CdS Medicine and Surgery

3rd year (1st semester)
A.Y. 2026-27

COORDINATOR-Coordinatore:

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Scientific Field	LABORATORY TECHNIQUES IN MEDICINE	TUTOR	ECTS
BIO/12	Clinical Biochemistry and Molecular Biology	Sergio Bernardini	3
MED/05	Clinical Pathology	Francesco Buccisano Silvia Pomella Giovanni Barillari	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

SPECIFIC AIMS :

OBIETTIVI FORMATIVI:

EN: 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.

IT: Conoscenza dei fondamenti delle principali tecniche di laboratorio applicabili allo studio qualitativo e quantitativo dei determinanti significativi dei processi patogenetici e biologici in medicina;

Acquisizione della capacità di applicare le metodologie al fine di rilevare correttamente dati clinici, funzionali e di laboratorio, e di interpretarli criticamente anche sotto l'aspetto fisiopatologico, a fini diagnostici e prognostici;
Capacità di valutare il rapporto costi/benefici nella scelta delle procedure diagnostiche, tenendo conto della necessità di una corretta metodologia clinica e dei principi della medicina basata sull'evidenza.

PROGRAM - PROGRAMMA Module/o CLINICAL BIOCHEMISTRY AND MOLECULAR BIOLOGY BIOCHIMICA CLINICA E BIOLOGIA MOLECOLARE	EN: 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 IT: - Variabili pre-analitiche -Automazione di laboratorio -Errori analitici in medicina di laboratorio -Errori post-analitici -Curva ROC, specificità e sensibilità dei biomarcatori -Immunodosaggi, RIA, EMIT, ELISA -Elettroforesi delle proteine -Spettrometria di massa -Vitamina D e biomarcatori ossei -Medicina di laboratorio nelle malattie tiroidee -Medicina di laboratorio in gastroenterologia -Prospettive della medicina di laboratorio e strumenti di intelligenza artificiale -Automazione del laboratorio di ematologia -Equilibrio acido-base -Medicina di laboratorio nelle malattie renali -Medicina di laboratorio nelle malattie autoimmuni e atopiche -Medicina di laboratorio nello screening prenatale -Medicina di laboratorio nelle malattie neurodegenerative -Medicina di laboratorio nelle malattie miocardiche -Diabete -Dislipidemie -Medicina di laboratorio in gastroenterologia -Prospettive della medicina di laboratorio e strumenti di intelligenza artificiale
PROGRAM- PROGRAMMA Modul/o CLINICAL MICROBIOLOGY	EN: **Principles of Clinical Microbiology:** Microbial ecology; Pathogenicity and virulence; Infection and disease; Hostparasite 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; Hear; 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

	IT: **Principi di microbiologia clinica:** Ecologia microbica; patogenicità e virulenza; infezione e malattia; interazione ospite-parassita; epidemiologia delle malattie infettive; conseguenze patologiche delle malattie infettive. **Metodi di microbiologia clinica:** Diagnosi provvisoria e indagini di laboratorio; diagnosi diretta e indiretta; raccolta, trasporto e validazione dei campioni clinici; tecniche diagnostiche batteriologiche, virologiche e micologiche; tempi di risposta (turnaround time) e interpretazione dei risultati. **Microbiologia clinica delle infezioni:** Vie respiratorie superiori e inferiori; cavità orale; apparato gastroenterico; apparato genitourinario; apparato cardiovascolare; sistema nervoso; cute e tessuti molli; ossa e articolazioni; occhio; orecchio; infezioni sessualmente trasmesse; batteriemia e setticemia; febbre di origine sconosciuta; infezioni in gravidanza; infezioni ostetriche e perinatali; infezioni pediatriche; infezioni trasmesse da vettori; zoonosi multisistemiche; infezioni nei pazienti immunocompromessi; infezioni nosocomiali. **Controllo delle malattie infettive:** Prescrizione degli antibiotici; monitoraggio della terapia delle infezioni.

PROGRAM- PROGRAMMA	EN: **Metazoan parasites**: Flatworms, Flukes and Roundworms (Cestodes, Trematodes and Nematodes) **Laboratory diagnosis** of parasitic diseases
Modul/o PARASITOLOGY	IT: Parassiti metazoari: platelminti, trematodi e nematodi (cestodi, trematodi e nematodi). Diagnosi di laboratorio delle malattie parassitarie.

