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**Facoltà di Scienze Matematiche Fisiche e Naturali**

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ABSTRACT

# **Ottimizzazione multi-obiettivo: scheduling delle attività di manutenzione delle reti elettriche.**

CANDIDATA: **DOTT.SSA VINCENZA TUFANO**

COORDINATORE: **PROF.SSA PATRIZIA LONGOBARDI**

TUTOR: **PROF. ABDELAZIZ RHANDI**

CO-TUTOR: **DOTT.SSA ROSANNA MANZO**

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# Abstract

In this thesis, a mathematical model to optimize the allocation of dynamic maintenances of electrical networks has been introduced.

The problem can be summarized as follows: given a set of maintenances that must be performed by a given set of resources (teams) to find a just allocation of teams to maintenances and to plan maintenances in a given period of time based on certain criteria.

The mathematical model, being multi-objective, tends to optimize different cost functions, with the following aims:

- Maximize productivity (scheduled tasks within the predefined time window);
- Minimize operating costs (staff costs and travel costs);
- Maximize the quality of service in terms of assignment of the appropriate operational resource to the maintenance.

These objective functions are subject to a number of constraints that describe the operational context of the problem: priorities, skills, assignment of maintenances, geographical constraints, and so on.

Finding a solution to the above problem can require a so high time as to be incompatible with the operational needs of companies involved in maintenance of electrical networks. Because of this limitation, the attention is focused on the application of meta-heuristic optimization techniques multi-objective which are able to determine a solution in a reasonable time often near to the global optimum. In particular techniques based on Evolutionary Computation (EC) NSGA and NSGA II have been used.

Interesting results in terms of quality of the solutions and in terms of performance have been obtained applying both resolution techniques. However, the algorithm NSGA II result is the most suitable for the implementation of the solver, as it identifies solutions of lower cost and in a shorter time.