Syllabus Master's Degree Course in Medicine and Surgery a.y. 2026 - 2027

DISEASE ONSET 2

Second year, second semester (13 academic credits [CFU])

Teachers

Subject	Academic credits (CFU)	Lecturer
General pathology and immunology	7	FAGONE Paolo Fabrizio
Microbiology	3	FUOCHI Virginia
Principles of anatomopathology	3	SALVATORELLI Lucia

Learning outcomes

Subject	Learning outcomes
General pathology and immunology	**Knowledge and understanding** By the end of the module, students are expected to: • Acquire knowledge on the molecular, cellular, and pathophysiological mechanisms underlying the development and progression of cancer, including tumor initiation, promotion, progression, sustained proliferative signalling, evasion of growth suppressors, cellular immortalization, resistance to cell death, and angiogenesis. • Understand the role of genomic alterations in tumorigenesis and the main characteristics of the tumor phenotype, including the differences between hereditary and sporadic tumors, tumor-associated cachexia, and the mechanisms of immune evasion. • Understand the molecular and immunological principles underlying cancer prevention and treatment, including targeted therapies, cancer immunotherapy, mechanisms of therapeutic resistance, and the role of preclinical models and clinical studies in the development of innovative approaches to cancer control. **Applying knowledge and understanding** By the end of the module, students are expected to: • Be able to relate the normal molecular and cellular functions of the organism to the alterations occurring during tumor development and progression, explaining how genomic and signalling pathway alterations contribute to the malignant phenotype.

	• Be able to integrate molecular, cellular, and immunological knowledge to explain the pathogenesis of cancer and the mechanisms underlying tumor immune evasion and therapeutic resistance. • Apply knowledge of tumor biology to understand the principles of preclinical and clinical cancer research, including the use of in vitro tumor models and the evaluation of innovative therapeutic approaches.
Microbiology	**Knowledge and understanding** By the end of the module, students are expected to: • Acquire knowledge on the essential biological characteristics and classification of the main bacteria, viruses, fungi, and parasites responsible for human infections, including their structural, functional, and genetic characteristics. • Understand the cellular and molecular basis of microbial pathogenicity and host–microorganism interactions, including the mechanisms of infection, microbial variation and mutation, and the factors influencing microbial survival and transmission. • Understand the principles of antimicrobial and antiparasitic therapy and the control of infectious diseases, including selective toxicity, mechanisms of action and resistance of antimicrobial agents, and the main diagnostic approaches for bacterial, viral, fungal, and parasitic infections. **Applying knowledge and understanding** By the end of the module, students are expected to: • Be able to relate the biological characteristics of specific microorganisms and parasites to their pathogenic mechanisms and the diseases they cause, explaining how microbial structure, function, variation, and environmental survival influence infection and disease development. • Be able to Integrate microbiological and immunological knowledge to explain the pathogenesis of infections caused by specific microbial agents, relating their mechanisms of pathogenicity to host defence responses and the resulting pathological processes. • Apply knowledge of specific microbial agents to identify appropriate diagnostic approaches and evaluate the principles of antimicrobial treatment, considering the mechanisms of action, spectrum of activity, selective toxicity, and resistance to antimicrobial agents.
Principles of anatomopathology	**Knowledge and understanding** By the end of the module, students are expected to: • Acquire knowledge on the histological characteristics of benign and malignant neoplasms, including the criteria for their distinction, the histological classification of tumors, and the differences between carcinoma in situ and invasive carcinoma. • Understand the principles of histological tumor grading and staging, including the TNM classification and the mechanisms of lymphatic and hematogenous metastasis. • Understand the role of histopathological and molecular investigations in the diagnosis and classification of neoplasms, and their contribution to prognostic assessment and therapeutic decision-making.

	Applying knowledge and understanding By the end of the module, students are expected to: • Be able to relate the normal histological structure of tissues to the morphological alterations observed in neoplasms, explaining the features that distinguish benign from malignant tumors and in situ from invasive lesions. • Be able to correlate the morphological and molecular characteristics of neoplasms with their biological behaviour and progression, including tumor invasion, metastatic spread, histological grading, and TNM staging. • Apply knowledge of histopathological classification, grading, staging, and molecular investigations to support cancer diagnosis, prognostic assessment, and therapeutic decision-making.

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	• Natural History of The Tumor. Initiation; Promotion and Progression. • Sustained Proliferative Signaling and Evasion to Growth Suppressors in Cancer • Cancer cell Immortalization. Resistance to Cell Death. • Tumor Angiogenesis. • Molecular mechanisms of cancer-associated cachexia • Hereditary and Sporadic Tumors. • Altered Molecular Pathways in Tumors. Principles Of Targeted Cancer Therapy. Molecular Mechanisms of Drug Resistance. • Immune Evasion by Tumors. Principles Of Immunotherapy • Main concepts on pre-clinical and clinical studies • Tumor in vitro models and experimental research **Supplementary activities** • Guided study and critical review of the scientific literature and clinical practice guidelines. • Thematic seminars for in-depth exploration of selected topics. • Theoretical and practical sessions.
Microbiology	**Bacteriology module** Special bacteriology: Gram positive cocci, Gram negative cocci, Enterobacterales, Gram negative non fermenting bacilli, Mycobacteria, Vibrio, Helicobacter, Aerobic spore-forming bacilli and anaerobes, Neisseriae, Corynebacterium, Lactobacillus, Listeria,

