



## PATHOGENESIS AND MICROBIOLOGY

**Year/Semester:** 1<sup>ST</sup> year, second semester

**ECTS:** 4

PROFESSORS	COLLABORATOR	HOURS	NOTES
Prof Raffaella Bonecchi	Dr Marinos Kallikourdis  Dr Sebastien Jaillon	30	University researchers with previous experience in teaching the degree course

### COURSE OBJECTIVE

By the end of the course the student will:

- Be knowledgeable in the causes, and the pathogenetic and physiopathological mechanisms of disease
- Be able to describe the main cellular changes in the course of disease
- Understand the inflammatory and healing processes

**TEACHING METHOD:** Lectures

**ASSESSMENT METHOD:** Written exam with 30 multiple-choice questions.

**MODULES:** Microbiology and clinical microbiology, General pathology

**MODULE: GENERAL PATHOLOGY**

Credits: 2

**MODULE OBJECTIVES**

- The student will be able to know the causes, and the pathogenetic and physiopathological mechanisms of disease.
- The student will be able to describe the main cellular changes in the course of disease.
- The student will be able to understand the inflammatory and healing processes.
- The student will be able to distinguish the characteristics of innate and adaptive immunity.
- The student will be able to recognise the causes and stages of neoplastic progression.
- The student will be able to recognise the main causes and consequences of vascular disease and thrombosis.

**RECOMMENDED READING:**

“Elementi di patologia generale” PONTIERI novembre 2012 PICCIN

**TEACHING METHOD:** Lectures

**ASSESSMENT METHOD:** Written exam with multiple choice questions, and a possible oral examination

**LECTURES:**

**1. Introduction to pathology (Bonecchi)**

**Learning objectives**

The student will be able to describe the concept of disease, aetiology and pathogenesis. The student will be able to distinguish the various types of cellular adaptation to stress: hypertrophy, atrophy, hyperplasia, metaplasia.

**2. Cell damage (Bonecchi)**

**Learning objectives**

The student will be able to recognise the various types of harmful stimuli and their impact on the cells

**3. Acute inflammation I (Bonecchi)**

**Learning objectives**

The student will be able to define the various phases of acute inflammation (vascular changes, leukocyte recruitment, phagocytosis, cellular mediators).

**4. Acute inflammation II (Bonecchi)**

**Learning objectives**

The student will be able to recognise and classify soluble mediators of inflammation, and the complement system

**5. Systemic manifestations of inflammation (Bonecchi)**

**Learning objectives**

The student will be able to describe the systemic manifestations of acute inflammation and the effects on tissue

**6. Chronic inflammation (Bonecchi)**

**Learning objectives**

The student will be able to describe the main differences between acute and chronic inflammation, and

The student will be able to recognise the main features of granulomatous inflammation.

**7. Cicatrisation and wound healing (Bonecchi)**

**Learning objectives**

The student will be able to describe the stages of the healing process.

The student will be able to describe the outcome of the healing process.

**8. General principles of specific immunity (Kallikourdis)**

**Learning objectives**

The student will be able to distinguish the main differences between innate and specific immunity

**9. Humoral immunity: antibodies (Kallikourdis)**

**Learning objectives**

The student will be able to describe the mechanisms of activation of humoral immunity and antibody production.

**10. Cell-mediated immunity (Kallikourdis)**

**Learning objectives**

The student will be able to describe the mechanisms of cell-mediated immunity.

The student will be able to distinguish stimuli that activate an adaptive T cell-mediated response.

**11. Immunopathologies(Jaillon)**

**Learning objectives**

The student will be able to describe major immune system disorders and their mechanisms.

**12. Tumours (Jaillon)**

**Learning objectives**

The student will be able to classify the various types of tumours and understand the molecular basis of carcinogenesis.

**13. Tumours II (Jaillon)**

**Learning objectives**

The student will be able to understand the stages of neoplastic progression and metastasis.

#### 14. Atherosclerosis (Bonecchi)

##### Learning objectives

The student will be able to describe the molecular basis and outcomes of the atherosclerosis process.

#### 15. Haemostasis and Thrombosis (Bonecchi)

##### Learning objectives

The student will be able to describe the mechanisms underlying the process of coagulation and its dysregulation.

