and Second Opinion (Telepathology)
Digital technology and machine learning systems in Anatomic Pathology
Privacy and data management

MOLECULAR PATHOLOGY TECHNIQUES
Main methods of nucleic acid extraction: from the pre-analytical phase to the evaluation
Techniques and Applications of PCR in Molecular Pathology
Techniques and Applications of F.I.S.H. in Molecular Pathology

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COURSE STRUCTURE

Integrated course of ANATOMIC PATHOLOGY II consists of 5 modules, 5 CFU (1 CFU for each module) for a total of 50 hours structured in frontal teaching and exercises. Attendance is mandatory. Each module is structured in 10 hours of frontal teaching, exercises and practical activities. 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.
At the end of the theoretical lessons theoretical-practical examples will be provide to the students in order to illustrate clinical activities in ANATAMIC PATOLOGY.

COURSE GRADE DETERMINATION
Students' preparation will be verified by oral interview. During the oral test, the Examining Committee will evaluate:
autonomy of judgement (making judgements), communication skills and learning skills of the student according to the Dublin descriptors.
"knowledge and understanding skills" will have a weight of 40%, "applied knowledge and understanding skills" of 40% and "autonomy of judgment" of 20%.
The examination grade, expressed in thirtieths, will be established according to the following criteria:
Rejected: important lacks and/or inaccuracy in the knowledge and understanding of the topics; limited ability to analyze and synthesize the themes, frequent generalizations.
18-20: Just sufficient knowledge and understanding of the topics.
21-23: Discreet knowledge and understanding of the topics.
24-26: Good knowledge and understanding of the topics.
27-29: Complete knowledge and understanding of the topics.
30-30L: Very good level of knowledge and understanding of the topics.

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
Recommended textbooks:

Subject: FUNDAMENTALS OF CYTOPATHOLOGY
- Comprehensive Cytopathology
  7th Edition, Marluce Bibbo, David C. Wilbur, 2015, Elsevier

Subject : FUNDAMENTALS OF HISTOPATHOLOGY
- Robbins & Cotran Pathologic: Basis of Disease
  Vinay Kumar, Abul K. Abbas, Jon C. Aster, 10th Ed (2020), Elsevier
- Rubin's Pathology: Clinicopathologic Foundations of Medicine
  7th Ed., Editor David S. Strayer and Emanuel Rubin, 2015 Wolters Kluwer Health

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Subject : PRINCIPLES OF AUTOPSY TECHNIQUE

- AUTOPSY IN THE 21ST CENTURY: BEST PRACTICES AND FUTURE DIRECTIONS
  Jody E. Hooper and Alex K. Williamson Editors, 2019, Springer Nature Switzerland
- THE HOSPITAL AUTOPSY: A MANUAL OF FUNDAMENTAL AUTOPSY PRACTICE
  Third Edition, Julian L. Burton and Sheffield Guy Rutty, 2010 Hodder Arnold

Subject : AUTOPSY AND CLINICAL DIAGNOSIS - ELEMENTS OF DIGITAL PATHOLOGY

- AUTOPSY IN THE 21ST CENTURY: BEST PRACTICES AND FUTURE DIRECTIONS
  Jody E. Hooper and Alex K. Williamson Editors, 2019, Springer Nature Switzerland
- DIGITAL PATHOLOGY
  Yves Sucaet, Wim Waelput, 2014, Springer Briefs in Computer Science

Subject: MOLECULAR PATHOLOGY TECHNIQUES

- Teaching materials such as handouts, presentations and scientific articles will be provided to the students

STUDENT RECEPTION

The teacher will reply to all booking requests that will arrive via e-mail. Receive by appointment.

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