



Programme of Course "Meccanica Razionale"

- Code: F0503
- Type of course unit: Compulsory (Bachelor Degree in Mathematics curriculum Generale)
- Level of course unit: Undergraduate Degrees
- Semester: 2

Number of ects credits: (Bachelor Degree in Mathematics) 9 (workload 225 hours)

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<b>1</b>	<b>Course objectives</b>	This course aims to enable the students to understand Classical and Analytical Mechanics and to handle the most important related mathematical tools.
<b>2</b>	<b>Course content and learning outcomes (dublin descriptors)</b>	<p>Topics of the module include:</p> <ul style="list-style-type: none"> <li>• Principles and mathematical formulation.</li> <li>• One-dimensional systems.</li> <li>• Motion under central forces.</li> <li>• N-points systems.</li> <li>• Constrained systems.</li> <li>• Lagrange equations.</li> <li>• Hamiltonian systems.</li> <li>• Canonical transformations.</li> <li>• Small oscillations of Lagrangian systems.</li> <li>• Variational principles.</li> <li>• More about hamiltonian systems.</li> </ul> <p>On successful completion of this module, the student should :</p> <ul style="list-style-type: none"> <li>• have acquired the basic notions of Classical and Analytical Mechanics,</li> <li>• be able to handle the related mathematical tools,</li> <li>• have acquired the ability of reading and understanding more advanced topics in Mechanics,</li> <li>• be able to face subsequent topics in Physics as Quantum and Statistical Mechanics,</li> <li>• be able to recognize when the acquired notions are useful for the comprehension of other topics,</li> <li>• be able to face novel problems with a similar mathematical modeling.</li> </ul>
<b>3</b>	<b>Course prerequisites</b>	Differential Equations, Elementary Linear Algebra.
<b>4</b>	<b>Teaching methods and language</b>	<p>Lectures and exercises.</p> <p><b>Language:</b> Italian</p> <p><b>Reference textbooks</b></p> <ul style="list-style-type: none"> <li>• A. Celletti, <b><i>Esercizi e complementi di Meccanica Razionale</i></b>. Aracne. 2003.</li> <li>• R. Esposito, <b><i>Appunti dalle lezioni di Meccanica Razionale</i></b>. Aracne. 1998.  <a href="http://univaq.it/~serva/teaching/teaching.html">http://univaq.it/~serva/teaching/teaching.html</a></li> <li>• A. Teta, <b><i>Appunti di Meccanica Razionale</i></b>.  <a href="http://univaq.it/~serva/teaching/teaching.html">http://univaq.it/~serva/teaching/teaching.html</a></li> <li>• E. Olivieri, <b><i>Appunti di Meccanica Razionale</i></b>. UniTor. 1990.</li> <li>• V. I. Arnold, <b><i>Mathematical Methods of Classical Mechanics</i></b>. Springer-Verlag. 1989.</li> <li>• L. Benfatto, R. Raimondi, E. Scoppola, <b><i>Meccanica Hamiltoniana</i></b>. 2006-2007.  <a href="http://univaq.it/~serva/teaching/teaching.html">http://univaq.it/~serva/teaching/teaching.html</a></li> </ul>
<b>5</b>	<b>Assessment methods</b>	Written and, if necessary, oral examination.