



# UNIVERSITÀ DEGLI STUDI DI PALERMO

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| <b>DEPARTMENT</b>              | Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                  |
| <b>ACADEMIC YEAR</b>           | 2022/2023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                  |
| <b>BACHELOR'S DEGREE (BSC)</b> | BIOTECHNOLOGIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                 |                  |
| <b>INTEGRATED COURSE</b>       | PATHOLOGY AND IMMUNOLOGY - INTEGRATED COURSE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                  |
| <b>CODE</b>                    | 20449                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 |                  |
| <b>MODULES</b>                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 |                  |
| <b>NUMBER OF MODULES</b>       | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                 |                  |
| <b>SCIENTIFIC SECTOR(S)</b>    | BIO/12, MED/04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                 |                  |
| <b>HEAD PROFESSOR(S)</b>       | VASTO SONYA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Professore Associato            | Univ. di PALERMO |
| <b>OTHER PROFESSOR(S)</b>      | DI ROSA LUIGI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Ricercatore a tempo determinato | Univ. di PALERMO |
|                                | VASTO SONYA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Professore Associato            | Univ. di PALERMO |
|                                | AGNELLO LUISA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Professore Associato            | Univ. di PALERMO |
| <b>CREDITS</b>                 | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                 |                  |
| <b>PROPAEDEUTICAL SUBJECTS</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                 |                  |
| <b>MUTUALIZATION</b>           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                 |                  |
| <b>YEAR</b>                    | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                 |                  |
| <b>TERM (SEMESTER)</b>         | 1° semester                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                 |                  |
| <b>ATTENDANCE</b>              | Not mandatory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                  |
| <b>EVALUATION</b>              | Out of 30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                 |                  |
| <b>TEACHER OFFICE HOURS</b>    | <p><b>AGNELLO LUISA</b></p> <p>Monday 10:00 12:00 Sezione di Biochimica Clinica, Medicina Molecolare Clinica e Medicina di Laboratorio, Dipartimento BIND, Via del Vespro 129</p> <p>Wednesday 10:00 12:00 Sezione di Biochimica Clinica, Medicina Molecolare Clinica e Medicina di Laboratorio, Dipartimento BIND, Via del Vespro 129</p> <p><b>VASTO SONYA</b></p> <p>Monday 10:00 11:30 Dipartimento Stebicef, parco d'Orleans, Edificio 16, piano primo</p> <p>Wednesday 10:00 11:30 Dipartimento Stebicef, parco d'Orleans, Edificio 16, piano primo</p> |                                 |                  |

**DOCENTE:** Prof.ssa SONYA VASTO

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| <b>PREREQUISITES</b>      | The student will have a basic knowledge of cell biology, biochemistry, genetics, microbiology to fully understand the physiologic mechanisms of the immune system and the pathogenic mechanisms leading to diseases and tumors and understand the methodologies of clinical biochemistry applied to human pathology.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>LEARNING OUTCOMES</b>  | <p>Knowledge and understanding: Role of the immune system towards infectious agents and tumors. Understanding the homeostasis and the alterations of human body which may lead to diseases using the methodologies of clinical biochemistry.</p> <p>Applying Knowledge and understanding: The newly acquired knowledge is very important to understand the human physiology and discern the aetiological events that may alter the natural homeostasis determining disease.</p> <p>Making judgement: Ability to synthesize and analyse. This ability will lead to the formulation of a critical thinking on the studied topics and to estimate the changes induced by the environmental factors on the human body. Acquiring a critical approach aimed at the application in immunology, pathology and clinical biochemistry methodologies.</p> <p>Communication: Acquiring the ability to correctly describe the human body and the related disease conditions by means of an appropriate terminology. Ability to interact with other professionals involved in diagnostic and therapeutic processes in an efficient work group Lifelong learning skills: Ability to correctly integrate the acquired knowledges of immunology, pathology and clinical biochemistry in physiology and human pathology that aims at fully understand the overall functioning of the human body and of the complex interactions between different anatomical regions. Understanding applications and limitations of the methodologies in the biomedical field.</p> |
| <b>ASSESSMENT METHODS</b> | The student will have to answer at least 2/3 questions posed orally by the examiner and these will be related to all the topics dealt with during the course, with reference to recommended textbooks. The examination evaluation will be scored in thirties along the following scheme: 30-30 cum laude: Excellent knowledge of the topics and correct use of language, analytical skills, ability to apply the knowledge to solve the proposed problems. 26-29: Good command of the subjects and correct use of language, ability to apply the knowledge to solve the proposed problems. 24-25: Basic knowledge of the main topics, proper language skills, limited ability to apply the knowledge to solve the proposed problems. 21-23: Lack of competence in the main topics dealt with during the course although getting the basic knowledge, satisfactory language skills, but limited ability to apply the knowledge to solve the proposed problems. 18-20: minimal basic knowledge of the main topics dealt with during the course and of the technical language, very low ability to apply the knowledge to solve the proposed problems. Failure: lack of an acceptable knowledge of the topics dealt with during the course.                                                                                                                                                                                                                                                                                                          |
| <b>TEACHING METHODS</b>   | Lessons, classroom and laboratory exercises.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**MODULE  
PATHOLOGY AND GENERAL ONCOLOGY**

