Professional Master's Degree
Artificial Intelligence in Design

tech technological university

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Professional Master's Degree
Artificial Intelligence in Design

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Website: www.techtitute.com/pk/design/professional-master-degree/master-artificial-intelligence-design

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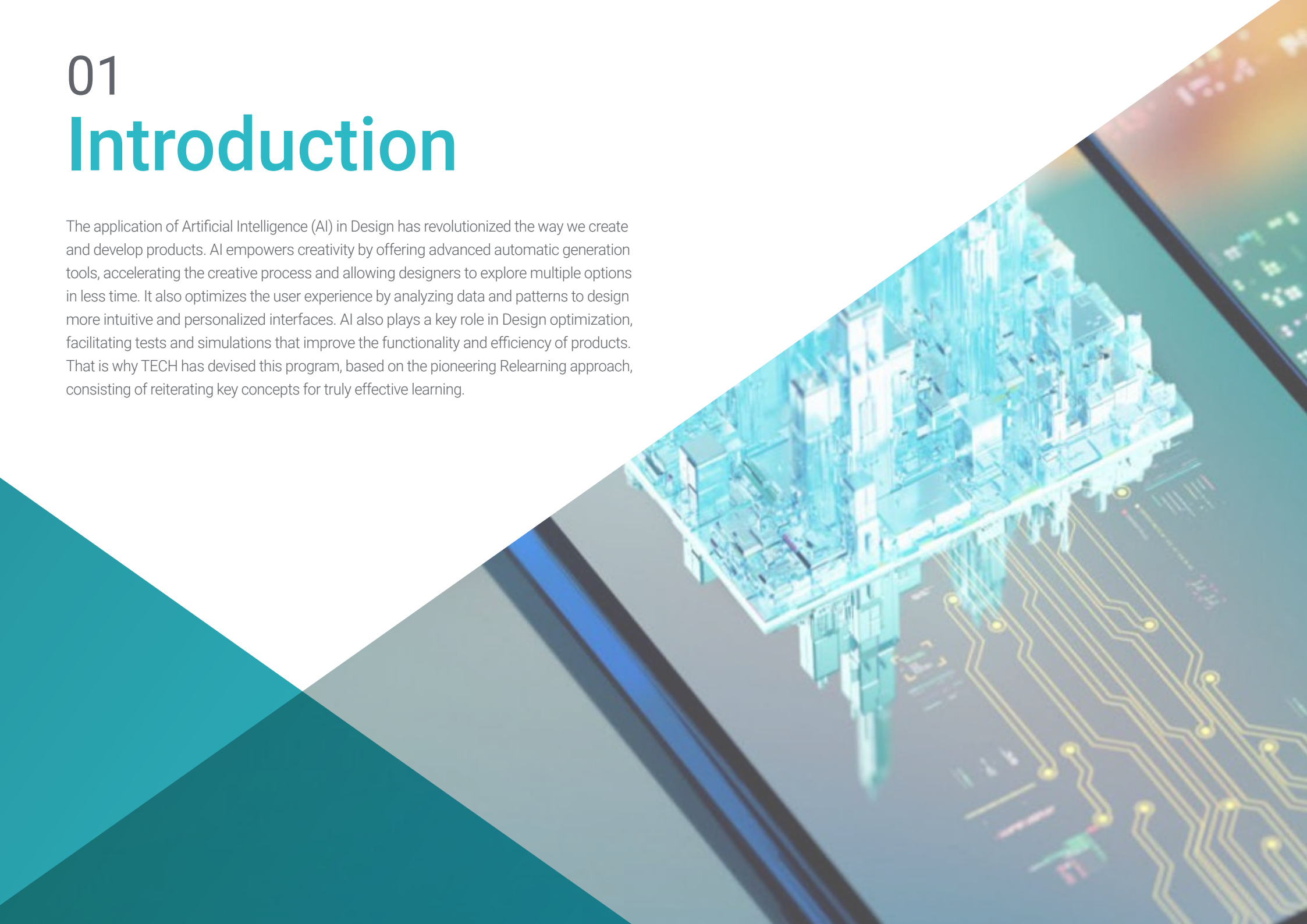
01

Introduction

The application of Artificial Intelligence (AI) in Design has revolutionized the way we create and develop products. AI empowers creativity by offering advanced automatic generation tools, accelerating the creative process and allowing designers to explore multiple options in less time. It also optimizes the user experience by analyzing data and patterns to design more intuitive and personalized interfaces. AI also plays a key role in Design optimization, facilitating tests and simulations that improve the functionality and efficiency of products. That is why TECH has devised this program, based on the pioneering Relearning approach, consisting of reiterating key concepts for truly effective learning.



The application of Artificial Intelligence in Design allows for a more innovative, user-centered creative process, driving the constant evolution of this field"

Artificial Intelligence (AI), implemented in the field of Design, has radically transformed the way projects are conceived and developed in this industry. One of the most outstanding benefits lies in the optimization of the creative process, where AI algorithms can analyze large data sets to identify patterns and trends, providing valuable insights that inspire Design decision making.

For this reason, TECH makes available to designers this Professional Master's Degree in Artificial Intelligence in Design, a unique perspective that holistically merges new technologies with the realization of creative products. Its holistic approach will not only provide graduates with technical knowledge, but will also have an impact on ethics and sustainability, ensuring that students are equipped to address current challenges in this field.

In fact, the diversity of topics to be addressed, from automatic content generation to waste reduction in the Design process, reflects the breadth of applications of AI in various disciplines. In addition, special attention will be paid to ethics and environmental impact, all with the aim of creating aware and competent professionals.

The contents of the program will also include data analysis for decision making in Design, the implementation of AI systems for product and experience personalization, and the exploration of advanced visualization techniques and creative content generation.

In this way, TECH has conceived a rigorous academic program, which is supported by the revolutionary *Relearning*method. This educational approach focuses on the repetition of fundamental principles, ensuring a complete understanding of the content. In addition, accessibility is a key element, since only an electronic device with an Internet connection is needed to explore the material at any time, freeing the student from the obligation to attend physically or to comply with established schedules.

This **Professional Master's Degree in Artificial Intelligence in Design** contains the most complete and up-to-date program on the market. The most important features include:

- The development of case studies presented by experts in Artificial Intelligence in Design
- The graphic, schematic and practical contents of the book provide technical and practical information on those disciplines that are essential for professional practice
- Practical exercises where the self-assessment process can be carried out to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

You'll tackle the integration of AI into Design, boosting efficiency and personalization and opening the door to new creative possibilities"

From automatic visual content generation, to trend prediction and AI-enhanced collaboration, you'll immerse yourself in an ever-evolving field"

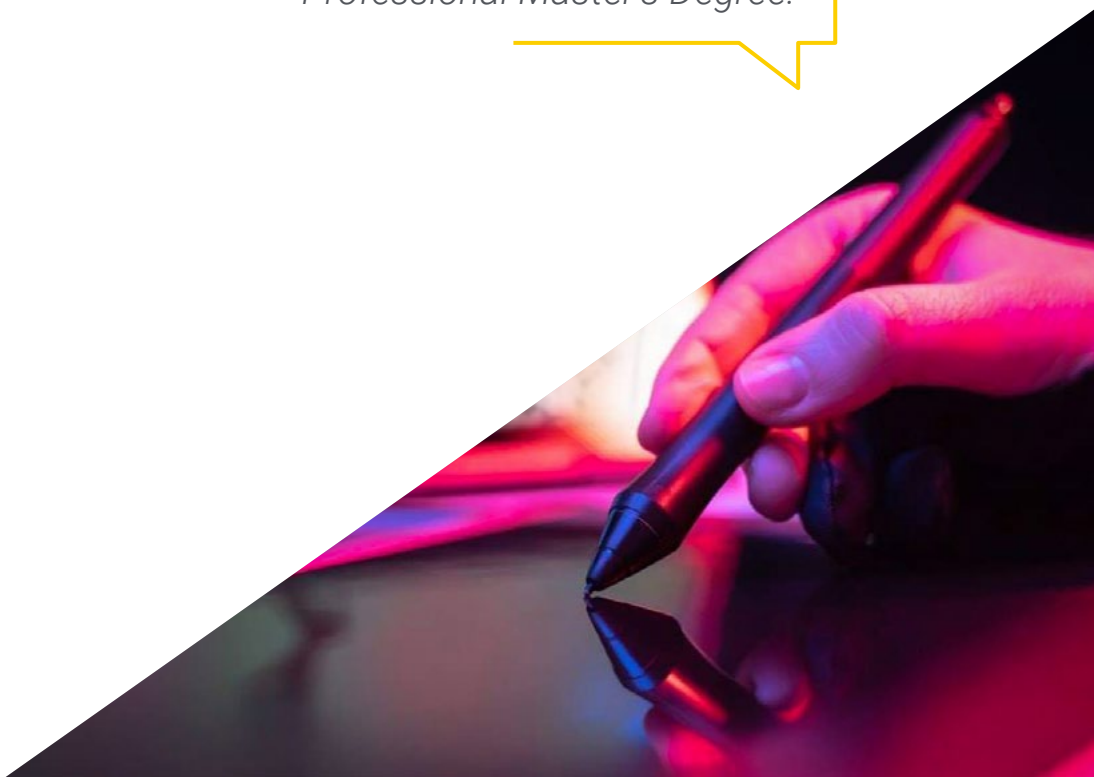
Thanks to the extensive library of multimedia resources offered by TECH, you will delve into the integration of virtual assistants and emotional analysis of the user.

