

Master's in Industrial Engineering 5.0: Focus on Senior Management and Global Trends

Máster en Ingeniería Industrial 5.0: Enfoque en Alta Dirección y Tendencias Globales

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Abstract This proposal presents a comprehensive curriculum for a Master's program in Industrial Engineering 5.0, integrating advanced technological, strategic, and human-centric components. By addressing key aspects such as digital transformation, artificial intelligence, sustainability, and psychological approaches to leadership, the program aims to prepare future leaders to meet the challenges of Industry 5.0. This document highlights the academic and industrial relevance of the proposed curriculum, supported by recent research and global trends.

Keywords: Artificial Intelligence, Digital Transformation, Industry 5.0, Psychological Leadership, Senior Management, Sustainability.

Resumen: Esta propuesta presenta un plan de estudios integral para un programa de Maestría en Ingeniería Industrial 5.0, integrando componentes tecnológicos, estratégicos y centrados en el ser humano de avanzada. Al abordar aspectos clave como la transformación digital, la inteligencia artificial, la sostenibilidad y los enfoques psicológicos del liderazgo, el programa tiene como objetivo preparar a los futuros líderes para enfrentar los desafíos de la Industria 5.0. Este documento destaca la relevancia académica e industrial del plan de estudios propuesto, respaldado por investigaciones recientes y tendencias globales.

Palabras clave: Inteligencia artificial, Transformación digital, Industria 5.0, Liderazgo psicológico, Alta dirección, Sostenibilidad.

1. Introduction

The advent of Industry 5.0 has shifted the focus from pure automation to human-centered innovation and sustainability (Schwab, 2023). Unlike Industry 4.0, which prioritized digitalization and automation of processes, Industry 5.0 seeks to balance interaction between humans and advanced technologies such as artificial intelligence and digital twins, promoting an ethical, resilient, and sustainable approach that places humans at the core of production processes (Tao et al., 2023). This shift requires the development of academic programs that not only train students in advanced techniques but also equip them with leadership skills and decision-making abilities to navigate a globalized industrial environment (Grieves & Vickers, 2023).

This document proposes a curriculum that integrates technological innovation, strategic management, and psychological approaches to leadership. For example, in the

Organizational Psychology course, group dynamics and case studies will be used to address motivation and work performance. In Senior Management and Corporate Strategy, students will analyze real cases of companies that implemented successful strategies based on emerging technologies. Additionally, in the Digital Transformation in Industry course, simulators and virtual learning platforms will be used to design optimized processes integrating AI and blockchain. The program design aligns with global industry standards and academic frameworks, ensuring its relevance and applicability in today's dynamic environment.

2. Justification

The increasing complexity of industrial operations requires professionals capable of leading multidisciplinary teams and effectively applying sustainable practices. A comprehensive academic program that addresses these needs is imperative (Kouhizadeh et al., 2024). Furthermore, the rapid integration of technologies such as blockchain, IoT, and digital twins into industrial environments underscores the need for advanced education in these areas (Xu et al., 2023). Research also highlights the importance of psychological leadership and emotional intelligence in fostering effective organizational change (Goleman, 2023).

3. Objectives

3.1 General Objective

To develop industrial leaders with expertise in senior management, technological integration, and sustainable practices, capable of driving innovation and transformation within the context of Industry 5.0.

3.2 Specific Objectives

1. Equip students with strategic leadership and decision-making skills.
2. Develop competencies in emerging technologies such as AI, blockchain, and IoT.
3. Promote principles of sustainability and circular economy.
4. Foster psychological approaches to leadership and team motivation.

5. Encourage research and innovation through real industrial projects.

4. Research Methodology

This document is based on a secondary research method, including data from reputable databases such as Scopus, Web of Science, and IEEE Xplore, as well as academic journals, peer-reviewed articles, and specialized publications. The literature was selected for its relevance and recentness, mainly from 2022 onwards. The data collected was thoroughly analyzed to ensure sound and relevant conclusions, providing a robust scientific and academic foundation. This approach ensures a comprehensive understanding of the relevance and feasibility of a Master's in Industrial Engineering 5.0: Focus on Senior Management and Global Trends.

5. Proposed Curriculum The Master's program spans two years, with four semesters comprising core subjects, specialized modules, and a final project.

First Semester

- Introduction to Industry 5.0
- Senior Management and Corporate Strategy
- Organizational Psychology and Work Motivation
- Digital Transformation in Industry

Second Semester

- Applied Artificial Intelligence and Machine Learning
- Change Management and Organizational Resilience
- Industrial Geopolitics and International Trade
- Sustainability and Circular Economy

Third Semester

- Emerging Technologies: Blockchain, IoT, and Digital Twins
- Emotional Intelligence in Decision-Making

- Industrial Cybersecurity and Data Protection
- Ethics and Corporate Social Responsibility

Fourth Semester

- Global Logistics and Intelligent Supply Chains
- Case Analysis in Nearshoring and Reshoring
- Leadership and Multidisciplinary Management Seminar
- Final Project on Industrial Innovation

6. Methodology

The program will adopt a hybrid learning model, combining 60% in-class activities and 40% virtual platforms. Emphasis will be placed on case studies, practical applications, and collaborative research projects. In-class sessions will focus on practical activities and the use of state-of-the-art laboratories equipped with technologies such as robots, IoT devices, and simulation tools. Online sessions will include forums, collaborative assignments, and interactive assessments. Additionally, platforms like Moodle, Microsoft Teams, and Google Classroom will manage content, Zoom will facilitate synchronous sessions, and simulation software like Arena and MATLAB will support advanced virtual practices (Christopher & Peck, 2023).

7. Impact and Relevance

The proposed curriculum aligns with current global industry demands. By integrating technological, strategic, and psychological dimensions, graduates will possess a unique skill set that enhances their employability and leadership potential (Manyika et al., 2024). Additionally, the program will contribute to sustainable industrial practices, fostering a culture of innovation and ethical responsibility.

8. Conclusion

The Master's in Industrial Engineering 5.0 represents a visionary approach to higher education. It equips students with the tools necessary to navigate and lead in a rapidly

evolving industrial environment. By addressing technological advancements, strategic management, and human-centered leadership, this program aligns with global trends and prepares graduates for future challenges. Graduates will also be fully equipped to perform competitively within the framework of new humanism, excelling in international business and intercultural management. This approach will not only strengthen their technical and human skills but also position them as key agents in the global transformation of the industry. For example, graduates may lead international optimization projects in global supply chains, implementing blockchain-based solutions to ensure traceability and transparency. A successful case is observed in the food industry, where companies like Walmart have used blockchain to track product origins, significantly reducing response times in product recalls and enhancing consumer trust. Furthermore, their training in emotional intelligence and intercultural leadership will enable them to manage diverse teams in multicultural corporate environments, contributing to business expansion in emerging markets (Schwab, 2023; Tao et al., 2023; Manyika et al., 2024).

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