

## Degree course in Physiotherapy

### **INTEGRATED COURSE: General Pathology And Microbiology**

**CFU: 3**

**SSD: MED/07- MED/04**

**COURSE COORDINATOR: Daniele Armenia**

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MODULE: Microbiology and Clinical Microbiology

CFU: 2

SSD: MED/07

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office hours: monday 12.00

MODULE: General Patology

CFU: 1

SSD: MED/04

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office hours: on appointment

### **PREREQUISITES**

#### Microbiology and Clinical Microbiology

Even though no prior exams passed are necessary to follow the course, in order to understand the course, the student should have basic knowledge of biology, histology and biochemistry.

#### General Patology

*Although there are no preparatory courses, basic knowledge of biology, histology, biochemistry, anatomy, physiology, and immunology is required. In order to understand the topics covered, students must have attended the courses taught in the first semester.*

### **LEARNING OBJECTIVES**

#### Microbiology and Clinical Microbiology

Knowledge of the following objective will be essential: structure of different microorganisms, microbial pathogenicity, interactions between micro-organism and host, causes and mechanisms of onset of the main microbial aetiology diseases. In addition, general knowledge on microbiological diagnostics will be essential for the identification of bacteria, viruses, fungi and protozoa. These objectives will be achieved through frontal lectures, seminars and interactive teaching activities, designed to facilitate learning and improve the ability to address and solve the main questions of Clinical Microbiology.

## General Patology

*The course is inserted within the general objectives of the Degree Course in Physiotherapy with the aim to study the alterations of the biochemical/molecular processes during the onset of diseases. The course will describe the mechanisms, the risk factors and the effects of the main pathologies in the fields of Physiotherapy. In particular, the objectives of the course will be to know: the meaning of disease status and its pathological change; the physical, chemical, genetic and biological factors that contribute to the onset of diseases; the fundamental mechanisms of defence of the cells, tissues, organs and organism; the molecular and cellular basis of the inflammatory diseases; the fundamental stages of carcinogenesis and the role of genetic and environmental risk factors at the basis of the tumoral transformation; the molecular basis of benign and malignant tumors in humans, the main types of neoplasia and the classification criteria of tumors. The course will help to provide the student with tools that will enable him/her to improve the skills to communicate with other professional figures (doctors, nurses, psychologists) that will take care of the patient in a multidisciplinary approach. Finally, the student will be induced to ameliorate his/her skills for an independent study and will acquire the functional methodological tools for an autonomous update.*

## **LEARNING OUTCOMES**

### Microbiology and Clinical Microbiology

#### **Knowledge and understanding**

At the end of this course the student should know:

- The criteria of bacterial and virological classification.
- The architecture of the bacterial, fungal and protozoal cell and the structure of the viral particles.
- The metabolism and bacterial growth: the production of bacterial spores.
- The basics of bacterial and viral genetics: transformation, transduction, bacterial conjugation, viral genetic variability.
- The pathogenic action of bacteria and viruses: transmission routes and stages of the infectious process.
- The process of toxin production and explain the mechanisms of action of exotoxins and endotoxins.
- The general characteristics of viral polymerases e viral genetic variability
- The basics about innate immunity and cell-mediated immunity.
- The characteristics of immune sera and vaccines.
- The general principles for the diagnosis of diseases caused by pathogenic microorganisms
- The main pathogens associated with infection of orthopedic/physiotherapeutic interest
- The basics of microbiological pharmacology: notes on anti-bacterial and antiviral drugs and resistance mechanisms

## **Applying knowledge and understanding**

At the end of the course the student will be able to:

- To use the acquired knowledge for the autonomous deepening of aspects related to the specific field to which the student will devote himself within the professional activity;

## **Communication skills**

At the end of the course, the student should know :

- Use specific scientific terminology in an appropriate manner.

## **Making judgements**

At the end of the course, the student should know:

- Carry out general assessments of the topics covered.

General Pathology

## **Knowledge and understanding**

The student will know a cellular and molecular vision of pathology and immunology; the mechanisms that regulate the body's responses to cellular damage; the main mechanisms of the functioning of the immune system and alterations of immune responses.

General Pathology

All the above knowledge will help the student to understand the basis of the pathophysiology of the diseases in the fields of Physiotherapy. At the end of the course the student will be able to use a medical-scientific terminology suitable to the health professional role.

## **COURSE SYLLABUS**

### **Syllabus Microbiology and Clinical Microbiology**

Characteristics of the main infection agents. Vital associations: commensalism, mutualism, parasitism. Associated microbial flora. Generalities on infection diseases: infectious ratio, infection and disease, endogenous infection, exogenous infections, opportunistic infections.

