

Master of Science in Data Science (M.Sc.)

- **HUM 501: Leadership and Change Management (3 Credits)**

The course studies the key aspects for a manager or executive to assume leadership and provides tools for high-performance teams in a complex and highly uncertain context. The content includes addressing the problem and the main factors of change management processes, as well as the key elements to carry them out successfully. At the end of the course, the student will be able to identify strengths and areas for improvement and apply a set of tools to lead results-oriented teams.

- **ADM 512: Innovation and Intellectual Capital Management**

This course studies the methodologies of Design and Creative Thinking, creative thinking, the creative process, innovation techniques, customer-oriented innovation, co-creation, and leadership in collaboration. Techniques will be developed to model innovative businesses at a disruptive and incremental level, and to design new products and services from the users' perspective and focused on their needs. The fundamentals, mechanisms, and instruments for managing intangibles, intellectual capital, information systems, the impact of ICT in organizations, Integrated Management Systems, competitive intelligence, and processes and subprocesses inherent to knowledge management will be addressed.

- **HUM 522: Innovative Behavior**

The course studies the anatomy and functioning of the Silicon Valley innovation ecosystem to extract key lessons from high-impact companies and see how these networks connect with our potential ventures, as well as agile techniques and methodologies to maximize the chances of success for our initiatives. The content includes: why act innovatively, the power of questioning, conceptual liberation and experimentation, discovering innovative opportunities, organizational ambidexterity and some biases that hinder its implementation, how to manage the uncertainty surrounding innovative opportunities, and policies to improve the behavior of established companies.

- **CSC 504: Data, Information and Knowledge Ecosystem (3 Credits)**

Presents the general topics of data science, reviewing the environments and technologies involved, as well as the main challenges faced by cognitive, knowledge, information, and data systems, in terms of types, sources, scale, and processing. It links to non-computer science specialties and professions.

- **CSC 516: Algebra for Data Science (3 Credits)**

Covers the fundamentals of linear algebra, elements, concepts, and matrix operations. Geometric intuitions behind linear algebra, relating the tools to real-life problems. It includes from matrix operations to scalar multiplication, determinants, and adjugates. Introduction to vectors, dimensions, and vector spaces.

- **CSC 524: Data Analysis (3 Credits)**

Presents the fundamentals of data: sources, quality, structure, size, formats, and their relationship with practical applications. It introduces the concept of analysis as the value contained in the data. Includes analytical tools. Data processing in tables and databases. Data frames and table systems. Operations with tables.

- **CSC 533: Data visualization (2 Credits)**

Presents the challenge of data visualization, using communication skills and the value of information as a basis, and covering information management tools: Dashboards, interactivity, applications, graphs and diagrams, maps, geographic visualization, and geocoordinates.

- **ADM 503: Tools for innovation (2 Credits)**

This course studies how to form teams. How to implement a solution comprehensively. Digital transformation process. Innovation process. Project management. Uncertainty management. Complexity management.

- **CSC 555: Statistics for Data Science (3 Credits)**

Fundamentals of statistics. Different types of data. Measures of dispersion and position. Calculation of measures of central tendency, skewness, and variability. Distributions. Calculation of correlation and covariance. Estimation of confidence intervals. Data-driven decision making. Hypothesis testing. Understanding the mechanics of regression analysis. Using and understanding dummy variables. Performing regression analysis.

- **CSC 607: Introduction to artificial intelligence (3 Credits)**

Presents algorithm-based processes. It covers the definition and origins of artificial intelligence (AI), its importance in current work and research, and the conceptual basis for understanding how algorithms perform certain cognitive functions. It explains the pillars of AI and the different approaches of AI for different challenges. Brief introduction to applications: NLP, computer vision.

- **CSC 617: Machine Learning (3 Credits)**

This course studies the application of algorithms for machine learning, covering supervised and unsupervised learning. The process of modeling algorithms, from data preparation to feature engineering, addresses explainable pre- and post-modeling problems. It develops the use of computer tools for machine learning applications. It models real-world cases.

- **HUM 603: Ethics and social engineering (2 Credits)**

The course studies the contextualization of ethics and data in the real world. Information ethics, ethical hacking, information protection, data and sustainability, human practices, and algorithms. Anonymization, de-identification strategies, and policies. Introduction to cybercrime and cybersecurity.

- **CSC 628: Advanced topics in AI (3 Credits)**

Includes the explanation of the neural network as a prediction and classification tool. Types of neural networks. Functions of the neural network. Architectures: GAN, autoencoders, convolutional. Applications of the architectures.

- **CSC 636: Natural language processing and applications (2 Credits)**

The Natural Language Processing and Applications course studies Applied Machine Learning (ML) (effects on industries): Policies, agents, and reward systems. Simulation. Team building for data science and cognitive design (multidisciplinary AI).

- CSC 686: Data Science Real World Applications (3 Credits)

This course covers a set of cases in which participants develop real-world solutions based on pre-trained or training algorithms.