	Department of Biomedical Sciences **Physiotherapy Degree Programme** **Physics and Kinesiology Syllabus**
Academic year 2020-2021. Academic term: first and second semester of the first year **Course coordinator: Prof. Roberto Gatti**	

PHYSICS (2 ECTS)	
Dr Matteo Bersanelli	Graduated in Applied Mathematics from the University of Milan, he attended the City University of New York when writing his thesis. He obtained his PhD from the University of Bologna. He is currently a researcher at Humanitas University E-mail: matteo_bersanelli@hotmail.com
Objectives	The applied physics module aims to provide essential knowledge of physics in order to integrate this basic science with the mechanical aspects of kinesiology and the physics of physiology. The content of the lectures may vary according to the course teaching requirements and are to be considered as indicative.
Teaching methods	Two-hour long lectures, including classroom discussion.
Teaching material	Slides presented during the lecture, available for physiotherapy students on LMS D. Scannicchio, fisica Biomedica. EdiSes.

Content

1) Introduction to the module and to physics.

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based on numerical and experimental verification: dimensional analysis, definition of the concepts

5) Fundamentals of mechanics

Introduction to elasticity. Hooke's law, tension and deformation, elongation and compression. Collisions and impulse: the physics of "body damage". Compression fractures. Free fall. Bending fractures.

Functional anatomy of the dorsal and cervical spine. Arthrokinematics and ligaments of the dorsal and cervical spine. Biomechanics of the thoracic cage. Kinesiology of the dorsal and cervical spine muscles. Relationship between head posture and activity of the cervical musculature.

14) Shoulder Biomechanics
Functional anatomy of the shoulder complex and characteristics of the scapula. Arthrokinematics and ligaments of the shoulder complex. Kinesiology of the muscles of the shoulder complex

15) Moments of inertia and anticipatory postural adjustments
Inertia and moments of inertia. Calculation of moments of inertia during rotational movements. Mechanical characteristics of anticipatory postural adjustments (APA). APA and balance. Analysis of APA during daily activities.

17) Mechanisms of intra-body postural fixation
Mechanical characteristics of mechanisms of intra-body postural fixation. Relationship between correct IFS and quality of muscle performance. Analysis of the mechanisms of intra-body fixation during some activities of daily life

18) Postural mechanisms and neuromotor control
Models of voluntary movement planning. Postural mechanisms as a connection between mechanics and neurophysiology of neuromotor control

19) Deformation of biological structures
Elastic, viscous and plastic deformations. Tension-deformation relationship. Mechanical properties of elasticity. Exploitation of elastic properties of biological structures during movement.

20) Biomechanics of the elbow and hand
Functional anatomy of the elbow and hand. Mechanics of the most common grip and grasp Arthrokinematics and ligaments of the elbow and hand. Kinesiology of the elbow and hand muscles. Role of sensitivity in the neuromechanical control of the hand.

2) The process phases: the "*CLINICAL REASONING CYCLE*".

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