You will address the delicate line between ethics, the environment and emerging technologies through this 100% online Professional Master's Degree.

The program's teaching staff includes professionals from the field who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

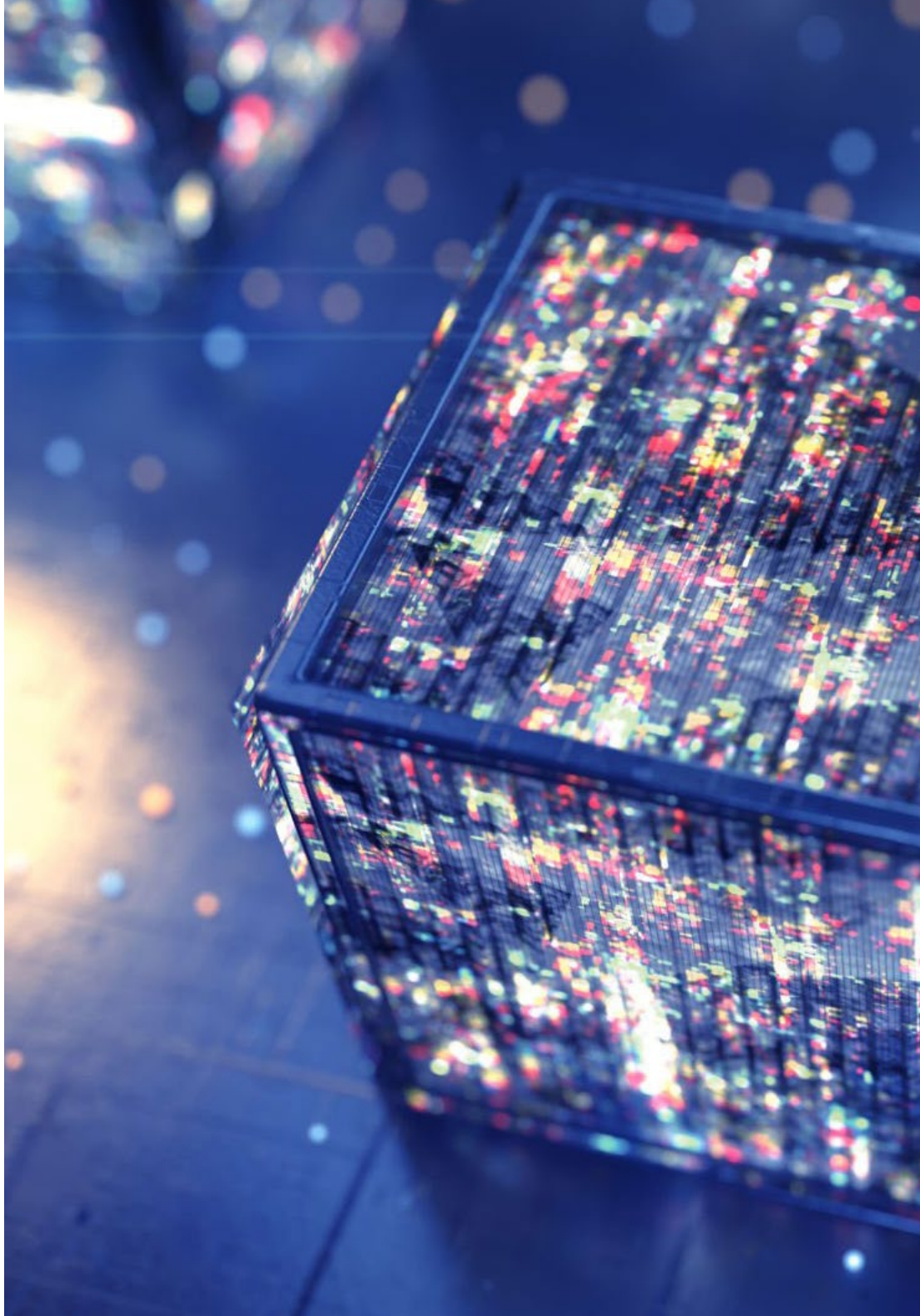
Objectives

The main objective of this program is to provide graduates with a deep and holistic understanding of how AI intertwines with the world of Design. In this way, it aims to cultivate their technical and creative skills, enabling them to develop and apply AI algorithms in innovative processes. In addition, it will foster a critical and ethical perspective on the use of AI in creative projects, preparing professionals to address emerging ethical and social challenges. In addition, you will delve into the personalization of user experiences, the generation of visual content and the resolution of complex Design problems.

You will be able to lead in an environment where the synergy between human creativity and cutting-edge technology is essential for the evolution of contemporary Design"

General Objectives

- Understand the theoretical foundations of Artificial Intelligence
- Study the different types of data and understand the data lifecycle
- Evaluate the crucial role of data in the development and implementation of AI solutions
- Delve into algorithms and complexity to solve specific problems
- Explore the theoretical basis of neural networks for *Deep Learning* development
- Analyze bio-inspired computing and its relevance in the development of intelligent systems
- Analyze current strategies of Artificial Intelligence in various fields, identifying opportunities and challenges
- Develop skills to implement artificial intelligence tools in design projects, including automatic content generation, design optimization and pattern recognition
- Apply collaborative tools, taking advantage of Artificial Intelligence to improve communication and efficiency in design teams
- Incorporate emotional aspects into designs through techniques that effectively connect with the audience
- Understand the symbiosis between interactive design and Artificial Intelligence to optimize the user experience
- Develop skills in adaptive design, considering user behavior and applying advanced AI tools
- Critically analyze the challenges and opportunities when implementing personalized designs in industry using Artificial Intelligence
- Understand the transformative role of Artificial Intelligence in design and manufacturing process innovation



Specific Objectives

Module 1. Fundamentals of Artificial Intelligence

- Analyze the historical evolution of Artificial Intelligence, from its beginnings to its current state, identifying key milestones and developments
- Understand the functioning of neural networks and their application in learning models in Artificial Intelligence
- Study the principles and applications of genetic algorithms, analyzing their usefulness in solving complex problems
- Analyze the importance of thesauri, vocabularies and taxonomies in the structuring and processing of data for AI systems
- Explore the concept of the semantic web and its influence on the organization and understanding of information in digital environments

Module 2. Data Types and Data Life Cycle

- Understand the fundamental concepts of statistics and their application in data analysis
- Identify and classify the different types of statistical data, from quantitative to qualitative data
- Analyze the life cycle of data, from generation to disposal, identifying key stages
- Explore the initial stages of the data life cycle, highlighting the importance of data planning and structure
- Study data collection processes, including methodology, tools and collection channels
- Explore the *Datawarehouse* concept, with emphasis on the elements that comprise it and its design
- Analyze the regulatory aspects related to data management, complying with privacy and security regulations, as well as best practices

Module 3. Data in Artificial Intelligence

- Master the fundamentals of data science, covering tools, types and sources for information analysis
- Explore the process of transforming data into information using data mining and visualization techniques
- Study the structure and characteristics of *datasets*, understanding their importance in the preparation and use of data for Artificial Intelligence models
- Analyze supervised and unsupervised models, including methods and classification
- Use specific tools and best practices in data handling and processing, ensuring efficiency and quality in the implementation of Artificial Intelligence

Module 4. Data Mining. Selection, Pre-Processing and Transformation

- Master the techniques of statistical inference to understand and apply statistical methods in data mining
- Perform detailed exploratory analysis of data sets to identify relevant patterns, anomalies, and trends
- Develop skills for data preparation, including data cleaning, integration, and formatting for use in data mining
- Implement effective strategies for handling missing values in datasets, applying imputation or elimination methods according to context
- Identify and mitigate noise present in data, using filtering and smoothing techniques to improve the quality of the data set
- Address data preprocessing in *Big Data* environments

