ID	1962
Curricular Unit	Biomechanics of Sports Techniques
Regent	António Prieto Veloso
Learning Outcomes	Understand and explain Human motion as the interaction between the body and the physical environment, in the context of sports techniques. Quantitative and detailed description Of body movement. Definition and application of dynamics variables to the study of sports performance optimization; Demonstration of biomechanics experimental methodologies, for analysis and evaluation of sports movements
Syllabus	1 – Kinematics of Sports Movements?– Linear and angular kinematics variables for the description of sports movements?–. Deductive and Inductive approach for kinematics analysis. Motion equation and experimental motion capture. – Kinematics experimental data processing. Curve fitting, smoothing and digital filtering. 2 – Movement and Force – Kinetics of sports movements.?– Movement laws. Simplified representation models free body diagram. Movement due to external forces (ground reaction forces) and to body mass (inertial forces). Friction forces.?– Internal forces. Muscle action and intersegmental dynamics. Joints reactions forces and energy transfer between body segments. Muscle mechanics associated to muscle activation– Impulse and Momentum. Mechanical energy production and absorption in sports techniques. Linear and angular kinetic energy. Gravitational and elastic potential energy.? 3 – Biomechanical analysis of fundamental sports movements. Running, jumping and throwing.
Evaluation	Students are submitted to an initial theoretical approach in which the basic concepts of biomechanics are reviewed in an expository teaching method (using a directive learning method). The former approach is immediately followed by the use of experimental methodologies in the laboratory for each corresponding experimental methodology (learning method: guided experience). The experimentally measured mechanical variables are studied and the interpretation of the experimental results is performed by comparing those results with the ones of similar studies found in scientific literature. Thus 50% of the time the method of teaching is guided discovery directive 50% the evaluation is performed through a final test accompanied by the delivery of a report describing the experimental methodologies and results. The written test has a valuation of 60% and 40% lab report.

Bibliography	Enoka, Roger. (2002) Neuromechanics of Human Movement, 3th edition Human Kinetics Champaign IL. 61825-5076. Hay, James (1993) The biomechanics of Sports Techniques (4th edition). Englewood Cliffs. N. J.: Prentice Hall. Nigg, B.M. & Herzog W. (Eds) (1994). Biomechanics of the Musculo-skeletal system. New York. Wiley.