*Prof. LUIGI DI ROSA*

**SUGGESTED BIBLIOGRAPHY**

G.M. Pontieri a cura di Mainiero F., Misasi R., Sorice M. - Patologia generale e Fisiopatologia generale- VI Edizione, Piccin, ISBN: 978-88-299-2963-4

Rosa M. Pascale, Francesco Feo - Elementi di Oncologia Molecolare - Piccin ISBN:978-88-299-2937-5

Robbins - Basic Pathology - 10e edition Elsevier May, 10 2017 ISBN: 978-0323353175

Sono a disposizione degli studenti le presentazioni (.pdf) utilizzate durante le lezioni ed, a richiesta, articoli scientifici di approfondimento su specifici argomenti

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|-------------------------------|-----------------------------------------------|
| <b>AMBIT</b>                  | 10643-Attività formative affini o integrative |
| <b>INDIVIDUAL STUDY (Hrs)</b> | 47                                            |
| <b>COURSE ACTIVITY (Hrs)</b>  | 28                                            |

**EDUCATIONAL OBJECTIVES OF THE MODULE**

Understanding the causes and pathogenic mechanisms that alter the natural homeostasis through the cellular and molecular events involved. Use of advanced diagnostic methods in the field of human pathology

**SYLLABUS**

| <b>Hrs</b> | <b>Frontal teaching</b>                                                                                                                                                                                                                                                                                                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2          | Disease as an alteration of natural homeostasis, molecular mechanism of damage.                                                                                                                                                                                                                                                                   |
| 4          | The inflammatory response. Acute inflammation:vascular changes, edema. Cytokines as molecular mediator of inflammatory responses and their receptors. Systemic effects of cytokines: fever, pathophysiology and different types of fever, the acute phase response. Chronic inflammation: cellular infiltration, different types of infiltration. |
| 4          | Hypersensitivity reactions: classification, activation and effector mechanisms                                                                                                                                                                                                                                                                    |
| 4          | Neoplasia: nomenclature, molecular aetiology of tumors, molecular mechanisms of neoplastic transformation, oncogenes and tumor suppressor genes. Molecular markers in oncology. Cancer and inflammation. Tumor angiogenesis.                                                                                                                      |
| 2          | Anti tumor immunity: cells, mediator, tumor specific and tumor associated antigens. Use of monoclonal antibodies in human anti tumor therapy                                                                                                                                                                                                      |
| <b>Hrs</b> | <b>Practice</b>                                                                                                                                                                                                                                                                                                                                   |
| 4          | Applications in laboratory diagnostics of antigen-antibody reaction.                                                                                                                                                                                                                                                                              |
| 4          | Applications of molecular biology in clinical diagnostics                                                                                                                                                                                                                                                                                         |
| 4          | Real time PCR: genotyping with fluorescence-labeled probes                                                                                                                                                                                                                                                                                        |