Module 5. Algorithm and Complexity in Artificial Intelligence

- Introduce algorithm design strategies, providing a solid understanding of fundamental approaches to problem solving
- Analyze the efficiency and complexity of algorithms, applying analysis techniques to evaluate performance in terms of time and space
- Study and apply sorting algorithms, understanding their performance and comparing their efficiency in different contexts
- Explore tree-based algorithms, understanding their structure and applications
- Investigate algorithms with *Heaps*, analyzing their implementation and usefulness in efficient data manipulation
- Analyze graph-based algorithms, exploring their application in the representation and solution of problems involving complex relationships
- Study *Greedy*algorithms, understanding their logic and applications in solving optimization problems
- Investigate and apply the *backtracking* technique for systematic problem solving, analyzing its effectiveness in various scenarios

Module 6. Intelligent Systems

- Explore agent theory, understanding the fundamental concepts of its operation and its application in Artificial Intelligence and software engineering
- Study the representation of knowledge, including the analysis of ontologies and their application in the organization of structured information
- Analyze the concept of the semantic web and its impact on the organization and retrieval of information in digital environments

- Evaluate and compare different knowledge representations, integrating these to improve the efficiency and accuracy of intelligent systems
- Study semantic reasoners, knowledge-based systems and expert systems, understanding their functionality and applications in intelligent decision making

Module 7. Machine Learning and Data Mining

- Introduce the processes of knowledge discovery and the fundamental concepts of machine learning
- Study decision trees as supervised learning models, understanding their structure and applications
- Evaluate classifiers using specific techniques to measure their performance and accuracy in data classification
- Study neural networks, understanding their operation and architecture to solve complex machine learning problems
- Explore Bayesian methods and their application in machine learning, including Bayesian networks and Bayesian classifiers
- Analyze regression and continuous response models for predicting numerical values from data
- Study *clustering* techniques to identify patterns and structures in unlabeled data sets
- Explore text mining and natural language processing (NLP), understanding how machine learning techniques are applied to analyze and understand text

Module 8. Neural networks, the basis of Deep Learning

- Master the fundamentals of Deep Learning, understanding its essential role in Deep Learning
- Explore the fundamental operations in neural networks and understand their application in model building
- Analyze the different layers used in neural networks and learn how to select them appropriately
- Understanding the effective linking of layers and operations to design complex and efficient neural network architectures
- Use trainers and optimizers to tune and improve the performance of neural networks
- Explore the connection between biological and artificial neurons for a deeper understanding of model design
- Tuning hyperparameters for *Fine Tuning* of neural networks, optimizing their performance on specific tasks

Module 9. Deep Neural Networks Training

- Solve gradient-related problems in deep neural network training
- Explore and apply different optimizers to improve the efficiency and convergence of models
- Program the learning rate to dynamically adjust the convergence speed of the model
- Understand and address overfitting through specific strategies during training

- Apply practical guidelines to ensure efficient and effective training of deep neural networks
- Implement *Transfer Learning* as an advanced technique to improve model performance on specific tasks
- Explore and apply *Data Augmentation* techniques to enrich datasets and improve model generalization
- Develop practical applications using *Transfer Learning* to solve real-world problems
- Understand and apply regularization techniques to improve generalization and avoid overfitting in deep neural networks

Module 10. Model Customization and Training with *TensorFlow*

- Master the fundamentals of *TensorFlow* and its integration with NumPy for efficient data management and calculations
- Customize models and training algorithms using the advanced capabilities of *TensorFlow*
- Explore the tfdata API to efficiently manage and manipulate datasets
- Implement the TFRecord format for storing and accessing large datasets in *TensorFlow*
- Use Keras preprocessing layers to facilitate the construction of custom models
- Explore the *TensorFlow Datasets*project to access predefined datasets and improve development efficiency
- Develop a *Deep Learning* application with *TensorFlow*, integrating the knowledge acquired in the module
- Apply in a practical way all the concepts learned in building and training custom models with *TensorFlow* in real-world situations

Module 11. Deep Computer Vision with Convolutional Neural Networks

- Understand the architecture of the visual cortex and its relevance in *Deep Computer Vision*
- Explore and apply convolutional layers to extract key features from images
- Implement clustering layers and their use in *Deep Computer Vision* models with Keras
- Analyze various Convolutional Neural Network (CNN) architectures and their applicability in different contexts
- Develop and implement a CNN ResNet using the Keras library to improve model efficiency and performance
- Use pre-trained Keras models to leverage transfer learning for specific tasks
- Apply classification and localization techniques in *Deep Computer Vision* environments
- Explore object detection and object tracking strategies using Convolutional Neural Networks
- Implement semantic segmentation techniques to understand and classify objects in images in a detailed manner

Module 12. Natural Language Processing (NLP) with Natural Recurrent Networks (NNN) and Attention

- Developing skills in text generation using Recurrent Neural Networks (RNN)
- Apply RNNs in opinion classification for sentiment analysis in texts

- Understand and apply attentional mechanisms in natural language processing models
- Analyze and use *Transformers* models in specific NLP tasks
- Explore the application of *Transformers* models in the context of image processing and computer vision
- Become familiar with the *Hugging Face Transformers* library for efficient implementation of advanced models
- Compare different *Transformers* libraries to evaluate their suitability for specific tasks
- Develop a practical application of NLP that integrates RNN and attention mechanisms to solve real-world problems

Module 13. Autoencoders, GANs, and Diffusion Models

- Develop efficient representations of data using *Autoencoders*, *GANs* and Diffusion Models
- Perform PCA using an incomplete linear autoencoder to optimize data representation
- Implement and understand the operation of stacked autoencoders
- Explore and apply convolutional autoencoders for efficient visual data representations
- Analyze and apply the effectiveness of sparse automatic encoders in data representation
- Generate fashion images from the MNIST dataset using *Autoencoders*
- Understand the concept of Generative Adversarial Networks (*GANs*) and Diffusion Models
- Implement and compare the performance of Diffusion Models and *GANs* in data generation

Module 14. Bio-Inspired Computing

- Introduce the fundamental concepts of bio-inspired computing
- Explore social adaptation algorithms as a key approach in bio-inspired computing
- Analyze space exploration-exploitation strategies in genetic algorithms
- Examine models of evolutionary computation in the context of optimization
- Continue detailed analysis of evolutionary computation models
- Apply evolutionary programming to specific learning problems
- Address the complexity of multi-objective problems in the framework of bio-inspired computing
- Explore the application of neural networks in the field of bio-inspired computing
- Delve into the implementation and usefulness of neural networks in bio-inspired computing

Module 15. Artificial Intelligence: Strategies and applications

- Develop strategies for the implementation of artificial intelligence in financial services
- Analyze the implications of artificial intelligence in the delivery of healthcare services
- Identify and assess the risks associated with the use of AI in the healthcare field
- Assess the potential risks associated with the use of AI in industry

- Apply artificial intelligence techniques in industry to improve productivity
- Design artificial intelligence solutions to optimize processes in public administration
- Evaluate the implementation of AI technologies in the education sector
- Apply artificial intelligence techniques in forestry and agriculture to improve productivity
- Optimize human resources processes through the strategic use of artificial intelligence

Module 16. Practical Applications of Artificial Intelligence in Design

- Apply collaborative tools, leveraging AI to improve communication and efficiency in design teams
- Incorporate emotional aspects into designs through techniques that effectively connect with the audience, exploring how AI can influence the emotional perception of Design
- Master tools and frameworks specific to the application of AI in Design, such as GANs (Generative Adversarial Networks) and other relevant libraries
- Employ AI to generate images, illustrations and other visual elements automatically
- Implementing AI techniques to analyze design-related data, such as navigation behavior and user feedback

Module 17. Design-User Interaction and AI

- Understand the symbiosis between Interactive Design and AI to optimize the user experience
- Develop skills in Adaptive Design, considering user behavior and applying advanced AI tools
- Critically analyze the challenges and opportunities when implementing personalized designs in industry using AI
- Use predictive AI algorithms to anticipate user interactions, enabling proactive and efficient design responses
- Develop AI-based recommender systems that suggest relevant content, products or actions to users

Module 18. Innovation in Design and AI Processes

- Understand the transformative role of AI in design and manufacturing process innovation
- Implement mass customization strategies in production through Artificial Intelligence, adapting products to individual needs
- Apply AI techniques to minimize waste in the Design process, contributing to more sustainable practices
- Develop practical skills to apply AI techniques to improve industrial and design processes
- Encourage creativity and exploration during design processes, using AI as a tool to generate innovative solutions

Module 19. Technologies Applied to Design and AI

- Enhance comprehensive understanding and practical skills to leverage advanced technologies and Artificial Intelligence in various facets of Design
- Understand the strategic integration of emerging technologies and AI in the Design domain
- Apply microchip architecture optimization techniques using AI to improve both performance and efficiency