PROGRAM- PROGRAMMA Modul/o CLINICAL PATHOLOGY	EN: INTRODUCTION : immunological reactions; antigens and antibodies; the complement in immunohemolitic 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. IT: I NTRODUZIONE: reazioni immunologiche; antigeni e anticorpi; il complemento nelle reazioni immunoemolitiche. -GRUPPI SANGUIGNI ERITROCITARI: approccio genetico e immunologico; approccio biochimico. -GRUPPO SANGUIGNO ABO: antigeni ABH e LEWIS, genetica biochimica; glicoproteine dei gruppi sanguigni; glicolipidi eritrocitari ABH; glicolipidi eritrocitari Lewis. -GRUPPO SANGUIGNO ABO: fenotipi ABO; biologia molecolare dei gruppi sanguigni ABO; anticorpi ABO; sistema Hh. - SISTEMA LEWIS - ANTIGENI I e i - SISTEMA P

	-SISTEMA RH: principali fenotipi e genetica del sistema. - SISTEMI KELL E DUFFY - ALTRI SISTEMI DEI GRUPPI SANGUIGNI - SISTEMI LEUCOCITARI E PIASTRINICI: gruppi HLA leucopiastrinici; antigeni non HLA leucopiastrinici; anticorpi anti-leucociti; anticorpi anti-piastrine. - SISTEMA HLA: genetica del MHC; geni e molecole MHC di classe I e II; polimorfismo MHC; MHC e risposta immunologica; MHC e suscettibilità alle malattie. - REAZIONI IMMUNOLOGICHE CONTRO ERITROCITI, GRANULOCITI E PIASTRINE NELLA TRASFUSIONE. - MALATTIA EMOLITICA DEL NEONATO: diagnosi e terapia. - ANEMIE: diagnosi e terapia. - ANEMIA EMOLITICA AUTOIMMUNE: diagnosi e terapia. - TALASSEMIE: diagnosi e terapia. - MHC E TRAPIANTO D'ORGANO: genetica dell'istocompatibilità; tipizzazione cellulare; aspetti immunologici del rigetto; antigeni da trapianto. - GVHD (malattia del trapianto contro l'ospite): diagnosi e terapia. - TERAPIA TRASFUSIONALE: componenti del sangue, indicazioni terapeutiche, rischi e complicanze. - AFERESI EMATICA: principi e indicazioni. - Conoscenza della medicina trasfusionale, aferesi e immunoematologia; conoscenza della lavorazione del sangue e della produzione di emocomponenti per terapia trasfusionale e uso topico.

TEXTBOOKS	EN: Michael Laposata Laboratory medicine diagnosis of disease in the clinical laboratory: The Diagnosis of Disease in the Clinical Laboratory Teacher's notes Robbins The pathologic basis of disease . Merck's online manual, Subsection Haematology and Oncology

TESTI DI RIFERIMENTO	- http://www.merckmanuals.com/professional/hematology-and-oncology Transfusion Medicine and Hemostasis Clinical and Laboratory Aspects Shaz, Hillyer, Roshal, Abrams, Elsevier IT: come sopra e Note del Docente
TEACHING METHODS METODI DIDATTICI	EN: IT:
EXAM METHODS MODALITA' DI VALUTAZIONE	EN: The Coordinator, full Professors of the disciplines, Professors of similar disciplines, Specialists of the subject, compose the exam Commission of the Integrated Course IT: Il Coordinatore, i Professori ordinari delle discipline, i Professori di discipline affini e gli Specialisti della materia compongono la Commissione d'esame del Corso Integrato.

EXAM COMMISSION	EN: The Coordinator, full Professors of the disciplines, Professors of similar disciplines, Specialists of the subject, compose the exam Commission of the Integrated Course

	IT: Il Coordinatore, i Professori ordinari delle discipline, i Professori di discipline affini e gli Specialisti della materia compongono la Commissione d'esame del Corso Integrato.

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PREREQUISITES-PREREQUISITI	EN: 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. IT: PREREQUISITI: conoscenze e competenze pregresse nelle seguenti discipline: Anatomia umana 1, Anatomia umana 2, Istologia ed embriologia, Chimica e biochimica introduttiva, Biochimica e biologia molecolare, Fisica e statistica, Immunologia e immunopatologia, Microbiologia.

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.