#### MODULE: MICROBIOLOGY-SEROLOGY (Monari)

CREDITS: 1

#### LECTURES:

##### 1) Introduction to serology

*The student will be able to:*

- distinguish the main diagnostic methods in order to interpret the analytical data provided by the laboratory report
- understand the antigen-antibody interaction
- understand the meaning of sensitivity, specificity and diagnostic accuracy

##### 2) Tuberculosis and Legionella

*The student will know about:*

- The history of the disease
- The epidemiological implications
- Strategies to prevent infection and disease spread
- The diagnostic methods

##### 3) Orthomyxoviruses

*The student will know about:*

- influenza
- the genetic basis for epidemics and pandemics and genetic variation
- the epidemiological implications
- strategies to prevent infection and disease spread
- the diagnostic methods
- the vaccine

##### 4,5) Hepatitis and HIV

*The student will know:*

- the different hepatitis and HIV
- the molecular basis of viral replication
- the epidemiological implications
- strategies to prevent infection and disease spread

- the diagnostic methods
- how to read laboratory reports to interpret the results

### **6.7) Epstein Barr Virus, Toxoplasma gondii, Cytomegalovirus and Rubella Virus**

*The student will know:*

- about the different pathologies
- the related clinical implications
- the epidemiological implications
- strategies to prevent infection and disease spread
- the diagnostic methods
- how to read laboratory reports to interpret the results

### **8,9) Faecal parasitology**

*The student will know:*

- how to correctly collect samples for investigation
- the main associated diseases
- the available diagnostic methods
- strategies to prevent infection and disease spread

### **10, 11) Blood parasites**

*The student will know:*

- about the different pathologies
- the related clinical implications
- the epidemiological implications
- strategies to prevent infection and disease spread
- the diagnostic methods
- how to read laboratory reports to interpret the results

### **12, 13) Urinary tract infections**

*The student will know:*

- about the different pathologies
- the related clinical implications
- the epidemiological implications
- strategies to prevent infection and disease spread
- the diagnostic methods
- how to read laboratory reports to interpret the results

### **14, 15) Vaccines**

*The student will know:*

- the different types of vaccines
- the different time intervals and recalls



- the epidemiological implications and benefits of vaccine therapy
- the Italian vaccine schedule
- the developments for upcoming vaccines

At the end of each lesson, the topic will be reviewed with questions to check what the students' learned during class.

**MODULE: MICROBIOLOGY (Casari)**  
CREDITS: 1

**LECTURES:**

**1) THE BACTERIAL CELL**

**Learning objectives**

- The student will know the structure of the bacterial cell and how it reproduces.
- The student will know the gram staining technique
- The student will know the ultrastructure and functions of the bacterial cell wall.
- The student will know the processes of host-pathogen interaction: colonisation, symbiosis, commensalism, infection and disease.

**2) THE CULTIVATION AND IDENTIFICATION OF BACTERIA**

**Learning objectives**

- The student will know the techniques for culturing bacteria
- The student will know the techniques for identifying bacteria
- The student will know the technique for performing blood cultures
- The student will know the blood culture pathway
- The Sepsis Six campaign

**3) BACTERIAL RESISTANCE AND ANTIBIOTIC SENSITIVITY TESTS**

**Learning objectives**

- The student will know the main mechanisms of bacterial resistance
- The student will know the methodology of antibiotic susceptibility testing.
- The student will know the issues related to the major health-care associated infections, definitions, risk factors and pathogens.

#### **4) MICRO-ORGANISMS FOUND IN RESPIRATORY TRACT INFECTIONS**

##### **Learning objectives**

- The student will know the main causative agents of respiratory tract infections.
- The student will know about the sampling methods for investigating infections of the respiratory system.

#### **5) MICRO-ORGANISMS FOUND IN GASTROINTESTINAL INFECTIONS**

##### **Learning objectives**

- The student will know the main causative agents of gastrointestinal infections
- The student will know about the sampling methods for investigating gastrointestinal infections

#### **6) MICRO-ORGANISMS FOUND IN WOUNDS, ABSCESSSES, SUBSTANCES REMOVED DURING SURGERY**

##### **Learning objectives**

- The student will know the main causative agents of skin and tissue infections.
- The student will know about the sampling methods for investigating infections of skin and tissues.

#### **7) MICRO-ORGANISMS FOUND IN CEREBROSPINAL FLUID**

##### **Learning objectives**

- The student will be able to know the main causative agents of central nervous system infections
- The student will know about the sampling methods for investigating infections of the central nervous system