- Properly use algorithms for the automatic generation of multimedia content, enriching visual communication in editorial projects
- Implement the knowledge and skills acquired during this program to real projects involving technologies and AI in Design

Module 20. Ethics and Environment in Design and AI

- Understand the ethical principles related to Design and Artificial Intelligence, cultivating an ethical awareness in decision making
- Focus on the ethical integration of technologies, such as emotion recognition, ensuring immersive experiences that respect the user's privacy and dignity
- Promote social and environmental responsibility in Game Design and in the industry in general, considering ethical aspects in representation and gameplay
- Generate sustainable practices in design processes, ranging from waste reduction to the integration of responsible technologies, contributing to the preservation of the environment
- Analyze how AI technologies can affect society, considering strategies to mitigate their possible negative impacts

You will harness the potential of AI in optimizing creative processes and creating innovative and responsible Design solutions"

03

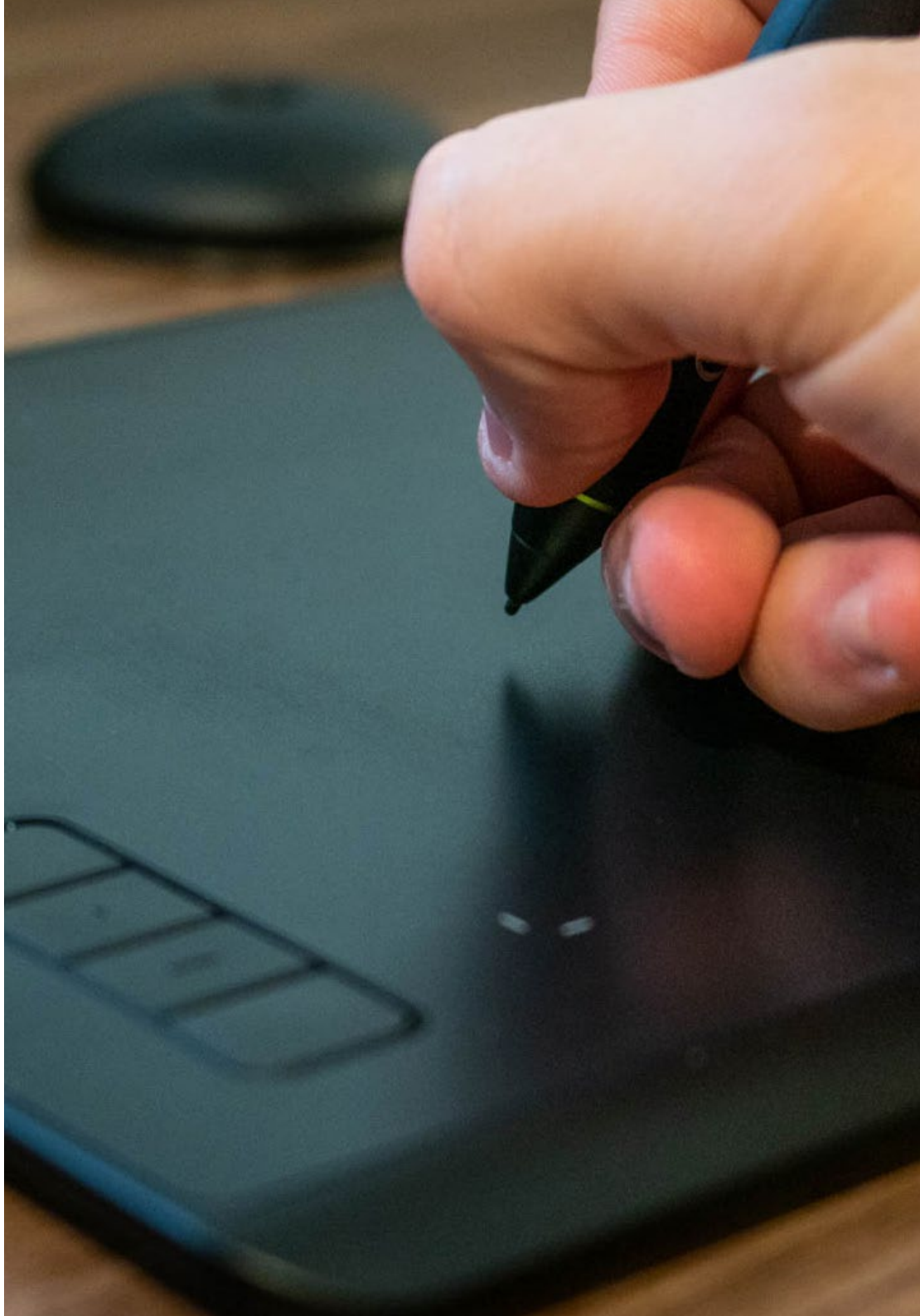
Skills

The program will provide designers with the technical skills necessary to effectively implement Artificial Intelligence in Design projects, from automatic content generation to industrial process optimization. In addition, through a deep understanding of the ethical and sustainable implications, it will prepare them to lead responsibly in a world where technology and creativity converge. This program will not only broaden graduates' technical capabilities, but will also instill an ethical and environmental awareness, to excel in contemporary Design innovation and address emerging challenges in the field of AI.

You will master the synergy between creativity and technology with this Professional Master's Degree! You will develop innovative and strategic solutions that will redefine the future of Design"

General Skills

- Master data mining techniques, including complex data selection, preprocessing and transformation
- Design and develop intelligent systems capable of learning and adapting to changing environments
- Control machine learning tools and their application in data mining for decision making
- Employ Autoencoders, GANs and Diffusion Models to solve specific challenges in Artificial Intelligence
- Implement an encoder-decoder network for neural machine translation
- Apply the fundamental principles of neural networks in solving specific problems
- Use AI tools, platforms and techniques, from data analysis to the application of neural networks and predictive modeling
- Conceive and execute projects using generative techniques, understanding their application in industrial and artistic environments
- Use predictive AI algorithms to anticipate user interactions, enabling proactive and efficient design responses
- Apply Artificial Intelligence techniques to minimize waste in the design process, contributing to more sustainable practices



Specific Skills

- Apply AI techniques and strategies to improve efficiency in the *retail* sector
- Delve into understanding and application of genetic algorithms
- Implement noise removal techniques using automatic encoders
- Effectively create training data sets for natural language processing (NLP) tasks
- Run grouping layers and their use in *Deep Computer Vision* models with Keras
- Use *TensorFlow* features and graphics to optimize the performance of custom models
- Optimize the development and application of *chatbots* and virtual assistants, understanding their operation and potential applications
- Master reuse of pre-workout layers to optimize and accelerate the training process
- Build the first neural network, applying the concepts learned in practice
- Activate Multilayer Perceptron (MLP) using the Keras library
- Apply data scanning and preprocessing techniques, identifying and preparing data for effective use in machine learning models
- Implement effective strategies for handling missing values in datasets, applying imputation or elimination methods according to context
- Investigate languages and software for the creation of ontologies, using specific tools for the development of semantic models
- Develop data cleaning techniques to ensure the quality and accuracy of the information used in subsequent analyses
- Implement Artificial Intelligence tools in specific design projects, including automatic content generation, optimization and pattern recognition.
- Conceive and execute projects using generative techniques, understanding their application in industrial and artistic environments.
- Use predictive AI algorithms to anticipate user interactions, enabling proactive and efficient design responses
- Develop practical skills to apply AI techniques to improve industrial and design processes.
- Apply microchip architecture optimization techniques using Artificial Intelligence to improve performance and efficiency.
- Use algorithms for the automatic generation of multimedia content, enriching presentation and visual communication in publishing projects
- Promote sustainable practices in Design, from waste reduction to the integration of responsible technologies.

04

Course Management

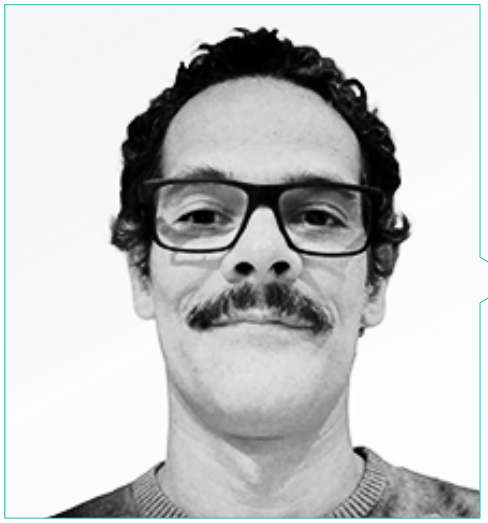
The faculty of this Artificial Intelligence in Design program is comprised of leaders in the field, experts committed to driving the cutting edge of creativity and technology. With a unique combination of practical and academic experience, these leading practitioners will not only share current theories and innovative tools, but will inspire students with their bold vision and ability to navigate the complexity of AI-driven Design.

