

<b>ID</b>	3709
<b>Curricular Unit</b>	Biomechanics
<b>Regent</b>	António Prieto Veloso
<b>Learning Outcomes</b>	<ol style="list-style-type: none"> <li>1. To identify the basic principles of classical mechanics (kinematics, kinetics).</li> <li>2. To apply the previous mentioned principles to solve different types of practical exercises concerning sports applications.</li> <li>3. To identify the different experimental measurement techniques used in biomechanics.</li> </ol>
<b>Syllabus</b>	<ol style="list-style-type: none"> <li>1 - Biomechanics: definition and importance for the sports science field.</li> <li>2 - The description of linear and angular motion: kinematics. <ol style="list-style-type: none"> <li>a) Linear and angular parameters: position, velocity and acceleration.</li> <li>b) Computation of kinematic parameters considering two types of models: particle and 2D rigid segment model.</li> <li>c) Experimental techniques to measure kinematic parameters: 2D motion analysis.</li> </ol> </li> <li>3 - Explaining the causes of linear and angular motion: kinetics. <ol style="list-style-type: none"> <li>a) Newton's laws for linear and angular motion.</li> <li>b) External forces and instruments of measurement.</li> <li>c) Computation of all body momentum change based on the impulse and momentum relationship.</li> <li>d) Computation of all body energy change based on the work-energy principle.</li> <li>e) Moment of force and internal forces: computation of joint moment of a single segment.</li> <li>f) Rotational work, energy and power: relationship with muscle action.</li> </ol> </li> </ol>
<b>Evaluation</b>	<p>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:</p> <ol style="list-style-type: none"> <li>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.</li> <li>2. Final exam</li> </ol> <p>The final grade is obtained throughout a written exam, which includes all topics covered during the course.</p>

**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