	Gardnerella, Clostridium, Haemophilus, pasteurella, Legionella, Brucella, Bordetella, Bacteroides, Spirochetes, Chlamydia. **Virology module** Control of viral infections • Antiviral chemotherapeutic agents. Classification • Mechanism of action and resistance • Combined therapies. Vaccines The principles of diagnostics of viral diseases • Cultivation method • Non-culture and molecular methods. Serological methods Characteristics of the main viruses of medical interest: • 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). **Mycology and Parasitology module** Opportunistic pathogens: • Yeasts: Candida, Cryptococcus, Malassezia, Pneumocystis, • Filamentous fungi: Mucorales, Entomophthorales, Aspergillus, Fusarium, Main medically significant parasites: • Protozoa and intestinal parasitosis (Giardia, Entamoeba, Cryptosporidium) • Protozoa and parasitosis in the blood and other sites (Trypanosoma, Leishmania, Trichomonas, Plasmodium, Toxoplasma) • Metazoans (Taenia saginata and Taenia solium, Ascaris lumbricoides, Enterobius vermicularis) **Supplementary activities** • Guided study and critical review of the scientific literature and clinical practice guidelines. • Thematic seminars for in-depth exploration of selected topics. • Theoretical and practical sessions.
Principles of anatomopathology	• Benign and malignant neoplasms. • Histological classification of neoplasms. • Carcinoma in situ and invasive. • Histological tumor grade. • Metastasis: lymphatic and blood. • Tumor staging system: TNM. **Supplementary activities** • Guided study and critical review of the scientific literature and clinical practice guidelines. • Thematic seminars for in-depth exploration of selected topics. • Theoretical and practical sessions.

Assessment methods

Subject	Assessment methods
General pathology and immunology Microbiology Principles of anatomopathology	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. 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. For the assignment of the final grade, the following parameters will be considered: • 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. • 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. • 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. • 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. • 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.

Examples of common questions and/or exercises

Subject	Examples of common questions and/or exercises
General pathology and immunology	• Discuss the molecular mechanisms behind the sustained proliferative signaling of cancer • Mechanisms of evasion from cytotoxic responses by cancer cells • Main in vitro assays for evaluating cell viability • Description of statistical approaches for the analyses of pre-clinical and clinical data
Microbiology	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 The test takes place through an oral exam. 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. Examples of frequently asked questions and / or exercises Description of the main microbial groups. Etiopathogenesis of different species Diagnostic assessment and Antimicrobial stewardship algorithms
Principles of anatomopathology	• Differences between benign and malignant neoplasm • Definition of carcinoma in situ • Describe the staging system of neoplasm • Role of molecular biology in malignant neoplasms

Reference texts

Subject	Textbooks
General pathology and immunology	• Weinberg, The Biology of Cancer, 2nd edition, Garland Science, (2014) Additional educational material (slides, videos, handouts, etc.) will be distributed or indicated during the lessons.
Microbiology	The most recent edition of one of these texts chosen by the student: TEXT 1: Medical Microbiology - Murray - EDRA Edition TEXT 2: Medical Microbiology - Sherris - EMSI Edition TEXT 3: Principles of medical microbiology - Antonelli G., Clementi M., Pozzi G., Rossolini G.M. - Ambrosiana Publishing House https://onlinelibrary.wiley.com/doi/book/10.1002/9780470688618 Any additional educational material (slides, videos, handouts, etc.) will be distributed or indicated during the lessons.
Principles of anatomopathology	• 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.

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
Microbiology	

Principles of anatomopathology	previously stated, in order to adhere to the planned program as outlined in the Syllabus.

Attendance

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

Course schedule

Subject	Course schedule
General pathology and immunology	Natural history of cancer (Weinberg chapter 11) Sustained proliferative Signaling (Weinberg chapters 4-6) Immortalization (Weinberg chapter 10) Angiogenesis (Weinberg chapter 13) Resistance to cell death (Weinberg chapter 9) Altered pathways in cancer (Weinberg chapters 4-6) Immunotherapy (Weinberg chapter 15)
Microbiology	The special part of one of the texts above described can be used. In particular for Murrey: Part II chapters 17-34 Part III chapters 40-56 Part IV chapters 62-65 Part V chapters 72-77
Principles of anatomopathology	Definition of hyperplasia, hypertrophy, atrophy, aplasia, hypotrophy, metaplasia, dysplasia, carcinoma in situ (Robbins and Kumar, chapter 1) Benign and malignant neoplasms (Robbins and Kumar, chapter 6). Carcinogenesis (Robbins and Kumar, chapter 6) Histological classification of neoplasms (Robbins and Kumar, chapter 6). Carcinoma in situ and invasive (Robbins and Kumar, chapter 6). Histological tumor grade (Robbins and Kumar, chapter 6). Metastasis: lymphatic and blood (Robbins and Kumar, chapter 6) Tumor staging system: TNM (Robbins and Kumar, chapter 6).