Prepare to be guided by visionary mentors, who will prepare you to lead the next wave of innovation in the world of Design"

Management

Dr. Peralta Martín-Palomino, Arturo

- CEO and CTO at Prometeus Global Solutions
- CTO at Korporate Technologies
- CTO at AI Shephers GmbH
- Consultant and Strategic Business Advisor at Alliance Medical
- Director of Design and Development at DocPath
- PhD in Psychology from the University of Castilla - La Mancha
- PhD in Economics, Business and Finance from the Camilo José Cela University
- PhD in Psychology from University of Castilla – La Mancha
- Professional Master's Degree in Executive MBA by the Isabel I University
- Professional Master's Degree in Sales and Marketing Management, Isabel I University
- Expert Master's Degree in Big Data by Hadoop Training
- Professional Master's Degree in Advanced Information Technologies from the University of Castilla - La Mancha
- Member of the: SMILE Research Group



Mr. Maldonado Pardo, Chema

- Graphic Design Specialist
- Graphic Designer at DocPath Document Solutions S.L
- Founding Partner and Head of the Design and Advertising Department at D.C.M. Difusión Integral de Ideas, C.B
- Head of the Design and Digital Printing Department at Ofipaper, La Mancha S.L
- Graphic Designer in Ático, Estudio Gráfico
- Graphic Designer and Craftsman Printer at Lozano Artes Gráficas
- Layout and Graphic Designer in Gráficas Lozano
- ETSI Telecommunications by the Polytechnic University of Madrid
- ETS Computer Systems ETSI by the University of Castilla-La Mancha

Professors

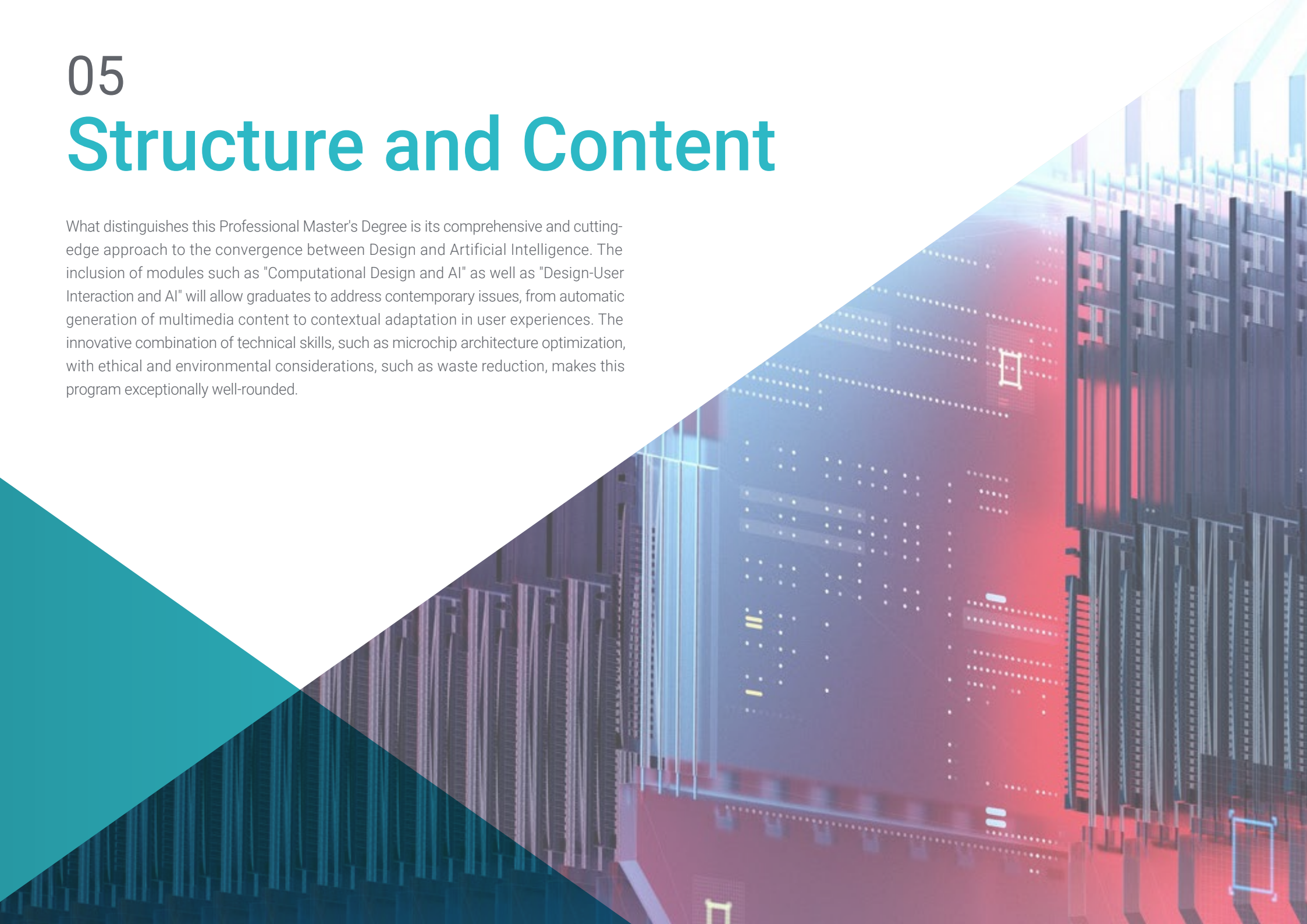
Ms. Parreño Rodríguez, Adelaida

- Technical Developer & Energy Communities Engineer at the University of Murcia
- Manager in Research & Innovation in European Projects at the University of Murcia
- Technical Developer & Energy/Electrical Engineer & Researcher in PHOENIX Project and FLEXUM (ONENET) Project
- Content Creator in Global UC3M Challenge
- Ginés Huertas Martínez Award (2023)
- Professional Master's Degree in Renewable Energies from the Polytechnic University of Cartagena
- Degree in Electrical Engineering (bilingual) from Carlos III University of Madrid

05

Structure and Content

What distinguishes this Professional Master's Degree is its comprehensive and cutting-edge approach to the convergence between Design and Artificial Intelligence. The inclusion of modules such as "Computational Design and AI" as well as "Design-User Interaction and AI" will allow graduates to address contemporary issues, from automatic generation of multimedia content to contextual adaptation in user experiences. The innovative combination of technical skills, such as microchip architecture optimization, with ethical and environmental considerations, such as waste reduction, makes this program exceptionally well-rounded.



Step into a unique program, which will encompass both creativity and ethical and sustainable awareness in the application of AI in the field of Design"

Module 1. Fundamentals of Artificial Intelligence

1.1. History of Artificial Intelligence
- 1.1.1. When Do We Start Talking About Artificial Intelligence?
- 1.1.2. References in Film
- 1.1.3. Importance of Artificial Intelligence
- 1.1.4. Technologies that Enable and Support Artificial Intelligence

1.2. Artificial Intelligence in Games
- 1.2.1. Game Theory
- 1.2.2. Minimax and Alpha-Beta Pruning
- 1.2.3. Simulation: Monte Carlo

1.3. Neural Networks
- 1.3.1. Biological Fundamentals
- 1.3.2. Computational Model
- 1.3.3. Supervised and Unsupervised Neural Networks
- 1.3.4. Simple Perceptron
- 1.3.5. Multilayer Perceptron

1.4. Genetic Algorithms
- 1.4.1. History
- 1.4.2. Biological Basis
- 1.4.3. Problem Coding
- 1.4.4. Generation of the Initial Population
- 1.4.5. Main Algorithm and Genetic Operators
- 1.4.6. Evaluation of Individuals: Fitness

1.5. Thesauri, Vocabularies, Taxonomies
- 1.5.1. Vocabulary
- 1.5.2. Taxonomy
- 1.5.3. Thesauri
- 1.5.4. Ontologies
- 1.5.5. Knowledge Representation Semantic Web

1.6. Semantic Web
- 1.6.1. Specifications RDF, RDFS and OWL
- 1.6.2. Inference/ Reasoning
- 1.6.3. Linked Data

1.7. Expert systems and DSS
  1.7.1. Expert Systems
  1.7.2. Decision Support Systems
1.8. Chatbots and Virtual Assistants
  1.8.1. Types of assistants: Voice and text-based assistants
  1.8.2. Fundamental Parts for the Development of an Assistant: Intents, Entities and Dialog Flow
  1.8.3. Integrations: Web, Slack, WhatsApp, Facebook
  1.8.4. Assistant Development Tools: Dialog Flow, Watson Assistant
1.9. AI Implementation Strategy
1.10. Future of Artificial Intelligence
  1.10.1. Understand How to Detect Emotions Using Algorithms
  1.10.2. Creation of a Personality: Language, Expressions and Content
  1.10.3. Trends of Artificial Intelligence
  1.10.4. Reflections

