



### Programme of Module "Ricerca Operativa"

- Code: F0140
- Type of course unit: Compulsory (Bachelor Degree in Computer Science curriculum General)
- Level of course unit: Undergraduate Degrees
- Semester: 2

Number of ects credits: (Bachelor Degree in Computer Science) 6 (workload 150 hours)

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1	<b>Course objectives</b>	Introduce the student to the formulation of basic Optimization problems, particularly Linear Optimization problems, and train him/her to the related solution algorithms.
2	<b>Course content and learning outcomes (dublin descriptors)</b>	<p>Topics of the module include:</p> <ul style="list-style-type: none"> <li>• Optimization problems: decision variables, objectives and constraints; modeling techniques and model classification</li> <li>• Convex optimization problems; local and global optima</li> <li>• Geometry of Linear Programming</li> <li>• The Simplex method</li> <li>• Duality theory in Linear Programming and its applications</li> <li>• Dual interpretation of the simplex method and the dual simplex method</li> </ul> <p>On successful completion of this module, the student should :</p> <ul style="list-style-type: none"> <li>• Acquire the knowledge of Optimization problems and of the mathematical modeling techniques for complex decisions. Acquire the knowledge of some solution algorithms for Linear Programming problems.</li> <li>• Acquire the ability to recognize optimization problems and develop mathematical models of decision-making problems. Acquire the ability of computing solutions of linear programming problems</li> <li>• Acquire autonomy in modeling and algorithmic choices for problems related to complex decision-making</li> <li>• Be able to hold a conversation and to read texts on topics related to the modeling of decision problems and Linear Programming</li> <li>• Acquire the ability of upgrading flexible knowledge and skills in the field of Optimization and related problems that arise in various areas, such as mathematics, computer science and management science</li> </ul>
3	<b>Course prerequisites</b>	Vector space, scalar product, matrix product, inverse matrix
4	<b>Teaching methods and language</b>	<p>teaching lessons  <b>Language:</b> Italian  <b>Reference textbooks</b></p> <ul style="list-style-type: none"> <li>• Dimitris Bertsimas and John N. Tsitsiklis, <i>Introduction to Linear Optimization</i>. Athena Scientific. 1997.</li> <li>• Matteo Fischetti, <i>Lezioni di Ricerca Operativa</i>. Progetto Libreria Padova. 1995.</li> <li>• Antonio Sassano, <i>Modelli e Algoritmi della Ricerca Operativa</i>. Franco Angeli. 1992.</li> </ul>
5	<b>Assessment methods</b>	<p>1. paper test consisting of various exercises (problem formulation, insights about algebraic or geometric problems properties, problem solution by know algorithms) 2. oral test about theoretical topics; this is accessible only for the students who earned a passing grade at the paper test; NOTE: a sufficient paper test allows the student only for the oral at the same date, but NOT for next dates. 3. A mid-term test is also planned: a</p>

positive grade to it allows the student to skip the corresponding topics in the final test.