



## ***Syllabus Master's Degree Course in Medicine and Surgery***

### **DISEASE ONSET 1**

Second year, first semester (12 academic credits [CFU])

#### **Teachers**

Subject	Academic credits (CFU)	Lecturer
General pathology and immunology	6	FAGONE Paolo Fabrizio
Microbiology	3	STEFANI Stefania
Principles of anatomopathology	3	SALVATORELLI Lucia

#### **Learning outcomes**

Subject	Learning outcomes
General pathology and immunology	<p>By the end of the course, students will learn how cells respond and adapt to various conditions, including stress and injury, and the different types of cell death. Students will also learn about the main features of cancer cells, such as sustained growth, evasion of growth controls, and resistance to cell death.</p> <p>Students will gain knowledge of the basic function of the immune system, the differences between innate and adaptive immune responses, and the roles of key immune cells.</p>
Microbiology	<p>The course aims to provide the student with the cognitive and methodological tools necessary to understand:</p> <ol style="list-style-type: none"><li>1) The mechanisms of infection in the host of microorganisms and parasites.</li><li>2) The essential biological characteristics of the microorganisms responsible for human infections.</li><li>3) The etiopathogenetic mechanisms.</li><li>4) Microorganisms responsible for human infections</li><li>5) Diagnostic assessment (outline) and in vitro sensitivity test</li></ol> <p>In particular, with reference to the objectives of learning, the essential biological characteristics of microorganisms and parasites responsible for human infections, the student must be able to:</p> <ol style="list-style-type: none"><li>i) Identify the different types of relationship that microorganisms can determine with the host, differentiating colonization from disease;</li><li>ii) Correlate the mechanisms of aggression of microorganisms and parasites with the various "types" of infection and induced pathological lesions;</li></ol>

	<p>iii) Analyzing the critical factors that determine the contagion and spread of microorganisms and parasites, correlating them with the relative peculiar biological characteristics;</p> <p>iv) Define the vaccines used in infectious diseases (vaccine prophylaxis / vaccinotherapy); Define immune sera (seroprophylaxis and serotherapy) correlating it with the prevention of human infections and with the treatment of an infectious disease; traditional vaccines and recombinant vaccines, listing those currently in use.</p> <p>By the end of the course, students will have gained knowledge of the basic host pathogen interactions.</p>
Principles of anatomopathology	<p>By the end of the course, students will learn:</p> <ul style="list-style-type: none"> <li>• management of histo-cytopathological samples and the correct methods of conservation techniques.</li> <li>• basic knowledge of human pathology, with particular reference to cellular, morphological, immunophenotypic and molecular alterations of inflammatory, immune and neoplastic diseases.</li> </ul>

## Prerequisites

Subject	Prerequisites
General pathology and immunology	Basic notions of Biology, Genetics, Biochemistry and Molecular Biology.
Microbiology	
Principles of anatomopathology	

## Course contents

Subject	Course contents
General pathology and immunology	<p>General pathology</p> <ul style="list-style-type: none"> <li>• Cellular Adaptations. Hypertrophy, Hyperplasia, Atrophy, Metaplasia.</li> <li>• Cell Injury and Death. Necrosis, Apoptosis, Pyroptosis, Other types of cell death.</li> <li>• Natural History of The Tumor. Initiation; Promotion and Progression.</li> <li>• Sustained Proliferative Signaling and Evasion to Growth Suppressors in Cancer</li> <li>• Cancer cell Immortalization. Resistance to Cell Death.</li> <li>• Tumor Angiogenesis.</li> <li>• Molecular mechanisms of cancer-associated cachexia</li> <li>• Main concepts on pre-clinical and clinical studies</li> </ul> <p>Immunology</p> <ul style="list-style-type: none"> <li>• General Characteristics of Immune Responses. The Concepts of Antigen and Antibody.</li> <li>• The Primary and Secondary Response to an Antigen.</li> <li>• Cells Involved in Innate and Adaptive Immune Responses. Antigen-Presenting Cells (APC). Macrophages. Natural Killer Cells. T And B Lymphocytes.</li> </ul>

