UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2023/2024		
BACHELOR'S DEGREE (BSC)	BIOMEDICAL LABORATORY TECHNIQUES		
INTEGRATED COURSE	CLINICAL BIOCHEMISTRY - INTEGRATED COURSE		
CODE	21908		
MODULES	Yes		
NUMBER OF MODULES	2		
SCIENTIFIC SECTOR(S)	BIO/12		
HEAD PROFESSOR(S)	SCAZZONE CONCETTA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)	GAMBINO CATERINA MARIA	Ricercatore a tempo determinato	Univ. di PALERMO
	SCAZZONE CONCETTA	Professore Associato	Univ. di PALERMO
CREDITS	7		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	**GAMBINO CATERINA MARIA** Monday 14:00 15:00 Sez. Biochimica Clinica, Medicina Molecolare Clinica e Medicina di Laboratorio A.O.U.P. "Paolo Giaccone", Palermo. **SCAZZONE CONCETTA** Monday 12:00 15:00 Istituto di Biochimica , via del Vespro 129, 90127 Palermo		

DOCENTE: Prof.ssa CONCETTA SCAZZONE

PREREQUISITES	The knowledge and skills defined annually by the ministerial decree for the admission test to the degree courses is required. Basic knowledge of physics, chemistry and biology and basic laboratory still represent essential points for the Integrated Course of Clinical Biochemistry.
LEARNING OUTCOMES	Targets of the Biochemistry and Clinical Molecular Biology Integrated course are to acquire the basic knowledge (theoretical and practical) to critically evaluate the biochemical data at the in relation to human disease. In particular: • knowledge of the main laboratory tests and the cellular, molecular and pathophysiological basis which are prerequisites and foundation. • critical interpretation of laboratory tests results with regard to analytical and biological variation; reliability of diagnostic laboratory tests, examples of correct forms of laboratory reports. • basic concepts on the most relevant methodologies used in Clinical Biochemistry and their limitations. • appropriate use of laboratory tests in screening, staging and treatment of the disease. • correct interpretation of laboratory tests results and their critical correlation with molecular and cellular events induced by the disease. • acquisition of a proper programming prescription of tests in relation to the diagnosis or monitoring. Knowledge of the main diagnostic tests used in the laboratory of Clinical Biochemistry and diagnostic significance of reference change values of the main laboratory parameters. Proper ordering for laboratory tests and using of guidelines and flowchart based on "Evidence Based Medicine". Be able to relate to colleagues and health operating in laboratory to understand and synthesize relevant information about all the problems, understanding their content and devising and agreeing on how to study. Perform adequately the request of the most common laboratory tests. Implement self-protection measures in the collection and handling of biological samples.
ASSESSMENT METHODS	The learning assessment consists in midterm examination and an oral examination. Oral examination consists in a conversation in order to check competences and basic knowledge. The final grade will be the arithmetic mean between the grade obtained in the midterm test and the grade obtained in the oral exam, both expressed on a scale of thirty. The exam will tend to test the knowledge of the student achieved by assessing a) the knowledge captured; b) the processing capacity, c) the possession of adequate exhibition capacity. The pass mark will be reached when the student will demonstrate the knowledge of the issues at least in general terms, and has minimal application knowledge in order to solve concrete cases; the student must also have oral presentation skills to allow the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient. Midterm exams and Oral assessment. This assessment is used to evaluate the student's knowledge and understanding of the programme content, independent judgement, ability to apply acquired knowledge and specific technical terminology. The student will have to answer a minimum of four questions posed orally which will focus on the subjects covered in the programme, making reference to suggested texts. The assessment grades are given as numerical scores awarded out of a possible 30 points, and as follows: - 30 - 30 cum laude - ECTS grades: Excellent (A – A+) Result: Excellent knowledge of the taught subject matter. The student demonstrates good analytic-synthetic capabilities and is able to apply knowledge to resolve highly complex problems. - 27 – 29 – ECTS grades: Very good (B) Result: Very good knowledge of the taught subject matter and good use of language. The student demonstrates analytic-synthetic capabilities and is able to apply knowledge to resolve some complex problems. - 24 – 26 – ECTS grades: Good (C) Result: Good knowledge of the taught subject matter and good use of language. The student is able to apply knowledge to resolve problems of medium complexity. - 21 – 23 – ECTS grades: Satisfactory (D) Result: Reasonable knowledge of the taught subject matter, in some cases limited to the main topics. Acceptable use of technical language and capacity to apply acquired knowledge independently. - 18 – 20 – ECTS grades: Sufficient (E) Result: Minimal knowledge of the taught subject matter, often limited to the main topics. Modest use of technical language and some capacity to apply acquired knowledge independently. - 1 – 17 – ECTS grades: Fail (F) Result: Unacceptable knowledge of the taught subject matter. Little or no use of technical language and capacity to apply acquired knowledge independently. Exam failed. Necessary condition for passing the final exam of the Integrated Course must be the achievement of sufficiency in all modules. Therefore, an insufficient evaluation in one of the modules will not allow passing the final exam of the Integrated Course.
TEACHING METHODS	The didactic activity takes place through lectures.

