

**III year (1st semester) A.Y.  
2025-26**

Scientific Field	<b>LABORATORY TECHNIQUES IN MEDICINE</b>	TUTOR	ECTS
BIO/12	Clinical Biochemistry and Molecular Biology	Sergio Bernardini	3
MED/05	Clinical Pathology	Francesco Buccisano Silvia Pomella Giovanni Barillari	1 1 1
MED/07	Microbiology and Clinical Microbiology	Ciotti Marco	1
MED/07	Microbiology and Clinical Microbiology	Ceccherini Silberstein Francesca	2
VET/06	Parasitology	Di Cave David	1
		TOT	10

Sergio  
Bernardini  
**COORDINATOR**

**SPECIFIC AIMS**

- Knowledge of the fundamentals of the main laboratory techniques applicable to the qualitative and quantitative study of the significant determinants of pathogenic and biological process in medicine;
- Acquisition of the ability to apply the methodologies in order to properly detect clinical, functional and laboratory specimen, and critically interpret them also under the physiopathologic aspect, for diagnostic and prognostic purposes;
- Ability to evaluate the costs / benefits ratios in choosing diagnostic procedures, taking into account the need for proper clinical methodology and the principles of evidence-based medicine.



Book:

Michael Laposata

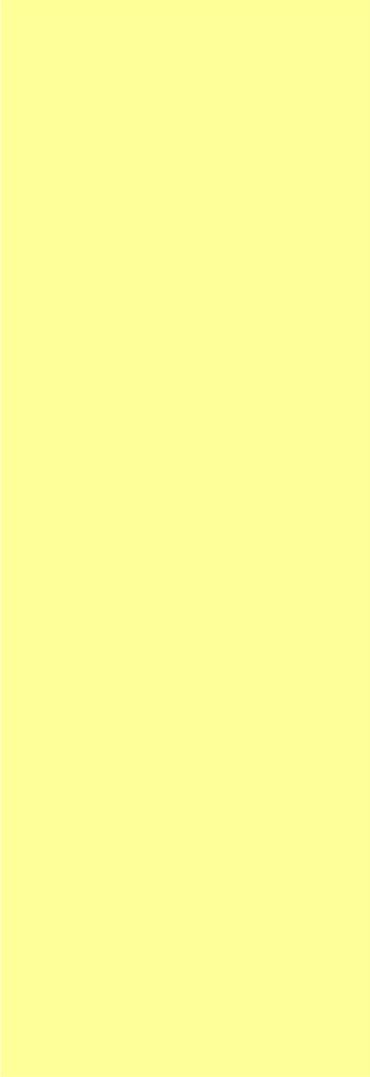
[Laboratory medicine diagnosis of disease in the clinical laboratory: The Diagnosis of Disease in the Clinical Laboratory](#)

**CLINICAL  
BIOCHEMISTRY AND  
MOLECULAR  
BIOLOGY**

Teacher's notes

Program:

- Pre-analytic variables.
- Laboratory automation.
- Analytic errors in Laboratory medicine.
- Post-analytic errors
- ROC curve, biomarkers specificity and sensitivity
- Immunoassay, RIA, EMIT, ELISA
- Protein Electrophoresis
- Mass spectrometry
- Vitamin D and Bone biomarkers
- LabMed in Thyroid diseases
- Hematology Laboratory Automation
- Acid-Base balance
- LabMed in Kidney diseases
- LabMed in Autoimmune and Atopic diseases
- LabMed in Prenatal screening
- LabMed in neurodegenerative diseases
- LabMed in Myocardial Diseases
- Diabetes
- Dyslipidemias



- LabMed in Gastroenterology

- LabMed Perspectives and Artificial Intelligence tools

## CLINICAL MICROBIOLOGY

**Principles of Clinical Microbiology:** Microbial ecology; Pathogenicity and virulence; Infection and disease; Host-parasite interaction; Epidemiology of infectious diseases; Pathologic consequences of infectious disease.

**Clinical Microbiology Methods:** Provisional diagnosis and laboratory investigation; Direct and indirect diagnosis; Collection, transportation and validation of clinical samples; Bacteriological, virologic and mycological diagnostic techniques; Turnaround time and results interpretation.

**Clinical Microbiology of Infections:** Upper and lower respiratory tract; Oral cavity; Gastroenteric apparatus; Genitourinary apparatus; Cardiovascular apparatus; Nervous system; Skin and soft tissues; Bones and articulations; Eye; Ear; Sexual transmitted infections; Bacteremia and septicemia; Fever of unknown origin; Infections in pregnancy; Obstetric and perinatal infections; Pediatric infections; Vector-borne infections; Multi-systemic zoonosis; Infections in immunocompromised patients; Nosocomial infections.