	<ul style="list-style-type: none"> <li>• The Complement System</li> <li>• The Major Histocompatibility Complex. Class I And II MHC.</li> <li>• Cytokines and Cytokine Receptors.</li> <li>• T Lymphocyte Receptor (TCR) And B Lymphocyte Receptor (BCR).</li> <li>• Activation and Polarization of T Lymphocytes.</li> <li>• Immunological Memory</li> </ul>
Microbiology	<p>1. Bacteria, virus and fungi of medical interest: Morphological characteristics, structure and function of the main structural components; biofilms, notions of biochemistry, physiology and microbial genetics; organization of viral particles</p> <p>2. Pathogenesis of bacterial, viral and fungi infections: the infectious process, from adhesion to the expression of virulence, eradication, pathogenic mechanisms, toxins</p> <p>3. Host-parasite relationship: extra and intracellular pathogens, host responses</p> <p>4. Infection control: a) Sterilization, disinfection, anti-sepsis; b) antimicrobials, hints of action and resistance mechanisms; antibiogram and efficacy measures.</p> <p>5. Immune prophylaxis: immune sera and vaccines; vaccines obtained with traditional and recombinant methods.</p>
Principles of anatomopathology	<ul style="list-style-type: none"> <li>• Introduction to anatomopathology</li> <li>• Method of fixation of biological material using formalin.</li> <li>• Phases of preparation of a histological slide: sampling, processing, paraffin embedding, cutting, staining.</li> <li>• Intraoperative/extemporaneous examination: methods of execution, indications, examples of applicability.</li> <li>• Incisional and excisional biopsy; endoscopic biopsy.</li> <li>• Diagnostic cytology: exfoliative, needle aspiration, by apposition: applications.</li> <li>• Immunohistochemistry.</li> <li>• Molecular biology to predict prognosis and treatment</li> <li>• Necrosis and apoptosis</li> <li>• Inflammation</li> </ul>

## Assessment methods

Subject	Assessment methods
General pathology and immunology	<p>The final assessment of acquired knowledge is conducted by an oral examination. The grade is expressed on a scale of thirty, up to a maximum of 30/30 cum laude (with honors). The final grade is determined by the weighted average of the scores obtained in the course subjects.</p> <p>The oral examination consists of an interview during which questions will cover at least three different topics from the course curriculum. The assessments aim to evaluate: i) the level of knowledge in the disciplines; ii) the ability to apply this knowledge to solve specific problems related to the disciplines (autonomous problem-solving); iii) clarity of expression; iv) proficiency in medical-scientific language. The assessment of learning can also be conducted remotely if the conditions necessitate it.</p> <p>For the assignment of the final grade, the following parameters will be considered:</p>
Microbiology	
Principles of anatomopathology	

	<ul style="list-style-type: none"> <li>• Score 29-30 with honors: The student demonstrates an in-depth knowledge of the topics, promptly and correctly integrates and critically analyzes presented situations, independently solving even highly complex problems. They possess excellent communication skills and command medical-scientific language proficiently.</li> <li>• Score 26-28: The student has a good understanding of the topics, can integrate and critically and logically analyze presented situations, can fairly independently solve complex problems, and presents topics clearly using appropriate medical-scientific language.</li> <li>• Score 22-25: The student has a fair understanding of the topics, although it may be limited to the main areas. They can integrate and critically analyze presented situations, although not always in a linear fashion, and present topics clearly with moderate language proficiency.</li> <li>• Score 18-21: The student has minimal knowledge of the topics, possesses modest ability to integrate and critically analyze presented situations, and presents topics sufficiently clearly, although their language proficiency may be underdeveloped.</li> <li>• Exam not passed: The student lacks the minimum required knowledge of the core content of the course. Their ability to use specific language is minimal or nonexistent, and they are unable to independently apply acquired knowledge.</li> </ul>
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## Examples of common questions and/or exercises

Subject	Examples of common questions and/or exercises
General pathology and immunology	<ul style="list-style-type: none"> <li>• Differences between necrosis, apoptosis, and pyroptosis.</li> <li>• Explain the signaling pathway of the main cytokines</li> <li>• Discuss the molecular mechanisms behind the sustained proliferative signaling of cancer</li> <li>• Description of statistical approaches for the analyses of pre-clinical and clinical data</li> </ul>
Microbiology	<p>The Microbiology test is aimed at assessing the level of knowledge regarding the provisions of the specific training objectives, the ability to know how to apply the basic knowledge acquired to the clinic (microbiological implications) and for the resolution of specific problems concerning the relationships between the pathogen and the host</p> <p>The test takes place through an oral exam.</p> <p>The oral exam consists of an interview in which 2-3 questions will be asked which concern at least n. 3 different topics of the program (bacteriology, virology and mycology). The test allows to verify: i) the level of knowledge about the main human pathogenic microorganisms; ii) the ability to apply this knowledge to define virulence and pathogenic power in human infections, as well as the main methods of controlling the infection itself; iii) clarity of presentation; iv) the property of medical-scientific language.</p>
Principles of anatomopathology	<ul style="list-style-type: none"> <li>• Explain the differences between necrosis and apoptosis</li> <li>• Types of histological and cytological examination.</li> <li>• Immunohistochemical profile of mesenchymal neoplasm</li> <li>• Describe the applications of excisional biopsy</li> </ul>