MODULE
CLINICAL BIOCHEMISTRY

Prof.ssa CATERINA MARIA GAMBINO

SUGGESTED BIBLIOGRAPHY

Ciaccio M. Elementi di Biochimica Clinica e Medicina di Laboratorio. Edises 2020. ISBN 978-88-3623-010-5 Ciaccio M. Trattato di Biochimica Clinica e Medicina di Laboratorio. Edises 2021. ISBN 978-88-3623-044-0

AMBIT	10338-Scienze biomediche
INDIVIDUAL STUDY (Hrs)	60
COURSE ACTIVITY (Hrs)	40

EDUCATIONAL OBJECTIVES OF THE MODULE

The student will have to acquire the methodological and cultural bases, as well as the ability to use the clinical biochemical data as a diagnostic tool. Specific objectives of the module are to acquire the knowledge of the main laboratory tests and the biological, molecular and pathophysiological bases of the disease; knowledge of the main biochemical methods used in the clinical laboratory.

SYLLABUS

Hrs	Frontal teaching
4	Introduction to Clinical Biochemistry. Analytical variability, analytical error. Intra-individual and inter-individual biological variability, reference values. Clinical sensitivity and specificity, negative and positive predictive values of diagnostic tests.
6	Protein diagnostics. Major clinically relevant serum proteins. Separative technology of the monoclonal component; immunological typing using immunofixation/immunoseparation; quantification of the serum monoclonal component. Detection of free light chains. Determination of Bence Jones proteinuria.
6	Regulation of glycemic homeostasis. Major laboratory investigations used for screening, diagnosis, and biochemical monitoring of diabetes. Hypoglycemia. Determination of glucose in biological fluids
6	Major biochemical investigations for assessing glomerular filtration and tubular damage. Biomarkers for definition and classification of acute and chronic kidney disease. Determination of serum creatinine.
4	Urine test: biochemical and physical examination, identification of cellular elements, casts, and crystals. Classification of proteinuria and its pathophysiological value.
4	Analysis of CSF (Cerebrospinal fluid), microscopic evaluation, cellular analysis, and biochemical analysis. Laboratory diagnosis of neurodegenerative dementias. Beta-amyloid and Tau Protein as cerebrospinal fluid biomarkers for Alzheimer's disease.
4	Biomarkers of acute coronary syndromes and their clinical use. Clinical enzymology and emerging biomarkers of myocardial damage. Heart failure: definition and role of circulating biomarkers.
6	Clinical use of genetic testing. Role of mutational analysis in hereditary thrombophilia. Principles of pharmacogenetics and its clinical application.

MODULE
APPLIED CLINICAL BIOCHEMISTRY

Prof.ssa CONCETTA SCAZZONE

SUGGESTED BIBLIOGRAPHY

Ciaccio M. Trattato di Biochimica Clinica e Medicina di Laboratorio. Edises 2021. ISBN 978-88-3623-044-0.
Luigi Spandrio. Principi e Tecniche di Chimica Clinica. Piccin 2000. ISBN 978-88-299-1569-6.

AMBIT	10338-Scienze biomediche
INDIVIDUAL STUDY (Hrs)	45
COURSE ACTIVITY (Hrs)	30

EDUCATIONAL OBJECTIVES OF THE MODULE

Main targets of the course are: critical interpretation of medical laboratory tests in relation to analytical and biological variation; evaluation of the clinical performances of laboratory tests; how to report laboratory tests correctly; fully description of the techniques used in medical laboratories.

SYLLABUS

Hrs	Frontal teaching
4	Pre-analytical phase: patient preparation, collection, processing and identification of biological samples. General laboratory techniques and descriptions of their principles. Post-analytical phase: data collection, calculation, automatic processing. Analytical variation, analytical error, quality control systems. Biological variability. Reference values. Reporting laboratory tests.
3	Hormonal regulation and integration of carbohydrate and lipid metabolism with applications to biochemical-clinical diagnostics of endocrine-metabolic diseases.
3	Calcaemia regulation. Bone markers and bone pathologies associated with vitamin D deficiency. Muscle enzyme profile and clinical biochemical significance.
3	Characteristics of lipoproteins. Primary and secondary dyslipidaemias and clinical biochemical diagnostics.
3	Methods of Separation. Dialysis. Filtration. Centrifugation.
4	Immunochemical techniques: Basic concepts. Radioimmunoassay (RIA). Enzyme immunoassay (ELISA). Immunoassays by fluorescence. Use of immunoassays for plasma measurement of hormones. Thyroid hormone metabolism. Diagnostics of hyperthyroidism, thyrotoxicosis and hypothyroidism.
4	Basic biochemical technologies in clinical laboratory. UV-visible spectroscopy (absorption and emission; main components of a spectrophotometer, Lambert and Beer’s equation, kinetic analysis). Main application of UV-visible spectrometry. Fluorometry, Turbidimetry, nephelometry and main applications in clinical biochemistry.
4	Chromatographic techniques: basic principles of chromatographic separation; partition coefficients; column efficiency; main components of a column chromatography system; isocratic and gradient elution; characteristics of the chromatographic peak. Thin layer chromatography (TLC) and paper; adsorption, partition, ion exchange, molecular exclusion chromatography. Main detection systems. Qualitative and quantitative analysis by chromatography. Applications in the clinical biochemistry laboratory.
2	Flow cytometry and applications in the hematological field.