

Course Description

Masters Degree in Intelligent systems for Industrial Engineering

No.	Course no	Course Title	Course Description
1	7080010	Applied Data analytics and machine learning	What machine learning is and how it is related to statistics and data analysis. How machine learning uses computer algorithms to search for patterns in data and to do clustering. How to use data patterns and regression analysis to make decisions and predictions with real-world examples that are related to manufacturing systems, service system and business system. How to prepare data, deal with missing data and create custom data analysis solutions for different industries. Design of intelligent systems that support the transformation of operation, monitoring, evaluation, reviews and improvement systems to the digital age.
2	7080011	Intelligent supply chain management	The digital supply chain management. Integrating Supply chain drivers, distribution networks, transportation, sourcing decisions, and information with the new technologies. Sustainable supply chain. Study evolving technologies to connect customer, company and supplier, such RFID, and EDI that is connected to the IoT. Utilize data science in the design of supply chains.
3	7080012	Artificial Intelligence	Artificial Intelligence (AI): theories, mathematical formalisms, and algorithms, that capture the elements of computational intelligence; decision making under uncertainty using expert systems, neural networks, fuzzy logic, genetic algorithm, simulated annealing, and their hybrid forms. The emphasis in this course will be on deep learning using neural networks.
4	7080013	Continuous Improvement and Lean Six-Sigma	Study the tools and knowledge necessary to effectively evaluate the nature and current state of the manufacturing, administrative, and service processes to identify the gaps and develop strategies to promote operational excellence, using Lean Manufacturing and Six Sigma methodologies. Eliminate or minimize the types of wastes using the lean tools.
5	7080014	IoT for Smart factories	Utilization of internet of things basic structure, controllers, communication, cloud, security and its applications in smart factories; it includes the following: Applications of IOT in the smart factories including the smart devices; sensors, controllers, actuators, and communication devices. Cyber physical industrial systems and cyber security. Study the virtual

			reality and augmented reality. Understanding the basis communication protocols and modern control devices. configure and design an IOT application. Security and ethical issues related to IOT applications. Artificial intelligence as a basic structure in IoT. Case studies and course project: IoT Application using Arduino.
6	7080015	Scientific Research Methodology	
7	7080017	Advanced optimization	Study optimization techniques for constrained and unconstrained problems such as: Newton's method and its variants, secant methods and conjugate gradient methods for unconstrained problems; active set methods, penalty methods and Lagrangian methods for constrained problems.
8	7080019	Project Management for Industry 4.0	Study project life cycle: initiation, project selection, organization, planning and negotiation, implementation (budgeting, scheduling, resource allocation and control) and termination using Primavera. Study risk Management; internal factors and external factors for both manufacturing industry and service industry. Study agile project management. Study project development principles like continuous innovation, real-time capability, product adaption, adjustment of people mindset, interoperability, and getting reliable results; thus achieving agility in the dynamic business environment and mass customization trend. Software that will be used in this course is Python and its libraries, and Primavera.
9	7080020	Behavioral science in a practical problem solving framework	Analysis of cause in the behavioral sciences using statistical methods for the social and behavioral sciences. Using big data for people analytics: the way talent is attracted, and retained.
10	7080021	Intelligent Decision Support Systems	Systems theory, System development life cycle, Systems engineering methodology applied to the design & analysis of information systems for management of all types of organizations. Programming & design of Data base management systems. Distributed and centralized systems. Direct management phase of system design and implementation, Computer networks & distributed databases, Selections of software and / or hardware for information systems.
11	7080022	Data sciences for Enterprise Resource Planning	Role of ERP systems within an organization. Integrated information systems. Hands-on activities of various business processes. Various business cases in which ERP concepts can be applied. An overview of Business Intelligence (BI) and analytics in the ERP context

12	7080023	Advanced simulation	Studying distribution modeling; after a review about Monte Carlo simulation and Queuing systems. Simulation output analysis, verification and validation of simulation models.
13	7080024	Marketing Engineering	The marketing engineering process strives to improve the efficiency and effectiveness of marketing by using information technologies enabling digital marketing and e-marketing. This course implements a technology-enabled and model-supported decision process; and utilizes knowledge-based data. Study decisions regarding price, packaging and promotion; how do these decisions affect sales.
14	7080025	Industrial automation and Robotics	The study of manufacturing planning, integration, and implementation of automation using computer integrated manufacturing.
15	7080026	Total Quality Management and Operational Excellence	This course examines the primary methods used to control quality in organizations and examines the tools with which quality can be improved .the topics included are: historical development of quality management, quality improvement tools, and Quality strategies such as ISO standards, EFQM excellence model and the Baldrige award criteria.