



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Biomedicina, Neuroscienze e Diagnostica avanzata		
ACADEMIC YEAR	2016/2017		
BACHELOR'S DEGREE (BSC)	BIOMEDICAL LABORATORY TECHNIQUES		
INTEGRATED COURSE	CLINICAL BIOCHEMISTRY AND CLINICAL MOLECULAR BIOLOGY - INTEGRATED COURSE		
CODE	01557		
MODULES	Yes		
NUMBER OF MODULES	3		
SCIENTIFIC SECTOR(S)	BIO/12, MED/46		
HEAD PROFESSOR(S)	CIACCIO MARCELLO	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)	CIACCIO MARCELLO	Professore Ordinario	Univ. di PALERMO
	BELLIA CHIARA	Professore Associato	Univ. di PALERMO
CREDITS	12		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p>BELLIA CHIARA</p> <p>Monday 12:00 14:00 Sezione di Biochimica Clinica, Medicina Molecolare Clinica e Medicina di Laboratorio, Dipartimento di Biomedicina, Neuroscienze e Diagnostica Avanzata (BiND), Via del Vespro 129</p> <p>Tuesday 12:00 14:00 Sezione di Biochimica Clinica, Medicina Molecolare Clinica e Medicina di Laboratorio, Dipartimento di Biomedicina, Neuroscienze e Diagnostica Avanzata (BiND), Via del Vespro 129</p> <p>CIACCIO MARCELLO</p> <p>Monday 10:00 12:00 Sezione di Biochimica Clinica</p> <p>Wednesday 10:00 12:00 Sezione di Biochimica Clinica</p>		

DOCENTE: Prof. MARCELLO CIACCIO

PREREQUISITES	As with all the teachings of the first year of the course of study is required the possession of knowledge and skills defined annually by the ministerial decree concerning the tests for admission to degree courses planned at national level. Basic knowledge of the areas of physical chemistry and biology and basic laboratory still represent essential points for the use of the training provided by the Integrated course of Clinical Biochemistry
LEARNING OUTCOMES	<p>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.</p> <p>In particular:</p> <ul style="list-style-type: none">• 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. <p>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.</p> <p>Proper ordering for laboratory tests and using of guidelines and flowchart based on "Evidence Based Medicine".</p> <p>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.</p> <p>Perform adequately the request of the most common laboratory tests.</p> <p>Implement self-protection measures in the collection and handling of biological samples.</p>
ASSESSMENT METHODS	<p>The learning assessment consists in itinere evaluations and an oral examination. Oral examination consists in a conversation, order to check competences and subject knowledge required from the course; the evaluation is expressed in thirtieths.</p> <p>The questions will tend to test the learning achieved by assessing a) the knowledge captured; b) the processing capacity, c) possession of adequate exhibition capacity. The pass mark will be reached when the student shows knowledge and understanding of the issues at least in general terms, and has minimal application knowledge in order to solve concrete cases; the student will also have presentation skills and of argument as to allow the transmission of his knowledge to the examiner. Below this threshold, the examination will be insufficient.</p>
TEACHING METHODS	The didactic activity takes place through lectures

MODULE CLINICAL BIOCHEMISTRY

Prof. MARCELLO CIACCIO

SUGGESTED BIBLIOGRAPHY

L. Sacchetti, P. Cavalcanti, G. Fortunato, L. Pastore, F. Rossano, D. Salvatore e F. Scopacasa: Medicina di Laboratorio e Diagnostica Genetica. Idelson-Gnocchi Editori, 2007.

G. Federici, P. Cipriani, C. Cortese, A. Fusco, P. Ialongo e C. Milani: Medicina di Laboratorio. 3a Edizione, McGraw-Hill, 2009.

I. Antonozzi, E. Gulletta. Medicina di Laboratorio Logica & Patologia Clinica. Piccin , 2012

L. Spandrio: Biochimica Clinica Speciale. Piccin Editore, 2006.

W.J. Marshall e S.K. Bangert: Biochimica in Medicina Clinica. Mc Graw-Hill, 1997.

