



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

### **DISEASE ONSET 2**

Second year, second semester (11 academic credits [CFU])

#### **Teachers**

Subject	Academic credits (CFU)	Lecturer
General pathology and immunology	5	FAGONE Paolo Fabrizio LIBRA Massimo
Microbiology	3	STEFANI Stefania MEZZATESTA Maria Lina
Principles of anatomopathology	3	SALVATORELLI Lucia

#### **Learning outcomes**

Subject	Learning outcomes
General pathology and immunology	At the end of the course, students will know about the main features of cancer cells, such as sustained growth, evasion of growth controls, and resistance to cell death. The students will also learn about the principles of targeted cancer therapy, the mechanisms of therapy resistance, and the immune evasion strategies employed by tumors.
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) Microorganisms responsible for human infections covering the complete spectrum of etiological agents: i.e. bacteriology, virology, mycology and parasitology modules.</li><li>2) The different "types" of infections; to differentiate a viral infection from that one induced by other microorganisms and parasites.</li><li>3) Infection control strategies</li><li>4) Antibiotics and resistance</li><li>5) Diagnostic stewardship</li></ol> <p>With reference to the objective of learning the essential biological characteristics of microorganisms and parasites responsible for human infections, the student must be able to: i) Distinguish microorganisms and parasites within the various stages of aggregation of living matter (metazoans, prokaryotes, eukaryotes, viruses), correlating the degree of organization and function with the pathogenic action; ii) Correlate the phenomenon of variation and mutation of microorganisms and parasites with the pathogenic action and resistance to antimicrobial substances.</p>

	<p>iii) Evaluate the degree of survival of microorganisms and parasites in the environment as a critical factor for host infection; iv) Define the principle of "selective toxicity" by aiming at the therapeutic use of antimicrobial substances; Describe and classify the inhibitory mechanisms, the site of action, the spectrum of action of chemo antibiotics, antivirals, antifungal and antiprotozoal substances; v) Indicate the mechanisms of chemo-antibiotic resistance (genotypic and phenotypic) and resistance to other antimicrobial agents (antivirals, antifungals, antiprotozoals); vi) Analyze the limits of antiviral chemotherapy in relation to the biological characteristics of the viruses and pathogenetic characteristics of the viral infection; vii) evaluate the experimental perspectives of interfering on the different functions of microorganisms and parasites by means of inhibiting substances; viii) possess the basic knowledge of basic and molecular phenotypic methodologies of the microbiology laboratory; know the antibiogram, its preparation and its reading for the purpose of clinical efficacy.</p>
Principles of anatomopathology	<p>By the end of the course, students are expected to know the differences between benign and malignant neoplasms, the histological classification of neoplasms, the use of molecular biology for diagnostic, prognostic and therapeutic purposes. the student must also know the grading and staging system of malignant neoplasms. At the end of the course the students will understand the histological basis of the main neoplastic diseases.</p>

## Prerequisites

Subject	Prerequisites
General pathology and immunology	Basic course Disease Onset 1
Microbiology	
Principles of anatomopathology	

## Course contents

Subject	Course contents
General pathology and immunology	<ul style="list-style-type: none"> <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>Hereditary and Sporadic Tumors.</li> <li>Altered Molecular Pathways in Tumors. Principles Of Targeted Cancer Therapy. Molecular Mechanisms of Drug Resistance.</li> <li>Immune Evasion by Tumors. Principles Of Immunotherapy</li> <li>Main concepts on pre-clinical and clinical studies</li> <li>Tumor in vitro models and experimental research</li> </ul>
Microbiology	<p><b>Bacteriology module</b></p> <p>Special bacteriology: Taxonomy, Taxonomic classification, characteristics, laboratory identification, mechanisms of</p>

