

**PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA
MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH**

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**University of Médéa- Faculty of Sciences
Department of Mathematics and Computer Science**

**PhD PROGRAM OFFER
FOR THE ACADEMIC YEAR 2024/2025**

Field: Operational Research and Discrete Mathematics

Objectives of the Doctoral Project

The doctoral program in Applied Mathematics aims to achieve several important objectives. First, it is committed to providing doctoral students with a solid foundation in mathematics while connecting them with recent developments in operational research, discrete mathematics, and combinatorics. Second, it seeks to encourage doctoral research and interdisciplinary collaboration, and to promote the application of mathematical knowledge in practical fields such as logistics, operations planning, and network design.

In addition, the program strives to offer comprehensive and high-quality training to doctoral researchers by providing a wide range of advanced concepts and methods covering key areas of applied mathematics, including graph theory, optimization, and combinatorial methods. This training also aims to develop the research skills of doctoral students by introducing them to scientific methodology, the formulation of research problems, and the pursuit of original work. Finally, the program aims to train highly qualified researchers through advanced teaching activities (courses, conferences, seminars, workshops, etc.).

The content of this doctoral program is closely aligned with the main projects and research areas of the Laboratory of Mathematics and its Applications. Indeed, there is a strong link between the proposed topics, which cover two major areas of applied mathematics: graph theory and combinatorics. These areas complement each other in the study of discrete structures and their properties. Both fields play a significant role in strategic and priority research axes by offering essential tools for technological innovation, decision-making, resource optimization, and economic development. Their practical application helps address concrete challenges in various domains such as finance, logistics, healthcare, and the environment, thus contributing to the prosperity and sustainability of societies.

1- Core courses

- Linear and Nonlinear Optimization
- Advanced Graph Theory
- Dynamic Programming and Multi-Criteria Analysis
- Combinatorial Optimization
- Enumerative Combinatorics
- Stochastic Methods in Optimization

2- Advanced Topics:

- Study of recent concepts related to coloring problems in graphs
- Study of the concept of domination in graphs and its applications
- Study of partitioning problems in graphs

3- Supporting and Affiliated Structures for the Training Program:

- Laboratory of Mathematics and its Applications

Laboratory Director: Dr. AYADI Hocine

4- Curriculum Highlights

- A Master's degree in Operational Research or an equivalent qualification in Applied Mathematics
- Proficiency in one of the following languages: English or French
- Submission of a research proposal aligned with the program's objectives and research areas
- A detailed curriculum vitae (CV)
- Two letters of recommendation written by academic instructors or research supervisors
- A motivation letter outlining academic goals and research interests