



**Programme of Course "OPTIMAL CONTROL"**

- Code: I2I015
- Type of course unit: Compulsory (Laurea Magistrale in Ingegneria Informatica e Automatica curriculum Automatica), Elective (Laurea Magistrale in Ingegneria Informatica e Automatica curriculum Informatica)
- Level of course unit: Postgraduate Degrees
- Semester: 2

Number of ects credits: (Laurea Magistrale in Ingegneria Informatica e Automatica) 9 (workload 225 hours)

Teachers: Elena De Santis

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| <b>1</b> | <b>Course objectives</b>   | The main objective is to give the tools for the design of open loop and closed loop optimal controls, mainly with the help of Pontryagin's Maximum Principle, for linear and nonlinear dynamical systems.   |
| <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>• - Unconstrained static optimization</li> <li>• - Static optimization under constraints</li> <li>• - Static solution of constrained optimal control for discrete time systems</li> <li>• - Pontryagin's Maximum Principle</li> <li>• - Optimal control with finite horizon, with unconstrained and constrained final state. Time optimal control.</li> <li>• - Linear quadratic problems, with finite and infinite horizon.</li> <li>• - Advanced optimal control problems and Engineering Applications</li> </ul> |
| <b>3</b> | <b>Course prerequisites</b>                                      | The students of this course should be familiar with systems theory and with the state space description of dynamic systems, in continuous and in discrete time domain.  |
| <b>4</b> | <b>Teaching methods and language</b>                             | <p><b>Language:</b> English</p> <p><b>Reference textbooks</b></p> <ul style="list-style-type: none"> <li>• D. Liberzon, <i>Calculus of variations and optimal control theory</i>. Princeton University Press.</li> </ul>  |
| <b>5</b> | <b>Assessment methods</b>  | This course requires completion of written and oral final examinations. Advanced optimal control problems and Engineering Applications are assigned as individual or group work to the students, who will give seminars to the colleagues, in the final part of the course  |