	<p>pathogenicity, clinical manifestations, sensitivity and resistance to antibiotics of: Gram positive cocci, Gram negative cocci, Enterobacterales, Gram negative non fermenting bacilli, Mycobacteria, Vibrio, Helicobacter, Aerobic spore-forming bacilli and anaerobes, Neisseriae, Streptomyces, Nocardia, Actinomyces, Corynebacterium, Lactobacillus, Listeria, Gardnerella, Clostridium, Haemophilus, pasteurella, Vibrio, Legionella, Brucella, Bordetella, Bacteroides, Campylobacter, Helicobacter, Macteria; Ureaplasma, non-spore-forming anaerobes, Spirochetes, Chlamydia.</p> <p>Principles of diagnosis of bacterial infections, phenotypic and molecular sensitivity tests.</p> <p><b>Virology module</b></p> <ol style="list-style-type: none"> <li>1. Viruses and subviral structures <ul style="list-style-type: none"> <li>• The organization of viral particles Replication of viruses</li> <li>• Subviral pathogens: prions, viroids and virusoids</li> </ul> </li> <li>2. The pathogenesis of viral infection <ul style="list-style-type: none"> <li>• Method of transmission</li> <li>• Types of viral infection: acute infection and persistent infection (latent, slow, chronic and cytotransforming)</li> <li>• The host's response to viral infection</li> <li>• The interferon system</li> </ul> </li> <li>3. Control of viral infections <ul style="list-style-type: none"> <li>• Antiviral chemotherapeutic agents. Classification</li> <li>• Mechanism of action and resistance</li> <li>• Combined therapies. Vaccines</li> </ul> </li> <li>4. The principles of diagnostics of viral diseases <ul style="list-style-type: none"> <li>• Cultivation method</li> <li>• Non-culture and molecular methods. Serological methods</li> </ul> </li> <li>5. Characteristics of the main viruses of medical interest: <ul style="list-style-type: none"> <li>• Poxviridae, Herpesviridae, Adenoviridae, Human Papillomavirus and Polyomavirus, Parvoviridae, Paramyxoviridae, Orthomyxoviridae, Picornaviridae, Arenaviridae, Bunyaviridae, Caliciviridae, Coronaviridae, Human Flaviridae, Hepviridae, Human Flaviridae, virus HCV, HDV, HEV, HGV).</li> </ul> </li> </ol> <p><b>Mycology and Parasitology module</b></p> <p>Opportunistic pathogens:</p> <ul style="list-style-type: none"> <li>• Yeasts: Candida, Cryptococcus, Malassezia, Pneumocystis, Saprochaeta</li> <li>• Filamentous fungi: Mucorales, Entomophthorales, Aspergillus, Fusarium, Lomentospora, dematiaceous fungi, and other fungi responsible for subcutaneous mycoses</li> </ul> <p>Main medically significant parasites:</p> <ul style="list-style-type: none"> <li>• Protozoa and intestinal parasitosis (Giardia, Entamoeba, Cryptosporidium)</li> <li>• Protozoa and parasitosis in the blood and other sites (Trypanosoma, Leishmania, Trichomonas, Plasmodium, Toxoplasma)</li> <li>• Metazoans (Taenia saginata and Taenia solium, Ascaris lumbricoides, Enterobius vermicularis)</li> </ul>
Principles of anatomopathology	<ul style="list-style-type: none"> <li>• Benign and malignant neoplasms.</li> <li>• Histological classification of neoplasms.</li> </ul>

	<ul style="list-style-type: none"> <li>• Carcinoma in situ and invasive.</li> <li>• Histological tumor grade.</li> <li>• Metastasis: lymphatic and blood.</li> <li>• Tumor staging system: TNM.</li> </ul>
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## 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> <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, is able to 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 fairly 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>
Microbiology	
Principles of anatomopathology	

## 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>• Discuss the molecular mechanisms behind the sustained proliferative signaling of cancer</li> <li>• Mechanisms of evasion from cytotoxic responses by cancer cells</li> </ul>

	<ul style="list-style-type: none"> <li>• Main in vitro assays for evaluating cell viability</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> <p>Examples of frequently asked questions and / or exercises</p> <p>Description of the main microbial groups.</p> <p>Etiopathogenesis of different species</p> <p>Diagnostic assessment and Antimicrobial stewardship algorithms</p>
Principles of anatomopathology	<ul style="list-style-type: none"> <li>• Differences between benign and malignant neoplasm</li> <li>• Definition of carcinoma in situ</li> <li>• Describe the staging system of neoplasm</li> <li>• Role of molecular biology in malignant neoplasms</li> </ul>

## Reference texts

Subject	Textbooks
General pathology and immunology	<ul style="list-style-type: none"> <li>• Weinberg, The Biology of Cancer, 2<sup>nd</sup> edition, Garland Science, (2014)</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>• Robbins and Kumar, Basic Pathology, 11th edition, Elsevier (2022)</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	<p>Natural history of cancer (Weinberg chapter 11)</p> <p>Sustained proliferative Signaling (Weinberg chapters 4-6)</p> <p>Immortalization (Weinberg chapter 10)</p> <p>Angiogenesis (Weinberg chapter 13)</p> <p>Resistance to cell death (Weinberg chapter 9)</p> <p>Altered pathways in cancer (Weinberg chapters 4-6)</p> <p>Immunotherapy (Weinberg chapter 15)</p>
Microbiology	<p>The special part of one of the texts above described can be used. In particular for Sherris:</p> <p>Part II chapters 10-20</p> <p>Part III chapters 24-41</p> <p>Part IV chapters 45-47</p> <p>Part V chapters 51-57</p>
Principles of anatomopathology	<p>Definition of hyperplasia, hypertrophy, atrophy, aplasia, hypotrophy, metaplasia, dysplasia, carcinoma in situ (Robbins and Kumar, chapter 1)</p> <p>Benign and malignant neoplasms (Robbins and Kumar, chapter 6).</p> <p>Carcinogenesis (Robbins and Kumar, chapter 6)</p> <p>Histological classification of neoplasms (Robbins and Kumar, chapter 6).</p> <p>Carcinoma in situ and invasive (Robbins and Kumar, chapter 6).</p> <p>Histological tumor grade (Robbins and Kumar, chapter 6).</p> <p>Metastasis: lymphatic and blood (Robbins and Kumar, chapter 6)</p>

	Tumor staging system: TNM (Robbins and Kumar, chapter 6).
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