Module 2. Data Types and Data Life Cycle

2.1. Statistics
  2.1.1. Statistics: Descriptive Statistics, Statistical Inferences
  2.1.2. Population, Sample, Individual
  2.1.3. Variables: Definition, Measurement Scales
2.2. Types of Data Statistics
  2.2.1. According to Type
    2.2.1.1. Quantitative: Continuous Data and Discrete Data
    2.2.1.2. Qualitative: Binomial Data, Nominal Data and Ordinal Data
  2.2.2. According to their Shape
    2.2.2.1. Numeric
    2.2.2.2. Text:
    2.2.2.3. Logical
  2.2.3. According to its Source
    2.2.3.1. Primary
    2.2.3.2. Secondary

2.3. Life Cycle of Data
- 2.3.1. Stages of the Cycle
- 2.3.2. Milestones of the Cycle
- 2.3.3. FAIR Principles

2.4. Initial Stages of the Cycle
- 2.4.1. Definition of Goals
- 2.4.2. Determination of Resource Requirements
- 2.4.3. Gantt Chart
- 2.4.4. Data Structure

2.5. Data Collection
- 2.5.1. Methodology of Data Collection
- 2.5.2. Data Collection Tools
- 2.5.3. Data Collection Channels

2.6. Data Cleaning
- 2.6.1. Phases of Data Cleansing
- 2.6.2. Data Quality
- 2.6.3. Data Manipulation (with R)

2.7. Data Analysis, Interpretation and Evaluation of Results
- 2.7.1. Statistical Measures
- 2.7.2. Relationship Indices
- 2.7.3. Data Mining

2.8. Data Warehouse (*Datawarehouse*)
- 2.8.1. Elements that Comprise it
- 2.8.2. Design
- 2.8.3. Aspects to Consider

2.9. Data Availability
- 2.9.1. Access
- 2.9.2. Uses
- 2.9.3. Security/Safety

2.10. Regulatory Aspects
- 2.10.1. Data Protection Law
- 2.10.2. Good Practices
- 2.10.3. Other Normative Aspects

Module 3. Data in Artificial Intelligence

3.1. Data Science
- 3.1.1. Data Science
- 3.1.2. Advanced Tools for Data Scientists

3.2. Data, Information and Knowledge
- 3.2.1. Data, Information and Knowledge
- 3.2.2. Types of Data
- 3.2.3. Data Sources

3.3. From Data to Information
- 3.3.1. Data Analysis
- 3.3.2. Types of Analysis
- 3.3.3. Extraction of Information from a *Dataset*

3.4. Extraction of Information Through Visualization
- 3.4.1. Visualization as an Analysis Tool
- 3.4.2. Visualization Methods
- 3.4.3. Visualization of a Data Set

3.5. Data Quality
- 3.5.1. Quality Data
- 3.5.2. Data Cleaning
- 3.5.3. Basic Data Pre-Processing

3.6. *Dataset*
- 3.6.1. *Dataset* Enrichment
- 3.6.2. The Curse of Dimensionality
- 3.6.3. Modification of Our Data Set

3.7. Unbalance
- 3.7.1. Classes of Unbalance
- 3.7.2. Unbalance Mitigation Techniques
- 3.7.3. Balancing a *Dataset*

3.8. Unsupervised Models
- 3.8.1. Unsupervised Model
- 3.8.2. Methods
- 3.8.3. Classification with Unsupervised Models

3.9. Supervised Models
- 3.9.1. Supervised Model
- 3.9.2. Methods
- 3.9.3. Classification with Supervised Models

3.10. Tools and Good Practices
- 3.10.1. Good Practices for Data Scientists
- 3.10.2. The Best Model
- 3.10.3. Useful Tools

Module 4. Data Mining. Selection, Pre-Processing and Transformation

4.1. Statistical Inference
- 4.1.1. Descriptive Statistics vs. Statistical Inference
- 4.1.2. Parametric Procedures
- 4.1.3. Non-Parametric Procedures

4.2. Exploratory Analysis
- 4.2.1. Descriptive Analysis
- 4.2.2. Visualization
- 4.2.3. Data Preparation

4.3. Data Preparation
- 4.3.1. Integration and Data Cleaning
- 4.3.2. Normalization of Data
- 4.3.3. Transforming Attributes

4.4. Missing Values
- 4.4.1. Treatment of Missing Values
- 4.4.2. Maximum Likelihood Imputation Methods
- 4.4.3. Missing Value Imputation Using Machine Learning

4.5. Noise in the Data
- 4.5.1. Noise Classes and Attributes
- 4.5.2. Noise Filtering
- 4.5.3. The Effect of Noise

4.6. The Curse of Dimensionality
- 4.6.1. *Oversampling*
- 4.6.2. *Undersampling*
- 4.6.3. Multidimensional Data Reduction

4.7. From Continuous to Discrete Attributes
- 4.7.1. Continuous Data Vs. Discreet Data
- 4.7.2. Discretization Process

4.8. The Data
- 4.8.1. Data Selection
- 4.8.2. Prospects and Selection Criteria
- 4.8.3. Selection Methods

4.9. Instance Selection
- 4.9.1. Methods for Instance Selection
- 4.9.2. Prototype Selection
- 4.9.3. Advanced Methods for Instance Selection
- 4.9.4. Data Pre-Processing in Big Data Environments

Module 5. Algorithm and Complexity in Artificial Intelligence

5.1. Introduction to Algorithm Design Strategies
- 5.1.1. Recursion
- 5.1.2. Divide and Conquer
- 5.1.3. Other Strategies

5.2. Efficiency and Analysis of Algorithms
- 5.2.1. Efficiency Measures
- 5.2.2. Measuring the Size of the Input
- 5.2.3. Measuring Execution Time
- 5.2.4. Worst, Best and Average Case
- 5.2.5. Asymptotic Notation
- 5.2.6. Criteria for Mathematical Analysis of Non-Recursive Algorithms
- 5.2.7. Mathematical Analysis of Recursive Algorithms
- 5.2.8. Empirical Analysis of Algorithms

5.3. Sorting Algorithms
- 5.3.1. Concept of Sorting
- 5.3.2. Bubble Sorting
- 5.3.3. Sorting by Selection
- 5.3.4. Sorting by Insertion
- 5.3.5. *Merge Sort*
- 5.3.6. Quick Sorting (*Quick_Sort)*

5.4. Algorithms with Trees
- 5.4.1. Tree Concept
- 5.4.2. Binary Trees
- 5.4.3. Tree Paths
- 5.4.4. Representing Expressions
- 5.4.5. Ordered Binary Trees
- 5.4.6. Balanced Binary Trees

5.5. Algorithms Using *Heaps*
- 5.5.1. *Heaps*
- 5.5.2. The *Heapsort* Algorithm
- 5.5.3. Priority Queues

5.6. Graph Algorithms
- 5.6.1. Representation
- 5.6.2. Traversal in Width
- 5.6.3. Depth Travel
- 5.6.4. Topological Sorting

5.7. *Greedy* Algorithms
- 5.7.1. *Greedy* Strategy
- 5.7.2. Elements of the *Greedy* Strategy
- 5.7.3. Currency Exchange
- 5.7.4. Traveler's Problem
- 5.7.5. Backpack Problem

5.8. Minimal Path Finding
- 5.8.1. The Minimum Path Problem
- 5.8.2. Negative Arcs and Cycles
- 5.8.3. Dijkstra's Algorithm

5.9. *Greedy* Algorithms on Graphs
- 5.9.1. The Minimum Covering Tree
- 5.9.2. Prim's Algorithm
- 5.9.3. Kruskal's Algorithm
- 5.9.4. Complexity Analysis

5.10. *Backtracking*
- 5.10.1. *Backtracking*
- 5.10.2. Alternative Techniques

Module 6. Intelligent Systems

6.1. Agent Theory
- 6.1.1. Concept History
- 6.1.2. Agent Definition
- 6.1.3. Agents in Artificial Intelligence
- 6.1.4. Agents in Software Engineering

6.2. Agent Architectures
- 6.2.1. The Reasoning Process of an Agent
- 6.2.2. Reactive Agents
- 6.2.3. Deductive Agents
- 6.2.4. Hybrid Agents
- 6.2.5. Comparison

6.3. Information and Knowledge
- 6.3.1. Difference between Data, Information and Knowledge
- 6.3.2. Data Quality Assessment
- 6.3.3. Data Collection Methods
- 6.3.4. Information Acquisition Methods
- 6.3.5. Knowledge Acquisition Methods

6.4. Knowledge Representation
- 6.4.1. The Importance of Knowledge Representation
- 6.4.2. Definition of Knowledge Representation According to Roles
- 6.4.3. Knowledge Representation Features

6.5. Ontologies
- 6.5.1. Introduction to Metadata
- 6.5.2. Philosophical Concept of Ontology
- 6.5.3. Computing Concept of Ontology
- 6.5.4. Domain Ontologies and Higher-Level Ontologies
- 6.5.5. How to Build an Ontology?

