ID	3303
Curricular Unit	Biomechanics
Regent	António Prieto Veloso
Learning Outcomes	1. To identify the basic principles of classical mechanics (kinematics, kinetics). 2. To apply the previous mentioned principles to solve different types of practical exercises concerning sports applications. 3. To identify the different experimental measurement techniques used in biomechanics.
Syllabus	1 – Biomechanics: definition and importance for the sports science field. 2 – The description of linear and angular motion: kinematics. a) Linear and angular parameters: position, velocity and acceleration. b) Computation of kinematic parameters considering two types of models: particle and 2D rigid segment model. c) Experimental techniques to measure kinematic parameters: 2D motion analysis. 3 – Explaining the causes of linear and angular motion: kinetics. a) Newton's laws for linear and angular motion. b) External forces and instruments of measurement. c) Computation of all body momentum change based on the impulse and momentum relationship. d) Computation of all body energy change based on the work-energy principle. e) Moment of force and internal forces: computation of joint moment of a single segment. f) Rotational work, energy and power: relationship with muscle action.
Evaluation	To be approved in this course, the student has to score higher than 9.5 points in 20. The assessment can be done in two ways: 1. Continuous assessment This assessment requires the student to be present in at least in 2/3 of the classes (theoretical-practical and practical lessons). The final grade include: (1) the quality of the participation during the activities proposed in the practical lessons (10%); (2) 2 written tests (1st test – 40%; 2nd test – 50%). The minimal score of each test as to be higher than 7.5 points in 20. 2. Final exam The final grade is obtained throughout a written exam, which includes all topics covered during the course.

Bibliography	1) Hay, J.G. (1973) The biomechanics of sports techniques. Englewood Cliffs: Prentice-Hall. OR 2) Hall, S.J. (2003) Basic biomechanics, 4th ed. The McGraw-Hill Companies. Any Physics book covering Classical Mechanics