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**COURSE (TITLE):** Molecular Pathology and Immunology

**LECTURERS:**

**YEAR and SEMESTER:** 2 year first semester

**CREDITS (CFU):** 8

**SECTOR (SDS):** MED/04 General Pathology

**ACADEMIC YEAR:**

**ASSESSMENT:** Oral examination

**LOCATION:** Department of Environmental, Biological and Pharmaceutical Science and Technologies, Via Vivaldi 43 Caserta

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**COURSE OBJECTIVES/OUTCOMES:**

To understand the molecular basis and the mechanisms leading to the onset of pathological phenomena in humans. To understand the role of the immune system in preventing disease.

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**SYLLABUS (overview)**

The course will focus on the Molecular mechanisms responsible for pathological phenomena and the role of the Immune response in human diseases. Oncology, Immunology and Immunopathology will be discussed.

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**SYLLABUS (Detailed description):**

**Cells and Tissues of the Immune System**

**Innate Immunity and Inflammation:**

**Natural Killer Cells**

**TLR signaling**

**Cytokines and chemokines**

**Adaptative Immunity:**

**Antibody Structure and Antigens**

**MHC Structure and Antigen Presentation**

**Antigen Receptors and Accessory Molecules**

**Lymphocyte Development and Expression of Antigen Receptors (BCR/TCR)**

**B cell receptor . Structure and function of Immunoglobulins. Molecular Genetics. Antigen-antibody interactions.**

**Regulation of the Immune Response**

**Lymphocyte Activation and Signal Transduction**

**Signal transduction to T lymphocytes. ITAM and phosphorylation.**

**Immunopathology:**

**Autoimmunity and Hypersensitivities**

**Immune Deficiencies**

**Immunological Tolerance**

**Vaccines:**

**Prophylactic and therapeutic vaccines. Role of humoral and cellular immune response.**

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**Correlates of protection. Impact and society concern. Side effects. Role of adjuvants. New generation vaccines.**

**OMIC analyses. Next generation sequencing. Applications in the study of the immune response.**

**T cell receptor. Molecular Genetics. The CD3 complex. Mechanisms of T cell recognition.**

**Cytofluorimetry (principles and applications in the study of the immune response)**

**Cancer Immunotherapy. Tumor associated antigens, tumor escape. Immuno-therapeutic markers and validated assays for monitoring the tumor-specific immune response. Adoptive T cell Therapy (CAR T and TCR).**

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**TEXTBOOKS:**

**The latest edition of:**

**Peter Parham "The immune system"**

**Abul Abbas "Cellular and Molecular Immunology"**

**Kennet Murphy "Janeway's Immunobiology"**

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**ADDITIONAL READING:**

**The cancer Immunotherapy mechanistic insights (J immunol monography 2018)**

**Costa V et al "uncovering the complexity of transcriptomes with RNA seq (J immunol and Biotechnol. 2010)**

**Metzker M "Sequencing technologies the next generation" (Nat Rev Gen 2009)**

**Cossarizza A et al "Guidelines for the use of flow cytometry and cell sorting in immunological studies" (eur J Immunol 2017)**

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