6.6. Ontology Languages and Ontology Creation Software
- 6.6.1. Triple RDF, *Turtle* and N
- 6.6.2. RDF *Schema*
- 6.6.3. OWL
- 6.6.4. SPARQL

6.6.5. Introduction to Ontology Creation Tools
6.6.6. Installing and Using *Protégé*
6.7. Semantic Web
6.7.1. Current and Future Status of the Semantic Web
6.7.2. Semantic Web Applications
6.8. Other Knowledge Representation Models
6.8.1. Vocabulary
6.8.2. Global Vision
6.8.3. Taxonomy
6.8.4. Thesauri
6.8.5. Folksonomy
6.8.6. Comparison
6.8.7. Mind Maps
6.9. Knowledge Representation Assessment and Integration
6.9.1. Zero-Order Logic
6.9.2. First-Order Logic
6.9.3. Descriptive Logic
6.9.4. Relationship between Different Types of Logic
6.9.5. *Prolog*: Programming Based on First-Order Logic
6.10. Semantic Reasoners, Knowledge-Based Systems and Expert Systems
6.10.1. Concept of Reasoner
6.10.2. Reasoner Applications
6.10.3. Knowledge-Based Systems
6.10.4. MYCIN: History of Expert Systems
6.10.5. Expert Systems Elements and Architecture
6.10.6. Creating Expert Systems

Module 7. Machine Learning and Data Mining

7.1. Introduction to Knowledge Discovery Processes and Basic Concepts of Machine Learning
7.1.1. Key Concepts of Knowledge Discovery Processes
7.1.2. Historical Perspective of Knowledge Discovery Processes
7.1.3. Stages of the Knowledge Discovery Processes
7.1.4. Techniques Used in Knowledge Discovery Processes
7.1.5. Characteristics of Good Machine Learning Models
7.1.6. Types of Machine Learning Information
7.1.7. Basic Learning Concepts
7.1.8. Basic Concepts of Unsupervised Learning
7.2. Data Exploration and Pre-processing
7.2.1. Data Processing
7.2.2. Data Processing in the Data Analysis Flow
7.2.3. Types of Data
7.2.4. Data Transformations
7.2.5. Visualization and Exploration of Continuous Variables
7.2.6. Visualization and Exploration of Categorical Variables
7.2.7. Correlation Measures
7.2.8. Most Common Graphic Representations
7.2.9. Introduction to Multivariate Analysis and Dimensionality Reduction
7.3. Decision Trees
7.3.1. ID Algorithm
7.3.2. Algorithm C
7.3.3. Overtraining and Pruning
7.3.4. Analysis of Results
7.4. Evaluation of Classifiers
7.4.1. Confusion Matrixes
7.4.2. Numerical Evaluation Matrixes
7.4.3. Kappa Statistic
7.4.4. ROC Curves
7.5. Classification Rules
7.5.1. Rule Evaluation Measures
7.5.2. Introduction to Graphic Representation
7.5.3. Sequential Overlay Algorithm
7.6. Neural Networks
7.6.1. Basic Concepts
7.6.2. Simple Neural Networks
7.6.3. *Backpropagation* Algorithm
7.6.4. Introduction to Recurrent Neural Networks

7.7. Bayesian Methods
- 7.7.1. Basic Probability Concepts
- 7.7.2. Bayes' Theorem
- 7.7.3. Naive Bayes
- 7.7.4. Introduction to Bayesian Networks

7.8. Regression and Continuous Response Models
- 7.8.1. Simple Linear Regression
- 7.8.2. Multiple Linear Regression
- 7.8.3. Logistic Regression
- 7.8.4. Regression Trees
- 7.8.5. Introduction to Support Vector Machines (SVM)
- 7.8.6. Goodness-of-Fit Measures

7.9. *Clustering*
- 7.9.1. Basic Concepts
- 7.9.2. Hierarchical *Clustering*
- 7.9.3. Probabilistic Methods
- 7.9.4. EM Algorithm
- 7.9.5. *B-Cubed* Method
- 7.9.6. Implicit Methods

7.10 Text Mining and Natural Language Processing (NLP)
- 7.10.1. Basic Concepts
- 7.10.2. Corpus Creation
- 7.10.3. Descriptive Analysis
- 7.10.4. Introduction to Feelings Analysis

Module 8. Neural networks, the basis of Deep Learning

8.1. Deep Learning
- 8.1.1. Types of Deep Learning
- 8.1.2. Applications of Deep Learning
- 8.1.3. Advantages and Disadvantages of Deep Learning

8.2. Surgery
- 8.2.1. Sum
- 8.2.2. Product
- 8.2.3. Transfer

8.3. Layers
- 8.3.1. Input Layer
- 8.3.2. Cloak
- 8.3.3. Output Layer

8.4. Layer Bonding and Operations
- 8.4.1. Architecture Design
- 8.4.2. Connection Between Layers
- 8.4.3. Forward Propagation

8.5. Construction of the First Neural Network
- 8.5.1. Network Design
- 8.5.2. Establish the Weights
- 8.5.3. Network Training

8.6. Trainer and Optimizer
- 8.6.1. Optimizer Selection
- 8.6.2. Establishment of a Loss Function
- 8.6.3. Establishing a Metric

8.7. Application of the Principles of Neural Networks
- 8.7.1. Activation Functions
- 8.7.2. Backward Propagation
- 8.7.3. Parameter Adjustment

8.8. From Biological to Artificial Neurons
- 8.8.1. Functioning of a Biological Neuron
- 8.8.2. Transfer of Knowledge to Artificial Neurons
- 8.8.3. Establish Relations Between the Two

8.9. Implementation of MLP (Multilayer Perceptron) with Keras
- 8.9.1. Definition of the Network Structure
- 8.9.2. Model Compilation
- 8.9.3. Model Training

8.10. *Fine tuning* Hyperparameters of Neural Networks
- 8.10.1. Selection of the Activation Function
- 8.10.2. Setting the *Learning rate*
- 8.10.3. Adjustment of Weights

Module 9. Deep Neural Networks Training

9.1. Gradient Problems
- 9.1.1. Gradient Optimization Techniques
- 9.1.2. Stochastic Gradients
- 9.1.3. Weight Initialization Techniques

9.2. Reuse of Pre-Trained Layers
- 9.2.1. Learning Transfer Training
- 9.2.2. Feature Extraction
- 9.2.3. Deep Learning

9.3. Optimizers
- 9.3.1. Stochastic Gradient Descent Optimizers
- 9.3.2. Optimizers Adam and *RMSprop*
- 9.3.3. Moment Optimizers

9.4. Learning Rate Programming
- 9.4.1. Automatic Learning Rate Control
- 9.4.2. Learning Cycles
- 9.4.3. Smoothing Terms

9.5. Overfitting
- 9.5.1. Cross Validation
- 9.5.2. Regularization
- 9.5.3. Evaluation Metrics

9.6. Practical Guidelines
- 9.6.1. Model Design
- 9.6.2. Selection of Metrics and Evaluation Parameters
- 9.6.3. Hypothesis Testing

9.7. *Transfer Learning*
- 9.7.1. Learning Transfer Training
- 9.7.2. Feature Extraction
- 9.7.3. Deep Learning

9.8. *Data Augmentation*
- 9.8.1. Image Transformations
- 9.8.2. Synthetic Data Generation
- 9.8.3. Text Transformation

9.9. Practical Application of Transfer Learning
- 9.9.1. Learning Transfer Training
- 9.9.2. Feature Extraction
- 9.9.3. Deep Learning

9.10. Regularization
- 9.10.1. L and L
- 9.10.2. Regularization by Maximum Entropy
- 9.10.3. *Dropout*

Module 10. Model Customization and Training with TensorFlow

10.1. *TensorFlow*
- 10.1.1. Use of the *TensorFlow* Library
- 10.1.2. Model Training with *TensorFlow*
- 10.1.3. Operations with Graphics in *TensorFlow*

10.2. *TensorFlow* and *NumPy*
- 10.2.1. NumPy Computing Environment for *TensorFlow*
- 10.2.2. Using *NumPy*Arrays with *TensorFlow*
- 10.2.3. *NumPy* Operations for *TensorFlow* Graphics