## Reference texts

Subject	Textbooks
General pathology and immunology	<p>General Pathology</p> <ul style="list-style-type: none"> <li>Robbins and Cotran, Pathologic Basis of Disease, 10<sup>th</sup> edition, Elsevier (2020)</li> <li>Weinberg, The Biology of Cancer, 2<sup>nd</sup> edition, Garland Science, (2014)</li> </ul> <p>Immunology</p> <ul style="list-style-type: none"> <li>Janeway, Immunobiology, 10<sup>th</sup> edition, Norton &amp; Company (2022)</li> </ul> <p>Additional educational material (slides, videos, handouts, etc.) will be distributed or indicated during the lessons.</p>
Microbiology	<p>The most recent edition of one of these texts chosen by the student:</p> <p>TEXT 1: Medical Microbiology - Murray - EDRA Edition</p> <p>TEXT 2: Medical Microbiology - Sherris - EMSI Edition</p> <p>TEXT 3: Principles of medical microbiology - Antonelli G., Clementi M., Pozzi G., Rossolini G.M. - Ambrosiana Publishing House</p> <p><a href="https://onlinelibrary.wiley.com/doi/book/10.1002/9780470688618">https://onlinelibrary.wiley.com/doi/book/10.1002/9780470688618</a></p> <p>Any additional educational material (slides, videos, handouts, etc.) will be distributed or indicated during the lessons.</p>
Principles of anatomopathology	<ul style="list-style-type: none"> <li>Pranab Dey, Basic and Advanced Laboratory Techniques in Histopathology and Cytology, Latest edition, Springer (2022)</li> <li>Robbins and Kumar, Basic Pathology, 11th edition, Elsevier (2022) Any additional educational material (slides, videos, handouts, etc.) will be distributed or indicated during the lessons.</li> </ul> <p>Any additional educational material (slides, videos, handouts, etc.) will be distributed or indicated during the lessons.</p>

## Course format

Subject	Course format
General pathology and immunology	The teaching will primarily be conducted through in-person lectures with a blend of theory and practical exercises. In the event that teaching is delivered in a blended or remote mode, necessary adjustments may be introduced compared to what has been previously stated, in order to adhere to the planned program as outlined in the Syllabus.
Microbiology	
Principles of anatomopathology	

## Attendance

Subject	Attendance
General pathology and immunology	Mandatory attendance.
Microbiology	
Principles of anatomopathology	

## Course schedule

Subject	Course schedule
General pathology and immunology	<ul style="list-style-type: none"> <li>• Cell injury, adaptations and death (Robbins chapter 1)</li> <li>• Natural history of cancer (Weinberg chapter 11)</li> <li>• Sustained proliferative Signaling (Weinberg chapters 4-6)</li> <li>• Immortalization (Weinberg chapter 10)</li> <li>• Angiogenesis (Weinberg chapter 13)</li> <li>• Resistance to cell death (Weinberg chapter 9)</li> <li>• Introduction to Immunology (Janeway chapter 1)</li> <li>• Innate immunity (Janeway chapters 2-3)</li> <li>• Adaptive immunity (Janeway chapters 4-11)</li> </ul>
Microbiology	<p>The general part of one of the texts above described can be used. In particular for the Sherris:</p> <p>Part I: all chapters Part II: chapters 6,7,8 Part III: chapters 21,22,23 Part IV: chapters 42,43,44 Part V: chapters 42, 43,44</p>
Principles of anatomopathology	<ul style="list-style-type: none"> <li>• Method of fixation of biological material using formalin (Pranab Dey, chapter 1).</li> <li>• Phases of preparation of a histological slide: sampling, processing, paraffin embedding, cutting, staining (Pranab Dey, chapter 2,3,5,7).</li> <li>• Intraoperative/extemporaneous examination: methods of execution, indications, examples of applicability (Pranab Dey, chapter 6)</li> <li>• Diagnostic cytology: exfoliative, needle aspiration, by apposition: applications (Pranab Dey, chapter 13-15).</li> <li>• Immunohistochemistry (Pranab Dey, chapter 16).</li> <li>• Molecular biology to predict prognosis and treatment (Pranab Dey, chapter 17-21)</li> <li>• Necrosis and apoptosis (Robbins and Kumar, chapter 1)</li> <li>• Inflammation (Robbins and Kumar, chapter 2)</li> </ul>