UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Medicina di Precisione in area Medica, Chirurgica e Critica
ACADEMIC YEAR	2017/2018
MASTER'S DEGREE (MSC)	DENTISTRY
INTEGRATED COURSE	BIOCHEMISTRY AND CLINICAL MOLECULAR BIOLOGY - INTEGRATED COURSE
CODE	17142
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	BIO/10, BIO/12
HEAD PROFESSOR(S)	SCAZZONE CONCETTA Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	SCAZZONE CONCETTA Professore Associato Univ. di PALERMO BIVONA GIULIA Professore Associato Univ. di PALERMO
CREDITS	8
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	2
TERM (SEMESTER)	1° semester
ATTENDANCE	Mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**BIVONA GIULIA** Wednesday 15:30 16:30 Dipartimento di Biopatologia e Biotecnologie Mediche, Sezione di Biochimica Clinica. **SCAZZONE CONCETTA** Monday 12:00 15:00 Istituto di Biochimica , via del Vespro 129, 90127 Palermo

DOCENTE: Prof.ssa CONCETTA SCAZZONE

PREREQUISITES	The student will know the biochemistry and physiology of major organ systems that make up the human body and know the pathophysiology of major diseases.
LEARNING OUTCOMES	Knowledge and understanding: Acquiring the basic knowledge of the disciplines, through lectures and personal study of texts and scientific publications, and the ability to use the specific language of these disciplines. Knowing the molecular, cellular, biochemical and physiological involved both in the body's homeostasis and diseases. Understanding the main laboratory tests and their correlations with the human diseases. This knowledge will be acquired through lectures and theoretical-practical activities and, it will be verify through tests in ongoing oral and/or written examinations. Applying knowledge and understanding: Demonstrating the ability to apply the acquired knowledge and understanding through the use of diagnostic strategies, performed with biotechnologies of the field of Clinical Pathology, and even based on both knowledge acquired in clinical pathophysiology (Human Pathology) and choose and use of appropriate equipment and biomolecular methods, identifying individual problems, advantages and limitations. These skills will be assessed through theoretical and practical exercises. Making judgments: Being able to assess the implications of biotechnological choices of the disciplines and the results obtained, by considering the data of the international bibliography. Communication skills: Being able to describe in an appropriate and suitable manner to the other health care professionals a critical interpretation of the obtained results of laboratory tests. Being able to describe to other health care professionals the presence of a laboratory result and its complications. Learning skills: Consolidating the knowledge of Biochemical, Clinic, and Human. Being able to deepen the study of laboratory tests for the diagnosis of diseases in order to perform a continuous and regular updating of scientific knowledge progressively in developing. Being able to perform a literature research, in order to correctly and periodically update the scientific knowledge. Acquiring the ability to improve the knowledge with Masters of Science of the I and II level. Knowing the application and limitations of biomedicine biotechnology
ASSESSMENT METHODS	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. The questions will tend to test the learning achieved by assessing a) the knowledge captured; b) the processing capacity, c) possession of adequate exhibition capacityThe 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.
TEACHING METHODS	The didactic activity takes place through lectures.

MODULE
BIOCHEMISTRY

Prof.ssa CONCETTA SCAZZONE

SUGGESTED BIBLIOGRAPHY	
Biochimica Medica" di Siliprandi. Tettamanti, Ed. Piccin Biochimica – Devlin-Idelson Gnocchi	
AMBIT	50450-Struttura, funzione e metabolismo delle molecole d'interesse biologico
INDIVIDUAL STUDY (Hrs)	75
COURSE ACTIVITY (Hrs)	50
EDUCATIONAL OBJECTIVES OF THE MODULE	
The aim of the course is: the knowledge of biological molecules; the acquisition of basic knowledge of biochemistry, the enzymatic mechanisms and their regulation; the learning of the biochemical and molecular processes that characterize the main metabolic pathways.	

SYLLABUS

Hrs	Frontal teaching
2	Introduction to metabolism. ATP, NAD/NADH, NADP/NADPH.
3	Enzymes: Properties. Mechanism of Action. Regulation of Activity. Inhibitors.
2	Carbohydrate. Classification: Monosaccharides, disaccharides and polisaccharides.
4	Carbohydrates metabolism: assimilation, degradation – Glycolysis reactions and regulation. Galactose, Mannose and Fructose metabolism.
3	Pyruvate destiny.Gluconeogenesis. Cori's cycle
2	Glycogen metabolism.
4	The tricarboxylic acid cycle, reactions and metabolic regulation. The Pentose Phosphate Pathway.
2	Oxidative phosphorylation. Mitochondrial electron transport chain complexes, Malate/aspartate shuttle, Glycerol 3-phosphate shuttle.
2	Fatty acids structures – Triacylglycerols – Glycerolphospholipids – Sphingolipids. Arachidonic acid derivatives (prostaglandins, leukotrienes, tromboxans). Terpens. Steroids.
4	Lipid methabolism. Fatty acid activation & transport . Fatty acid b-Oxidation. Lipoproteins.
2	Ketone bodies
3	Cholesterol metabolism
4	The destiny of amino group of aminoacids: structure and function of transaminases. Glucose/ alanine cycle. Urea cycle.
2	Catabolism EME
4	Hormones:general features, functions, biological effects.
4	Signal Transduction.
3	Vitamins: general features, functions, biological effects.

MODULE
CLINICAL BIOCHEMISTRY AND CLINICAL MOLECULAR BIOLOGY

Prof.ssa GIULIA BIVONA

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	50446- Diagnostica di laboratorio
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
•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
3	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	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	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: 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-choletserol, tryglicerides, phospholipids. Lipoprotein. Dyslipidemia. Hypercholesterolemia. Atherosclerosis and cardiovascular diseases.
2	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
2	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.
2	Clinical biochemistry of gastrointestinal hormones. Clinical biochemistry of adrenal cortex hyperplasia and hypofunction. 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. 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. Myocardial infarction: risk factors, biochemical modification in the necrotic area; clinical enzymes, new markers of myocardial infarction.
2	Clinical Biochemistry of liver diseases. Clinical Biochemistry of jaundice. Clinical biochemistry of exocrine pancreas. Clinical biochemistry of healthy and pathologic renal function. Clinical Biochemistry of heme metabolism Clinical Biochemistry of rheumatic, connective and autoimmune diseases.
2	Cancer diseases: biochemistry of cancer; metastasis, biomarkers. Biochemistry of nutrition and its surveillance.
2	Laboratory tests in genetic diseases. Laboratory tests in myopathies. Clinical biochemistry of neuro-psychiatric diseases. 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. 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.