B. Barbiroli, F. Filadoro, C. Franzini, L. Sacchetti, e F. Salvatore: Medicina di Laboratorio. UTET, 1996.

AMBIT	10338-Scienze biomediche
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INDIVIDUAL STUDY (Hrs)	45
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COURSE ACTIVITY (Hrs)	30
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EDUCATIONAL OBJECTIVES OF THE MODULE

Acquisition of basic and applied concepts of clinical biochemistry in order to evaluate methods and clinical applications of laboratory tests critically. Specific aim of the course is to be able to identify the correct tests in relation to clinical conditions of the patients and to be able to understand them in relation to the diagnosis.

Particularly, the students must:

- know the main laboratory tests and the biological, molecular and pathological basis for their use in medicine;
- use laboratory tests in screening, diagnosis, prognosis and therapy of diseases correctly;
- understand laboratory tests results and connect them to the molecular and cellular aspect of the pathologic state
- order laboratory tests appropriately in relation to diagnostic hypothesis or monitoring.

Knowledge of the molecular mechanisms underlying the main clinical syndromes arising from genetic alteration.

SYLLABUS

Hrs	Frontal teaching
2	Laboratory tests: definition, types, requests.
4	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. Post-analytical phase: data collection, calculation, automatic processing. Analytical variation, analytical error, quality control systems. Intra-individual and inter-individual biological variation, reference values, nomenclature and reporting of laboratory tests. Clinical sensitivity and specificity, predictive laboratory tests. Methodological approaches in clinical biochemistry. The main analytical techniques, automation in clinical biochemistry.
2	Biotechnologies and Clinical Biochemistry
2	Enzymes: tissue and organ profiles. Acid and alcalin phosphatase, aldolase, aminotrasferase, LDH, gammaGT, cholinesterase, amylase, lipase, protease, G-6-PD, piruvate kinase, lysozyme.
4	Metabolism of glucose: 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. Hypoglicemia: clinical biochemistry
2	Metabolism of lipids: Fatty acids, cholesterol, HDL-cholesterol, LDL-cholesterol, tryglicerides, phospholipids. Lipoprotein. Dyslipidemia. Hypercholesterolemia. Atherosclerosis and cardiovascular diseases.
4	Metabolism of proteins: 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
4	Endocrine system: Clinical biochemistry of hypothalamus-pituitary axis: GH and growth, prolactin and amenorrhea, GnRH, LH, FSH and reproduction, ACTH, TSH e functional tests. Clinical biochemistry of endocrine pancreas: insulin and glucagon, somatostatin. Clinical biochemistry of gastrointestinal hormones. Clinical biochemistry of adrenal cortex hyperplasia and hypofunction.
4	Clinical biochemistry of hyperthyroidism, thyreotoxicosis, hypothyroidism. Clinical biochemistry of testis, ovary and sex differentiation.

2	Clinical biochemistry of rickets. Clinical biochemistry of osteoporosis and osteomalacia. Calcium homeostasis. Hormone receptors and their importance in clinical biochemistry.
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MODULE CLINICAL MOLECULAR BIOLOGY

Prof. MARCELLO CIACCIO

SUGGESTED BIBLIOGRAPHY

L. Sacchetti, P. Cavalcanti, G. Fortunato, L. Pastore, F. Rossano, D. Salvatore e F. Scopacasa: Medicina di Laboratorio e Diagnostica Genetica. Idelson-Gnocchi Editori, 2007.
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L. Spandrio: Biochimica Clinica Speciale. Piccin Editore, 2006.
W.J. Marshall e S.K. Bangert: Biochimica in Medicina Clinica. Mc Graw-Hill, 1997.
B. Barbiroli, F. Filadoro, C. Franzini, L. Sacchetti, e F. Salvatore: Medicina di Laboratorio. UTET, 1996.

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

EDUCATIONAL OBJECTIVES OF THE MODULE

Acquisition of basic and applied concepts of clinical biochemistry in order to evaluate methods and clinical applications of laboratory tests critically. Specific aim of the course is to be able to identify the correct tests in relation to clinical conditions of the patients and to be able to understand them in relation to the diagnosis.

Particularly, the students must:

- know the main laboratory tests and the biological, molecular and pathological basis for their use in medicine;
- use laboratory tests in screening, diagnosis, prognosis and therapy of diseases correctly;
- understand laboratory tests results and connect them to the molecular and cellular aspect of the pathologic state
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Knowledge of the molecular mechanisms underlying the main clinical syndromes arising from genetic alteration.

