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**COURSE: GENERAL PATOLOGY**

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**ACADEMIC YEAR: 2017-2018**

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**TYPE OF EDUCATIONAL ACTIVITY: Basic**

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**TEACHER: Prof. Giuseppe Terrazzano**

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Language: **ITALIAN**

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ECTS: **6** (lessons and tutorials/practice)n. of hours: **48** (lessons and tutorials/practice)Campus: **Potenza**  
Dept./School: **Department of Sciences**  
Program: **Biotechnologies (L-2)**Semester: **I**  
(from **2 October 2017**  
to **31 January 2018**)

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**EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**

- The course of General pathology is the main teaching whose educational purpose is the transfer of knowledge about the biological basis of disease. The main objective of the course will be to address the study of the main pathogenic factors biological-chemical-physical features in human and the pathogenetic mechanisms responsible for homeostasis alterations underlying disease, and the development and progression of pathological events. Additional aims are the study of the basic principles of the pathophysiology and the acquisition of basic and common elements of medical terminology.
- The main knowledge provided will be:
  - the elements and the basic principles about the mechanism and determinism of diseases;
  - The knowledge of the pathological manifestations at the level of molecules and cells, as well as of tissues, organs, apparatuses and systems of the human body;
  - The study of pathophysiological processes of main systems;
  - The knowledge about the immune system and its role in defense against disease and in causing the pathological processes;
- The main student's ability will be:
  - the correct identification of the main causes of disease etiology;
  - The analysis and evaluation of pathological and pathophysiological processes,
  - The use of the acquired knowledge concerning the disease determinism for the identification of therapeutic strategies;
  - The appropriate acquisition of medical terminology.

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**PRE-REQUIREMENTS**

The mandatory prerequisite is to have successfully argued the final examination for the Biochemistry and General Biology courses. It is also considered crucial to have acquired and assimilated the following knowledge, typically provided by the courses of the first two years of the degree in Biotechnologies:

1. elementary concepts of the structure of molecules, cells and cell substructure;
  2. knowledge over the fundamental concepts of biochemical processes, particularly those relating to the Biochemistry representing prerequisites for Pathology;
  3. knowledge of the basics of anatomy and physiology of the cell, organs, apparatus and systems of the human body;
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**SYLLABUS**

The course is divided into the following thematic-learning modules based on classroom lessons (see detailed course program): 1. Basics (2 hours) 2. General etiology (4 hours). 3. Genetic Pathology (10 hours). 4. Adaptations and cellular mechanisms of injury (2 hours). 5. The molecular mechanisms of cell injury (6 hours). 6. Response to damage: repair processes (2 hours). 7. Reaction to give: host-pathogen interactions and immunity (6 hours). 8. Cellular and molecular basis of the immune response (6 hours). 9. Tumours (10 hours).

**Detailed program: 1. Fundamentals.** Concepts of general pathology and pathophysiology. Health and disease. Etiology, pathogenesis, evolution; course, results. Principles of the scientific method, epidemiological and experimental methodology; **2. Etiology general.** Physical causes of disease. Trauma. Changes in

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temperature, burns, pressure alterations. Ionizing radiations. Exciting radiation. Electric currents. Chemical causes. Exotoxins and bacterial endotoxins. The causes of diseases. Detoxification or activation of xenobiotics. Elements of environmental and occupational diseases; **3. Genetic Pathology.** Alterations in the number of chromosomes. Major chromosomal aberrations. The monogenic diseases. Pathogenesis of monogenic diseases. Types of mutations. Hereditary diseases and transmission mode. Mendelian monogenic diseases, anomalous transmission (triplet repeat diseases, imprinting, mitochondrial diseases). Inborn errors of metabolism (genetic diseases and enzymatic defects). Diseases and multifactorial polygenic inheritance; **4. Adaptations and cellular mechanisms of injury.** Atrophy, hypertrophy, hyperplasia: pathogenetic mechanisms. Definition of hypoplasia, aplasia, atresia, agenesis. The metaplasia. Dysplasia, pre-neoplastic lesions, carcinoma in situ; **5. The molecular mechanisms of cell injury.** Oxidative stress: source of free radicals, lipid peroxidation, oxidation of proteins and DNA. Antioxidant defenses of the cell. The hypoxic damage. Reperfusion injury. Necrosis. Causes of necrosis. Types of necrosis: simple, coagulative, colliquative, dry, wet, and gaseous Gangrene. The apoptosis. Causes of apoptosis. Morphological, biochemical and molecular process of necrosis and apoptosis. Distinctive elements of apoptosis compared to cell death by necrosis;