## MODULE CLINICAL BIOCHEMISTRY

*Prof.ssa LUISA AGNELLO*

### SUGGESTED BIBLIOGRAPHY

Panteghini - Interpretazione dei dati di laboratorio- Piccin ISBN 9788829918966

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|-------------------------------|-----------------------------------------------|
| <b>AMBIT</b>                  | 10643-Attività formative affini o integrative |
| <b>INDIVIDUAL STUDY (Hrs)</b> | 47                                            |
| <b>COURSE ACTIVITY (Hrs)</b>  | 28                                            |

### EDUCATIONAL OBJECTIVES OF THE MODULE

-optimal knowledge and comprehension of the mostly used guide lines and flow charts in clinical practice-EBM  
 -problem solving, from lab test to clinical diagnosis.  
 -excellent communication and analytical-synthetical ability.

## SYLLABUS

| Hrs | Frontal teaching                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
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| 3   | Laboratory tests: definition, types, requests.<br><br>Pre-analytical phase: preparation of the patient, collection of biological samples, processing and identification of biological samples. General laboratory techniques with descriptions of the principles - colorimetry, turbidimetry, nephelometry, fluorimetry, atomic absorption and emission, potentiometric electrochemical techniques, kinetic reactions, electrophoresis, immunoelectrophoresis, immunofixation, immunochemical analysis with monoclonal antibodies, isoelectric focusing, chromatography, radioimmunoassay, count cell, flow cytometry, clinical microscopy, mass spectrometry, HPLC, molecular biology and recombinant DNA technologies, multiple analyzers, magnetic resonance spectroscopy, PET. |
| 2   | Enzymes: tissue and organ profiles. Acid and alcalin phosphatase, aldolase, aminotrasferase, LDH, gammaGT, cholinesterase, amylase, lipase, protease, G-6-PD, piruvate kinase, lysozyme.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 3   | Metabolism of glucose:<br>Diabetes: biochemistry of DMT1 and DMT2; biochemistry of diabetes complications; clinical biochemistry diagnostics (serum glucose, urine glucose, insulin, C-peptide, glucagon, cortisol, GH, glicated proteins and their significance, OGTT, ketone bodies in serum and urine, lactic acid, piruvic acid, dyslipidemia in diabetic patients, urine test in diabetic patients.<br>Hypoglicemia: clinical biochemistry                                                                                                                                                                                                                                                                                                                                    |
| 2   | Metabolism of lipids:<br>Fatty acids, cholesterol, HDL-cholesterol, LDL-cholesterol, tryglicerides, phospholipids. Lipoprotein. Dyslipidemia. Hypercholesterolemia. Atherosclerosis and cardiovascular diseases.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2   | Metabolism of proteins:<br>Plasma proteins. Electrophoresis of plasma proteins: interpretation of results. Clinical biochemistry of kidney disease. Hyperammonemia. Clinical biochemistry of liver failure. Urea metabolism: clinical biochemistry of enzymatic deficiency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 2   | Endocrine system:<br>Clinical biochemistry of hypothalamus-pituitary axis: GH and growth, prolactin and amenorrhea, GnRH, LH, FSH and reproduction, ACTH, TSH e functional tests.<br>Clinical biochemistry of endocrine pancreas: insulin and glucagon, somatostatin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2   | Clinical biochemistry of gastrointestinal hormones.<br>Clinical biochemistry of adrenal cortex hyperplasia and hypofunction.<br>Clinical biochemistry of hyperthyroidism, thyreotoxicosis, hypothyroidism.<br>Clinical biochemistry of testis, ovary and sex differentiation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Hrs | Practice                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 2   | Clinical biochemistry of rickets. Clinical biochemistry of osteoporosis and osteomalacia. Calcium homeostasis. Hormone receptors and their importance in clinical biochemistry.<br><br>Clinical biochemistry of arterial pressure regulation: ANF, catecholamines, glucocorticoids. Essential hypertension and in the secondary forms.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2   | Clinical biochemistry of acid base balance. Blood gas analysis: interpretation and reporting.<br><br>Myocardial infarction: risk factors, biochemical modification in the necrotic area; clinical enzymes, new markers of myocardial infarction.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