SYLLABUS

Hrs	Frontal teaching
4	Clinical biochemistry of arterial pressure regulation: ANF, catecholamines, glucocorticoids. Essential hypertension and in the secondary forms. Clinical biochemistry of acid base balance. Blood gas analysis: interpretation and reporting.
4	Myocardial infarction: risk factors, biochemical modification in the necrotic area; clinical enzymes, new markers of myocardial infarction.
4	Clinical Biochemistry of jaundice. Clinical biochemistry of exocrine pancreas. Clinical biochemistry of healthy and pathologic renal function. Clinical Biochemistry of heme metabolism.
4	Clinical Biochemistry of rheumatic, connective and autoimmune diseases. Cancer diseases: biochemistry of cancer; metastasis, biomarkers. Biochemistry of nutrition and its surveillance.
4	Laboratory tests in genetic diseases. Laboratory tests in myopathies. Clinical biochemistry of neuro-psychiatric diseases.
4	Biochemistry of pain. Clinical biochemistry of cerebro-spinal fluid. Clinical biochemistry in shock, trauma and surgery.
2	Clinical molecular biology: diagnostic techniques used for the diagnosis of the main genetic diseases.
2	Main chromosomal abnormalities revealed by karyotyping. Monogenic diseases and DNA typing. DNA mutations analysis by direct and indirect analyzes (restriction polymorphism).
2	PCR reaction (polymerase chain reaction) for the amplification of abnormal DNA sequences.

MODULE
MEDICINE AND LABORATORY TECHNICAL SCIENCES

Prof.ssa CHIARA BELLIA

SUGGESTED BIBLIOGRAPHY

G. Federici, P. Cipriani, C. Cortese, A. Fusco, P. Ialongo e C. Milani: Medicina di Laboratorio. 3a Edizione, McGraw-Hill, 2009.

L. Spandrio. Principi e Tecniche di Chimica Clinica. Piccin, 2000

Stoppini M, Bellotti V. Biochimica Applicata. Edises.

De Marco C, Cini C. Principi di metodologia biochimica. Piccin.

AMBIT	10341-Scienze e tecniche di laboratorio biomedico
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INDIVIDUAL STUDY (Hrs)	90
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COURSE ACTIVITY (Hrs)	60
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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
5	Intro to Laboratory Medicine: handling and storage of biological samples; pre-analytical issues. Biological and analytical variation, accuracy and precision, analytical and clinical sensibility and specificity, laboratory errors, reference values, quality controls.
5	Separating techniques: dialysis, ultra-filtration, gel-filtration, analytical and preparative centrifugation, types of centrifuge, ultracentrifugation and main applications in clinical biochemistry.
10	UV-visible spectroscopy: electromagnetic waves and spectrum, electronic transitions, absorption and emission; main components of a spectrophotometer, Lambert and Beer's equation, calibration line, direct analysis, analysis with absorption increase or decrease, kinetic analysis. Main application fo UV-visible spectrometry: serum creatinine, glucose, total cholesterol, LDL and HDL cholesterol, triglycerides, direct and indirect bilirubinemia, AST, ALT.
5	Fluorometry: basic concepts, emission phenomena, main components of a fluorometer, quantitative analysis, main application in clinical biochemistry.
10	Electrophoresis: definition, basic concepts, main components of an electrophoresis systems. Protein electrophoresis: SDS-PAGE, serum protein electrophoresis. Capillary electrophoresis: main characteristics, components, electroendosmotic flow.
10	Chromatography: basic concepts; partition coefficients; theoretical plates end column efficiency; isocratic and gradient elution; characteristics of a chromatographic peak. Paper and thin layer chromatography; adsorption, partition, ionic exchange and molecular exclusion chromatography. Main detectors. Qualitative and quantitative analysis.
5	Isolation of nucleic acid: phenol-clorophorm purification, salting-out, chromatographic isolation. Electrophoresis of nucleic acid.
10	Amplification of nucleic acids: basic concepts; clinical applications; genotyping; RT-PCR; real-time PCR: chemistry, quantification of nucleic acids in biological samples, allelic discrimination. Restriction enzymes, RFLP and SNPs. Hybridization of nucleic acids: reverse dot blot. Application of capillary electrophoresis in molecular biology: Sanger sequencing and identification of mutations. Clinical molecular biology: hereditary thrombophilia, farmacogenetics of oral anticoagulant.