

DEGREE IN MIDWIFERY

Integrated Teaching: GENERAL PATHOLOGY AND PHYSIOPATHOLOGY

SSD: MED/07, MED/05, MED/04

Credits: 6

Responsible Professor: Gabriella D'Orazi

E-mail: gabriella.dorazi@unicamillus.org

MODULE: General Pathology

SSD: MED/04

Number of credits: 3

Professor: Gabriella D'Orazi

CFU:1

E-mail: gabriella.dorazi@unicamillus.org

Professor: Andrea Cardillo

CFU:1

E-mail: andrea.cardillo@unicamillus.org

Professor: Elena Toniato

CFU:1

E-mail: elena.toniato@unicamillus.org

MODULE: Microbiology

SSD: MED/07

Number of credits: 2

Professor: Daniele Armenia

E-mail: daniele.armenia@unicamillus.org

MODULE: Clinic Pathology

SSD: MED/05

Number of credits: 1

Professor: Anna Claudia Romeo

E-mail: annaclaudia.romeo@unicamillus.org

PREREQUISITES

In order to follow the course profitably it is expected that students have preliminary knowledge of the basic principles of biology, anatomy, biochemistry, physiology, histology, anatomy and physiology.

LEARNING OBJECTIVES

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, knowledge of bacterial, viral, mycotic or protozoal infections of gynaecological and obstetric interest will be indispensable in order to identify potential clinical problems during professional activity.

Moreover, the course introduces to the understanding of the mechanisms and phenomena that underlie human pathologies, in particular the changes in the state of health, the main exogenous and endogenous causes of disease, the fundamental mechanisms of disease and the biological mechanisms of defence, reaction to damage, regeneration and repair, as well as knowledge of the main aspects of the pathophysiology of organs and systems with particular reference to particular biological needs during pregnancy.

The course's aim is to allow the students 1) to learn on aspects of cell pathology and of the alterations of the integrated functions of tissues, organs, and systems, which may turn useful in the technical setting, and 2) to provide the knowledge of the main biomarkers for the evaluation of physiology and pathological conditions of the human body.

LEARNING OUTCOMES

The specific learning outcomes of the program are coherent with the general provisions of the Bologna Process and the specific provisions of EC Directive 2005/36/EC. They lie within the European Qualifications Framework (Dublin Descriptors) as follows.

At the end of this teaching, students will be able to:

Knowledge and Understanding

- List the criteria of bacterial and virological classification
- Describe the architecture of the bacterial, fungal and protozoal cell and the structure of the viral particles
- Explain the metabolism and bacterial growth: the production of bacterial spores
- Describe the basics of bacterial and viral genetics: transformation, transduction, bacterial conjugation, viral genetic variability
- Describe the pathogenic action of bacteria and viruses: transmission routes and stages of the infectious process
- Explain the process of toxin production and explain the mechanisms of action of exotoxins and endotoxins
- Describe the general characteristics of viral polymerases e viral genetic variability
- Explain the basics about innate immunity and cell-mediated immunity
- Describe the characteristics of immune sera and vaccines
- Explain the general principles for the diagnosis of diseases caused by pathogenic microorganisms
- Describe the main congenital and sexually transmitted infections caused by viruses, bacteria, fungi, and protozoa
- Describe the basics of microbiological pharmacology: notes on anti-bacterial and antiviral drugs and resistance mechanisms
- Describe the exogenous and endogenous causes of diseases
- Explain the mechanisms of disease, biological defence, reaction to cell and tissue damage, tissue responses, regeneration, and repair, together with their principal alteration
- Describe the state of disease resulting from the interaction of the causes with the body's regulatory mechanisms

Applying Knowledge and Understanding

- apply the principles of midwifery to selected cases, problems, and a variable range of situations
- use the tools, methodologies language and conventions of midwifery to test and communicate ideas and explanations

Communication Skills

- present the topics orally in an organized and consistent manner
- use a proper scientific language coherent with the topic of discussion

Making Judgements

- recognize the importance of an in-depth knowledge of the topics consistent with a proper education
- identify the importance of a proper theoretical knowledge of the topic in the clinical practice

COURSE SYLLABUS

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. Main bacteria responsible for human infection diseases, with particular reference to diseases of obstetrical-gynaecological and maternal-foetal district (gonorrhoea, syphilis, group B streptococci infection).

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. Infections with the main sexually transmitted and vertically transmitted viruses: hepatitis B virus (HBV), hepatitis C virus (HCV), human immunodeficiency virus (HIV), human papilloma virus (HPV), herpes simplex virus (cytomegalovirus, herpes simplex virus type 1 and type 2), rubella virus and Parvovirus B19.

MYCOLOGY - Habitat and morphology of fungi (yeasts, mycelial fungi). Fungal cell structure. Infections of the urogenital district by species of the genus *Candida*.

PARASITOLOGY - The protozoa cell: morphology and structure. Main characteristics of Helminths and Arthropods. Protozoa of gynaecological interest: *Toxoplasma gondii*; *Trichomonas vaginalis*.

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.
and irreversible.

- Mechanism of cellular damage: free radical damage, hypoxia damage. Altered intracellular calcium homeostasis.

Reversible cell damage. Irreversible cell damage.

Cell adaptations: atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia. Degeneration. Cellular aging.