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| 2 | Clinical Biochemistry of jaundice.<br>Clinical biochemistry of exocrine pancreas.<br>Clinical biochemistry of healthy and pathologic renal function<br>Clinical Biochemistry of heme metabolism<br>Clinical Biochemistry of rheumatic, connective and autoimmune diseases.                                                                                                     |
| 2 | Cancer diseases: biochemistry of cancer; metastasis, biomarkers.<br>Biochemistry of nutrition and its surveillance.                                                                                                                                                                                                                                                            |
| 2 | Laboratory tests in genetic diseases.<br>Laboratory tests in myopathies.<br>Clinical biochemistry of neuro-psychiatric diseases.<br>Biochemistry of pain.<br>Clinical biochemistry of cerebro-spinal fluid.<br>Clinical biochemistry in shock, trauma and surgery.<br>markers of neurodegeneration and cognitive impairment.                                                   |
| 2 | Clinical molecular biology: diagnostic techniques used for the diagnosis of the main genetic diseases. Main chromosomal abnormalities revealed by karyotyping. Monogenic diseases and DNA typing. DNA mutations analysis by direct and indirect analyzes (restriction polymorphism). PCR reaction (polymerase chain reaction) for the amplification of abnormal DNA sequences. |

## MODULE IMMUNOLOGY

*Prof.ssa SONYA VASTO*

### SUGGESTED BIBLIOGRAPHY

- Le basi dell'immunologia. Fisiopatologia del sistema immunitario  
Abul K. Abbas, Andrew H. Lichtman, Shiv Pillai, V edizione, 2017, EDRA  
ISBN: 978-0-323-39082-8  
Basic Immunology 6th Edition Functions and Disorders of the Immune System  
Authors: Abul Abbas Andrew H. Lichtman Shiv Pillai  
Paperback ISBN: 9780323549431  
eBook ISBN: 9780323639095

Review e articoli scientifici forniti dal docente.

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|-------------------------------|-----------------------------------------------|
| <b>AMBIT</b>                  | 10643-Attività formative affini o integrative |
| <b>INDIVIDUAL STUDY (Hrs)</b> | 51                                            |
| <b>COURSE ACTIVITY (Hrs)</b>  | 24                                            |

### EDUCATIONAL OBJECTIVES OF THE MODULE

The aims of the module are to provide an understanding of core immunology and the immunological basis of some common diseases. The students, at the end of the course, should understand the cellular and molecular mechanisms of the immune response and their role in defense against infectious agents in the pathogenesis of immune-mediated reactions.

## SYLLABUS

| Hrs | Frontal teaching                                                                                                                                                                                                                                                                                |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6   | Properties and Overview of Immune Responses. Cells and Tissues of the Immune System: cells and their receptors. Complement system activation, function, receptors and complement regulatory proteins. Phagocytosis, dendritic cells and antigen presentation, Major Histocompatibility Complex. |
| 4   | Antibodies and antigens: structure and functions. Fc receptors. Cytokines, chemokines and their receptors.                                                                                                                                                                                      |
| 6   | T lymphocytes: Lymphocyte Development and their activation and differentiation. Functions of CD4+ Effector T Cells, Functions of CD8+ Effector T Cells and DN T cells. Mechanism of apoptosis.                                                                                                  |
| 2   | B Cell Activation and Antibody Production: Effector Mechanisms of Humoral Immunity.                                                                                                                                                                                                             |
| 4   | Natural killer cells, gamma delta T lymphocytes, NKT cells, lymphoid innate cells: antigen recognition and effector functions.                                                                                                                                                                  |
| 2   | Mechanisms of central and peripheral Tolerance of T and B lymphocytes.                                                                                                                                                                                                                          |