



SECURE for
Student Success

Undergraduate Research Program

Dept. Manufacturing Systems Engineering and Management

Research Duration: Summer 2024 (June – August 2024)

Faculty: Silvia Carpitella

Email address: silvia.carpitella@csun.edu

Contact No: JD 3313, 8186776157, Tu/We/Th 6-7 pm

Title of Project: New Patterns for Evaluation and Optimization of Performance Level of Enterprises (NewPEOPLE)

Goals and Objectives of the Project, Expectations and Outcomes

In the ever-evolving realm of business, enterprises face a multitude of diverse challenges, with risk management emerging as a critical focal point. Among these challenges lies a significant yet often overlooked asset: the human capital within the organization. This project deals with how industries approach risk management by placing a spotlight on the role played by human resources. Acknowledging that progress inherently involves risks, this project aims to integrate innovative risk management perspectives into business strategies. The primary goal is to develop flexible approaches modeling and solving complex industrial decision-making problems, particularly in the domain of risk management, in the context of industry 4.0.

The following lines of research corresponding to intermediate research objectives will be fully developed to run the project.

1) Designing decision support systems dealing with human subjectivity. This will include the use of such tools as Fuzzy Cognitive Maps (FCMs) to promote spontaneous brainstorming sessions among human stakeholders, with the goal of enhancing the diversity of professional and personal backgrounds.

2) Developing innovative patterns of risk management on the basis of mathematical modelling of human knowledge. This will be approached to effectively capture and mitigate uncertainty affecting the collected input data. In this context, the Analytic Hierarchy Process (AHP), or other similar decision-making techniques, will be used to assign weights to parameters based on their impact, thus enabling a more comprehensive risk assessment.

3) Implementing real-world applications to test proposals' effectiveness. Innovative and flexible decision support systems for human-centered risk management will be developed in real-world scenarios by creating a link between the proposed theory and the practical use of established models. This part of the project will exploit rules of matrix calculation enabling to converge to a shared choice about how to design and schedule proper preventive or correction actions in order to minimize the global impact of risk on human safety and industrial outputs.

Students are expected to learn how to draft a comprehensive literature review, aimed at analyzing the current state of the art. Additionally, they will learn some fundamentals of Python programming and will become familiar with the use of several decision-making software and data analytics tools. No previous experience in programming is required. The research experience will culminate with the (tentative) production of a paper to be submitted for considering publication within the proceedings of an international conference.