<b>Department of Biomedical Sciences</b>
<b>Physiotherapy Degree Programme</b>
<b>Biological Sciences Syllabus</b>

Academic year 2020-2021. Academic term: first semester of the first year Course coordinator: Dr Stefania Vetrano

BIOCHEMISTRY (2 ECTS)					
Dr Riccardo	Master's degree in Mathematics from La Sapienza University of Rome.				
Sarti	Master's degree in Chimie Analytique, Physique et Théorique from the				
	Université Pierre et Marie Curie and the Ecole Normale Supérieure in Paris.				
	Bachelor's degree in Chemistry from the University of Pisa and the Ecole				
	Normale Superiore di Pisa. Adjunct professor at Humanitas University since				
	2016.				
	Email: riccardo.sarti@hunimed.eu				
Objectives	The biochemistry module aims to provide essential knowledge of chemistry and				
	biochemistry that are necessary to integrate these basic sciences with biology				
	and microbiology. The learning objectives also include providing students with				
	the scientific basis of other disciplines that use principles of chemistry and				
	biochemistry, such as physiology and pharmacology.				
Teaching	The course will be conducted through lectures (in-person and online,				
methods	synchronous and asynchronous), with exercises and				

	Email: stefania.vetrano@humanitasresearch.it; stefania.vetrano@hunimed.eu						
Objectives	Provide basic knowledge of the structure of the eukaryotic cell, in its						
	fundamental structural components, necessary for the life cycle, to oversee						
	macromolecular synthesis, and to interact with the external environment. The						
	module provides an overview of the mechanisms of transmission of genetic						
	information and an overview on genetic diseases.						
Teaching	The course will be conducted through lectures (face-to face and online).						
methods							
Teaching	Lecture slides						
material	Solomon, Berg, Martin. Elementi di biologia cellulare. Edises (VI edizione)						
	2013.						
	Zoppi, Colombi. Biologia e Genetica del Muscolo. Edises 2012.						

## **Content**

## 1) Eukaryotic cell

Components and structural and functional organisation of the eukaryotic cell, the lipid bilayer, membrane proteins, membrane transport, intracellular compartments, the nucleus - endoplasmic reticulum - Golgi apparatus - mitochondria - lysosomes - peroxisomes - ribosomes. Comparison of different cell types such as epithelial, muscle, nerve and blood cells.

## 2) The cytoskeleton

Functions and reticular organisation - Actin filaments - Microtubules - Intermediate filaments

#### 3) Cellular communication systems

The cell-cell junctions - The cell-extracellular matrix junctions - Messengers - Vesicular transport - Endocytosis and Exocytosis

# 5) Structural organisation and replication of DNA

DNA as the repository of genetic information - the central dogma of molecular biology - structural organisation of DNA - replication mechanism and function of the proteins involved in DNA repair

# 6) Transcription, translation and regulation of gene expression

The process of transcription, mRNA maturation, genetic code. Mechanism of translation. Main mechanisms of regulation of gene expression.

## 7) Cell cycle

The phases of the cell cycle - Mitosis - Control mechanisms of the cell cycle - Meiosis

## 8) Elements of Genetics

Karyotype - Chromosome abnormalities - Point mutations - Mendelian inheritance of genes - General characteristics of sex-linked hereditary diseases - Genetic diseases of muscles

MICROBIOLOGY (1 ECTS)						
Dr Marta	Specialised in Microbiology and Virology, Master II level in Molecular Virology,					
Monari	she works as Head of the Clinical Analysis Laboratory at the Istituto Clin					
	Humanitas.					
	Email: marta_noemi.monari@humanitas.it					
Objectives	Provide essential knowledge of microbiology and virology with a focus on					
	healthcare related infections and a special focus on nosocomial infections and their					

understanding of vaccination programmes and their impact on health and reducing the number of cases.

## **Examination for the Biological Sciences course**

The examination will be a multiple-choice test delivered via the LMS platform with LockDown browser on or off campus.

There are 3 sections (one for each module) structured as follows:

- Biochemistry: 20 questions; time available 20 minutes; 1.5 points per question; pass mark: 18 points.
- Biology: 10 questions, time available 10 minutes, 3 points per question, pass mark: 18 points.
- Microbiology: 10 questions, time available 10 minutes; 3 points per question, pass mark: 18 points.

Multiple-choice questions will have 4 answer options, only one of which will be correct. 0 points will be awarded for incorrect answers or unanswered questions.

For each module there will be a final mark over 30, after which a weighted average will be made according to the ECTS.

In order to pass the examination the student must achieve a pass mark in each module. However, if he/she only achieves a pass mark in 2 out of 3 modules, it is at the discretion of the lecturers to decide whether to repeat the exam for the failed module at the next exam session.

Honours are obtained with a mark of 30/30 in each module.