**Control of Infectious Diseases:** Antibiotic prescription; monitoring of infection treatment therapy.

## PARASITOLOGY

**Metazoan parasites:** Flatworms, Flukes and Roundworms (Cestodes, Trematodes and Nematodes) **Laboratory diagnosis** of parasitic diseases

## CLINICAL PATHOLOGY

- INTRODUCTION : immunological reactions; antigens and antibodies; the complement in immunohemolytic reactions.
- ERYTHROCYTE BLOOD GROUP : genetical and immunological approach; biochemical approach. - ABO BLOOD GROUP : ABH and LEWIS antigens biochemical genetics; blood group glycoproteins; erythrocytes ABH glycolipids; erythrocytes Lewis glycolipids.
- ABO BLOOD GROUP : ABO phenotypes; molecular biology of ABO blood groups; ABO antibodies; the Hh system.
- LEWIS SYSTEM
- I AND i ANTIGENS
- THE P SYSTEM
- THE RH SYSTEM : main phenotypes and genetics of the system.
- KELL AND DUFFY SYSTEM
- OTHER BLOOD GROUP SYSTEM

- LEUKOCYTE AND PLATELET SYSTEM : HLA leukoplatelet groups; leukoplatelet non-HLA antigens; antileukocyte antibodies; antiplatelet antibodies.
- THE HLA SYSTEM : MHC genetics; type I and II MHC genes and molecules; MHC polymorphism; MHC and immunological response; MHC and diseases susceptibility.
- IMMUNOLOGICAL REACTIONS TO RED BLOOD CELLS, GRANULOCYTE AND - PLATELETS TRANSFUSION.
- HEMOLYTIC DISEASE OF THE NEWBORN : diagnosis and therapy
- ANEMIAS : diagnosis and therapy
- AUTOIMMUNE HEMOLITIC ANEMIA: diagnosis and therapy
- THALASSEMIA: diagnosis and therapy
- MHC AND ORGAN TRANSPLANTATION: genetics of histocompatibility; cellular typing; immunological aspects of organ rejection; transplantation antigens.
- GVHD : diagnosis and therapy
- TRANSFUSIONAL THERAPY: blood components, therapeutic indications, risks and complications.
- HAEMAPHERESIS : principles and indications
- Knowledge of Transfusion Medicine, Apheresis and Immunohematology;
- Knowledge of blood processing and production of haemocomponents for transfusion therapy and topical use.

Robbins The pathologic basis of disease .

Merck's online manual, Subsection Haematology and Oncology

- <http://www.merckmanuals.com/professional/hematology-and-oncology>

Transfusion Medicine and Hemostasis Clinical and Laboratory Aspects Shaz, Hillyer, Roshal, Abrams, Elsevier

## EXAM COMMISSION

The Coordinator, full Professors of the disciplines, Professors of similar disciplines, Specialists of the subject, compose the exam Commission of the Integrated Course.

Bernardini Sergio President
Barillari Giovanni
Buccisano Francesco
Silvia Pomella
Di Cave David
Ciotti Marco
Ceccherini Silberstein Francesca

## CONTACTS

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PREREQUISITES: Previous knowledge and competence in the following subjects:

Human Anatomy1, Human Anatomy 2, Histology and Embryology, Chemistry and Introductory Biochemistry, Biochemistry and Molecular Biology, Physics and Statistics, Immunology and Immunopathology, Microbiology.

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:

### 1. **Knowledge and Understanding**

- Define the terms necessary to understand disease principles and epidemiology: normal and transient flora, opportunists, pathogen, infection, disease, virulence and its measures, etiology, nosocomial, epidemic, endemic, pandemic, portals of entry and exit, types of symbiosis, predisposing factors, morbidity and mortality.
- Provide a comprehensive explanation of main mechanism of clinical pathology; especially concerning the hematologic profile. Focus on the concept of blood transfusion, hemodialysis, transplantation and gvhd
- Describe the pre-analytic, analytic, post analytic principles of laboratory techniques, focusing on the thought of reaching a productive outcome.
- Learn the specific values of routine blood and urine examination and differentiate the physiologic and pathologic pattern.
- Interpret appropriate laboratory and diagnostic studies.

### 2. **Applying Knowledge and Understanding**

- Apply the theoretical knowledge to the clinical and laboratory setting, being able to recognize the general diagnostic aspects of biochemical, haematologic and infectious diseases.
- Understand and comply with laboratory safety rules and procedures, especially the constant use of aseptic technique and the proper handling of biohazards.
- Become familiar with procedures for performing and reporting laboratory experiments.
- Compare and contrast light and electron microscopy; differential and special stains and their purposes. Define tools and techniques used in biotechnology,

including recombinant DNA technologies, PCR, clonal selection, and therapeutic, agricultural and scientific applications.

- Learn the practical aspects of the transfusion techniques and how to perform them.
- Assess the indications and practical utilities of the major biochemical values.
- Provide a differential diagnosis based on specific clinical data.

### 3. **Making Judgements**

- Recognize the importance of an in-depth knowledge of the topics consistent with a proper medical education.
- Identify the benefits and adverse effects of any diagnostic and therapeutic intervention.

### 4. **Communication Skills**

- Present the topics orally in an organized and consistent manner.
- Use of proper scientific language coherent with the topic of discussion.

### 5. **Learning Skills**

- Identify the possible use of the acknowledged skills in the future career.
- Assess the importance of the acquired knowledge in the overall medical education process.