**Response to damage: repair processes.** Stages of the repair process of damaged tissues. Pathology of the extracellular space. Amyloidosis. pathological calcifications. Localized and systemic fibrosis; **7. Reaction to damage: host-parasite interaction and immunity.** Pathogenetic mechanisms of parasites, viruses, bacteria, fungi, protozoa and helminths. Physical and physiological barriers of innate immunity. The recognition of pathogens in innate immunity. Interferons. The complement system. Phagocytosis. Macrophages and professional phagocytes. Opsonization and phagocytosis. Mechanisms of killing by phagocytes. Role of reactive oxygen species and nitric oxide. Reaction to injury: inflammatory processes. Angiophlogosis. The cardinal signs. vascular and hemodynamic aspects. Modifications of the caliber and vascular leakage. Endothelial cell activation. Margining, leukocyte adhesion and diapedesis. Chemotaxis, chemokines and other chemotactic factors. Formation of exudates. Abscesses. Mediators of the inflammatory process of cellular origin. Mediators of the inflammatory process of the plasma source. The regulation of the inflammatory process. chronic inflammation. Factors of chronic inflammatory processes. chronic inflammation nonspecific, specific and granulomatous. General effects. acute phase protein, elevated ESR, leukocytosis. The fever.; **8. Cellular and molecular basis of the immune response.** Organization of the immune system. Primary and secondary lymphoid organs. Distribution and recirculation of immune cells. The antigen. The antigen receptor of B lymphocytes and the T-cell molecular structure of gene products. Organization of genes and rearrangement mechanisms. B and T lymphocyte repertoire development. The molecules of the Major Histocompatibility Complex (MHC). The antigen presentation to the immune system. Antigen Presenting Cells. Processing of the extracellular and intracellular antigens. Activation of T and B lymphocytes. The role of cytokines in the differentiation of Effector mechanisms and of humoral responses. The cooperation between T and B lymphocytes. Plasma cells. Kinetics of primary and secondary response. Effector mechanisms of cell-mediated. regulatory cells. Immune tolerance. Central and peripheral tolerance to self-antigens. Tolerance of foreign antigens. Hypersensitivity reactions. Autoimmunity. Classification of immune-mediated disease and pathogenesis of autoimmune diseases. Deficiency of the immune system. Congenital immune-deficiencies. Acquired immune- deficiencies. Tumor immunology; **9. Neoplasms.** Key features of malignancy. Properties of transformed cells (metabolic, proliferative and ultrastructural features). Dysplasias, pre-neoplastic lesions, carcinoma in situ. Histogenesis, morphology, and classification criteria. Aspects of cancer epidemiology. molecular basis of cancer. Viral oncogenes, proto-oncogenes and cellular oncogenes. Tumor suppressor genes. Growth and invasiveness of tumors. Mode of growth of benign and malignant neoplasms. Molecular basis of invasiveness. dissemination of metastases streets. Factors favoring metastasis. Immunity, inflammation and cancer. The causes of cancer. hereditary cancers. physical and chemical carcinogenesis. environmental carcinogenesis. viral carcinogenesis. Tumors and hormones. Cancer cachexia. Staging and grading of tumors;

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#### TEACHING METHODS

The course includes 80 hours of teaching, divided into classroom lessons

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#### EVALUATION METHODS

Final oral examination to ascertain the acquisition by the students of the knowledge and skills described in the "Educational objectives and expected learning outcomes". The final evaluation will be expressed by a vote (30/30).

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**TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL**

- Pontieri. Patologia Generale - PICCIN;
- Parham. Immunologia- EDISES;
- Robbins e Cotran, Le basi patologiche delle malattie, Elsevir Editore
- Abbas. "Immunologia Cellulare e Molecolare", Piccin Editore
- Doan, Le basi dell'immunologia, Zanichelli.

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**INTERACTION WITH STUDENTS**

At the beginning of the course, after describing the objectives, the detailed program and the Learning method, the teacher will indicate the reference texts and the availability of teaching materials (lessons, lecture notes, scientific articles, the course program , etc.). In this regard, during the course, the teacher will share with students, in electronic format (pdf sheet), each lesson took place on an appropriate web platform. The hours reserved for the interaction with student will be from 11.30 am to 01.30 pm on Wednesday and from 02.00 pm to 03.00 pm on Thursday. In addition, the teacher will be available for contact with the students, through the use of email or phone.

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**EXAMINATION SESSIONS (FORECAST)<sup>1</sup>**

02/2018, 04/2018, 05/2018, 07/2018, 09/2018, 11/2018,

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SEMINARS BY EXTERNAL EXPERTS	YES	X	NO
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**FURTHER INFORMATION**

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<sup>1</sup>Subject to possible changes: check the web site of the Teacher or the Department/School for updates.