IMMUNOLOGY - Concept of innate immunity and acquired immunity. Role of the immune response in different infections. Survival of infection agents to immunity mechanisms. Principles of microbiological diagnostics.

BACTERIOLOGY - The bacterial cell: structure and essential functions. Gram negative and Gram positive. The bacterial spore. Cultivation of bacteria: growth and development of bacterial populations. Elements of bacterial genetics: mutations and mechanisms of genetic recombination. Principles of pathogenicity and virulence. Bacterial toxins: exotoxins and endotoxins. Mode of action of the main antibacterial drugs. Resistance to

chemotherapy and antibiotics. Examples of bacteria of orthopaedic/physiotherapeutic interest and associated pathologies.

**VIROLOGY** -Nature, methods of study and classification of viruses. Composition and architecture of the viral particle. Cultivation of viruses. Virus-cell relationship: productive infection, transforming infection. Virus-to-host relationships: acute, persistent, latent, slow infections. Pathogenic mechanisms in viral infections. Vaccines and basis of antiviral chemotherapy. Examples of viruses of medical interest and associated diseases.

**MYCOLOGY** -Habitat and morphology of fungi (yeasts, mycelial fungi). Fungal cell structure. Examples of fungi of medical interest and associated diseases.

**PARASITOLOGY** - The protozoa cell: morphology and structure. Main characteristics of Helminths and Arthropods. Examples of parasites of medical interest and associated pathologies.

### **Syllabus General Pathology**

- Aetiology and cellular pathology: health and disease concepts, aetiology and pathogenesis. Environmental diseases: diseases caused by chemical or physical agents. Microbiologic agents and the patterns of disease caused by them. Molecular mechanisms of pathogenicity. Cellular damage and adaptations, reversible and irreversible cell injury: necrosis and apoptosis. Cell stress and cellular adaptation: hyperplasia, hypoplasia, metaplasia.
- Inflammatory-reparative response: aetiology and classification of acute inflammation, chemical mediators, vascular changes and exudates formation, cellular events and phagocytosis, chronic and granulomatous inflammation; reparative response: tissue repair and wound healing, fibrosis. Inflammatory diseases.
- Systemic consequences of inflammation and aetiopathogenesis of fever.
- Tumoral transformation as proliferative disease. Molecular basis of tumoral transformation: oncogenes and tumor suppressor genes. The causes of cancer including chemicals and biological agents, the phenotype of the transformed cell, the genes causing and restricting cancer growth, tumor classification; carcinogenesis; epidemiology and prevention; the molecular mechanisms of tumor progression and metastatization. The relationship between cancer cells and tumoral microenvironment. Inflammation and cancer.

### **COURSE STRUCTURE**

#### Microbiology and Clinical Microbiology

The course is structured in 20 hours of frontal teaching, divided into lessons of 2 or 4 hours according to the academic calendar. Frontal teaching includes theoretical lessons and additional seminars on the topics covered.

#### General Pathology

The Course is structured in 10 hours of frontal teaching, divided into lessons of 2, 4 or 5 hours according to the academic calendar.

## **COURSE GRADE DETERMINATION**

### Microbiology and Clinical Microbiology

Students' skills will be verified with a written exam followed by an oral interview. The written test will consist of 30 questions with multiple-choice answers, for each exact answer a point will be assigned. The final score of the written test will be given by the sum of the partial scores assigned to each question answered correctly. To take the oral exam, the student must have scored at least 15 points. During the oral test, the Examination Committee will assess the student's ability to apply the knowledge and will ensure that the skills are adequate to support and solve problems of a microbiological nature. The following will also be assessed: making judgements, communication skills and learning skills as indicated in the Dublin descriptors.

### General Pathology

The verification of the preparation of the students will take place through an oral test. During the oral examination the Examining Commission will assess the ability of the Student to apply the knowledge and will ensure that the skills are adequate to support and solve problems in the field of Physiotherapy. The following will also be assessed: making judgments, communication skills (communication skills) and learning skills (learning skills) as indicated in the Dublin descriptors

## **OPTIONAL ACTIVITIES**

### Microbiology and Clinical Microbiology

In addition to teaching activities, students will be given the opportunity to participate in Seminars, Research Internships, Department Internships and Monographic Courses. The subjects of the activities are not exam subjects.

## **READING MATERIALS**

### **Microbiology and Clinical Microbiology**

Le basi della Microbiologia

Autori: Richard A. Harvey, Pamela C. Champe Bruce D. Fisher

### **General Pathology**

Abul K. Abbas, Jon C. Aster, Vinay Kumar. Robbins Basic Pathology. Elsevier – Health Sciences Division