Cell death: necrosis and apoptosis

- Inflammation

Definition and general characteristics. Acute inflammation or angiophlogosis. The vasculoematic phenomena of inflammation: hemodynamic modifications and exudate formation. Inflammatory mediators of tissue and plasma origin. Cellular response in inflammation: inflammation cells, chemotaxis and phagocytosis; histolesivity of inflammatory cell products. Outcomes of inflammation: chronicization, healing, abscess, fibrosis. Chronic inflammation or histophlogosis. Causes of chronic inflammation. Chronic inflammation cells and mediators. Types of chronic inflammation.

- Concept of innate and acquired immunity.
- Molecular mechanisms of tumoral transformation: oncogenes and tumor suppressor genes. The causes of cancer including chemicals and biological carcinogenesis; the phenotype of the transformed cell; tumor classification; epidemiology and prevention; the molecular mechanisms of tumor progression and metastatization. The relationship between cancer cells and tumor microenvironment. Inflammation and cancer. Nutrition and cancer.
- Pathology of haemostasis and coagulation. The platelet, hemocoagulative and fibrinolytic phases. The main disorders of haemostasis and coagulation. The main defects of the plasma and fibrinolytic (hemophilia) phases.
- Molecular mechanisms of atherosclerosis, formation of atheromatous plaque and related consequences; thrombosis; embolism; infarction; hypoxia and cyanosis; oedema. Mechanism of diabetes, classification, and consequences. Concept of liver damage.
- Cardiovascular Physiopathology: Thrombosis, embolism. Infarction. Shock. Hypertension, atherosclerosis, red blood cells disorders, heart transplantation, etc.
- Concept of lung physiopathology: acute and chronic inflammations; bronchitis, pneumonia, tuberculosis, lung cancer.

CLINICAL PATHOLOGY

How to use biomarkers; biomarkers in clinical practice.

HEMATOLOGY AND HEMOSTASIS IN PREGNANCY

Composition and functions of blood. Blood count and leukocyte formula. Red blood cells: physiology and pathology (anaemia, hemoglobinopathies); Platelets and leukocytes; Evaluation parameters of iron metabolism, ferritin, transferrin. Iron deficiency, vit B12 deficiency and folate deficiency. Blood groups, maternal-foetal incompatibility.

Haemostasis in pregnancy; evaluation of platelet function and of the fibrinolytic system; laboratory investigations for the definition of hypercoagulability states; diagnostic tests for poliabortivity.

Coombs test and RH group. Erythroblastosis fetalis.

KIDNEY FUNCTION:

Markers of kidney function: creatinine, creatinine clearance, azotaemia, uric acid, electrolytes, complete urine test (chemical-physical and morphological). Laboratory tests for the diagnosis of eclampsia.

LIVER FUNCTION

Transaminases, bilirubin, and others, LDH; laboratory tests for the diagnosis of intrahepatic cholestasis in pregnancy.

GLUCOSE AND LIPID METABOLISM

Indicators of glucose metabolism: glucose, glucose tolerance curves; laboratory tests for the diagnosis of gestational diabetes. Cholesterol, HDL triglycerides, LDL, apolipoproteins.

COURSE STRUCTURE

The course consists of 84 hours of classroom teaching, composed of frontal lessons and interactive learning activities, especially using presentations of clinical cases.

COURSE GRADE DETERMINATION

The final exam will be oral and it will be communicated at the beginning of the lessons together with the didactic materials necessary to the preparation for the final evaluation.

The exam will focus on the program and will assess the student's knowledge and mastery of specific scientific language.

The evaluation criteria considered will be: acquired knowledge, independent judgment, communication skills and learning skills. The exams will be assessed according to the following criteria:

< 18 Fail	The candidate possesses an inadequate knowledge of the topic, makes significant errors in applying theoretical concepts, and shows weak presentation skills.
18-20	The candidate possesses a barely adequate and only superficial knowledge of topic, limited presentation skills, and only an inconsistent ability to apply theoretical concepts.
21-23:	The candidate possesses an adequate, but not in-depth, knowledge of the topic, a partial ability to apply theoretical concepts, and acceptable presentation skills.
24-26	The candidate possesses a fair knowledge of the topic, a reasonable ability to apply theoretical concepts correctly and present ideas clearly.
27-29	The candidate possesses an in-depth knowledge of the topic, a sound ability to apply theoretical concepts, good analytical skills, clear argumentative clarity and an ability to synthesize.
30-30L	The candidate possesses an in-depth knowledge of the topic, an outstanding ability to apply theoretical concepts, a high level of argumentative clarity, as well as excellent analytical skills, and a well-developed ability to synthesize and establish interdisciplinary connections.

OPTIONAL ACTIVITIES

Students can request optional workshops to deepen some specific topics.

READING MATERIALS

Le basi della Microbiologia. Autori: Richard A. Harvey, Pamela C. Champe Bruce D. Fisher
G.M. Pontieri - Elementi di Patologia e Fisiopatologia Generale - Per i corsi di Laurea in Professioni Sanitarie -Edizioni Piccin (4a Edizione, 2018).
G.Federici – Medicina di laboratorio – Ed McGraw Hill – 4 Edizione
Didactic and integrative material provided by the lecturer