10.3. Model Customization and Training Algorithms
- 10.3.1. Building Custom Models with *TensorFlow*
- 10.3.2. Management of Training Parameters
- 10.3.3. Use of Optimization Techniques for Training

10.4. *TensorFlow* Features and Graphics
- 10.4.1. Functions with *TensorFlow*
- 10.4.2. Use of Graphs for Model Training
- 10.4.3. Optimization of Graphs with *TensorFlow* Operations

10.5. Loading and Preprocessing Data with *TensorFlow*
- 10.5.1. Loading of Datasets with *TensorFlow*
- 10.5.2. Preprocessing data with *TensorFlow*
- 10.5.3. Using *TensorFlow* Tools for Data Manipulation

10.6. The API *tfdata*
- 10.6.1. Using the *tfdata*API for Data Processing
- 10.6.2. Construction of Data Streams with *tfdata*
- 10.6.3. Using the *tfdata* API for Model Training

10.7. The *TFRecord* Format
- 10.7.1. Using the *TFRecord* API for Data Serialization
- 10.7.2. *TFRecord* Files Upload with *TensorFlow*
- 10.7.3. Using *TFRecord* Files for Model Training

10.8. Keras Preprocessing layers
- 10.8.1. Using the Keras Preprocessing API
- 10.8.2. Preprocessing *pipelined* Construction with Keras
- 10.8.3. Using the Keras Preprocessing API for Model Training

10.9. The *TensorFlow Datasets* Project
- 10.9.1. Using *TensorFlow Datasets* for Data Loading
- 10.9.2. Preprocessing Data with *TensorFlow Datasets*
- 10.9.3. Using *TensorFlow Datasets* for Model Training

10.10. Building a *Deep Learning* App with *TensorFlow*
- 10.10.1. Practical Applications
- 10.10.2. Building a *Deep Learning* App with *TensorFlow*
- 10.10.3. Model training with *TensorFlow*
- 10.10.4. Use of the Application for the Prediction of Results

Module 11. Deep Computer Vision with Convolutional Neural Networks

11.1. The *Visual Cortex* Architecture
- 11.1.1. Functions of the Visual Cortex
- 11.1.2. Theories of Computational Vision
- 11.1.3. Models of Image Processing

11.2. Convolutional Layers
- 11.2.1 Reuse of Weights in Convolution
- 11.2.2. Convolution D
- 11.2.3. Activation Functions

11.3. Grouping Layers and Implementation of Grouping Layers with Keras
- 11.3.1. *Pooling and Striding*
- 11.3.2. *Flattening*
- 11.3.3. Types of *Pooling*

11.4. CNN Architecture
- 11.4.1. VGG Architecture
- 11.4.2. *AlexNet* Architecture
- 11.4.3. Architecture *ResNet*

11.5. Implementing a CNN *ResNet* using Keras
- 11.5.1. Weight Initialization
- 11.5.2. Input Layer Definition
- 11.5.3. Output Definition

11.6. Use of Pre-trained Keras Models
- 11.6.1. Characteristics of Pre-trained Models
- 11.6.2. Uses of Pre-trained Models
- 11.6.3. Advantages of Pre-trained Models

11.7. Pre-trained Models for Transfer Learning
- 11.7.1. Transfer Learning
- 11.7.2. Transfer Learning Process
- 11.7.3. Advantages of Transfer Learning

11.8. *Deep Computer Vision* Classification and Localization
- 11.8.1. Image Classification
- 11.8.2. Localization of Objects in Images
- 11.8.3. Object Detection

11.9. Object Detection and Object Tracking
- 11.9.1. Object Detection Methods
- 11.9.2. Object Tracking Algorithms
- 11.9.3. Tracking and Localization Techniques

11.10. Semantic Segmentation
- 11.10.1. Deep Learning for Semantic Segmentation
- 11.10.1. Edge Detection
- 11.10.1. Rule-based Segmentation Methods

Module 12. Natural Language Processing (NLP) with Natural Recurrent Networks (NNN) and Attention

12.1. Text Generation Using RNN
- 12.1.1. Training an RNN for Text Generation
- 12.1.2. Natural Language Generation with RNN
- 12.1.3. Text Generation Applications with RNN

12.2. Training Data Set Creation
- 12.2.1. Preparation of the Data for Training an RNN
- 12.2.2. Storage of the Training Dataset

12.2.3. Data Cleaning and Transformation
12.2.4. Sentiment Analysis
12.3. Classification of Opinions with RNN
12.3.1. Detection of Themes in Comments
12.3.2. Sentiment Analysis with Deep Learning Algorithms
12.4. Encoder-decoder Network for Neural Machine Translation
12.4.1. Training an RNN for Machine Translation
12.4.2. Use of an *Encoder-decoder* Network for Machine Translation
12.4.3. Improving the Accuracy of Machine Translation with RNNs
12.5. Attention Mechanisms
12.5.1. Application of Care Mechanisms in RNN
12.5.2. Use of Care Mechanisms to Improve the Accuracy of the Models
12.5.3. Advantages of Attention Mechanisms in Neural Networks
12.6. *Transformers* Models
12.6.1. Using *Transformers*Models for Natural Language Processing
12.6.2. Application of *Transformers* Models for Vision
12.6.3. Advantages of *Transformers* Models
12.7. *Transformers* for Vision
12.7.1. Use of *Transformers* Models for Vision
12.7.2. Image Data Preprocessing
12.7.3. Training a *Transformers* Model for vVision
12.8. *Hugging Face's Transformers* Bookstore
12.8.1. Using the *Hugging Face's Transformers*Library
12.8.2. Application of the *Hugging Face Transformers* Library
12.8.3. Advantages of the *Hugging Face Transformers* library
12.9. Other *Transformers* Libraries. Comparison
12.9.1. Comparison Between Different *Transformers*Libraries
12.9.2. Use of the Other *Transformers* Libraries
12.9.3. Advantages of the Other *Transformers* Libraries
12.10. Development of an NLP Application with RNN and Attention. Practical Applications
12.10.1. Development of a Natural Language Processing Application with RNN and Attention
12.10.2. Use of RNN, Attention Mechanisms and Transformers Models in the Application
12.10.3. Evaluation of the Practical Application

Module 13. Autoencoders, GANs and Diffusion Models

13.1. Representation of Efficient Data
13.1.1. Dimensionality Reduction
13.1.2. Deep Learning
13.1.3. Compact Representations
13.2. PCA Realization with an Incomplete Linear Automatic Encoder
13.2.1. Training Process
13.2.2. Implementation in Python
13.2.3. Use of Test Data
13.3. Stacked Automatic Encoders
13.3.1. Deep Neural Networks
13.3.2. Construction of Coding Architectures
13.3.3. Use of Regularization
13.4. Convolutional Autoencoders
13.4.1. Design of Convolutional Models
13.4.2. Convolutional Model Training
13.4.3. Results Evaluation
13.5. Automatic Encoder Denoising
13.5.1. Application of Filters
13.5.2. Design of Coding Models
13.5.3. Use of Regularization Techniques
13.6. Sparse Automatic Encoders
13.6.1. Increasing Coding Efficiency
13.6.2. Minimizing the Number of Parameters
13.6.3. Using Regularization Techniques
13.7. Variational Automatic Encoders
13.7.1. Use of Variational Optimization
13.7.2. Unsupervised Deep Learning
13.7.3. Deep Latent Representations
13.8. Generation of Fashion MNIST Images
13.8.1. Pattern Recognition
13.8.2. Image Generation
13.8.3. Deep Neural Networks Training

13.9. Generative Adversarial Networks and Diffusion Models
- 13.9.1. Content Generation from Images
- 13.9.2. Modeling of Data Distributions
- 13.9.3. Use of Adversarial Networks

13.10 Model Implementation
- 13.10.1. Practical Application
- 13.10.2. Implementation of the Models
- 13.10.3. Use of Real Data
- 13.10.4. Results Evaluation

Module 14. Bio-Inspired Computing

14.1. Introduction to Bio-Inspired Computing
- 14.1.1. Introduction to Bio-Inspired Computing

14.2. Social Adaptation Algorithms
- 14.2.1. Bio-Inspired Computation Based on Ant Colonies
- 14.2.2. Variants of Ant Colony Algorithms
- 14.2.3. Particle Cloud Computing

14.3. Genetic Algorithms
- 14.3.1. General Structure
- 14.3.2. Implementations of the Major Operators

14.4. Space Exploration-Exploitation Strategies for Genetic Algorithms
- 14.4.1. CHC Algorithm
- 14.4.2. Multimodal Problems

14.5. Evolutionary Computing Models (I)
- 14.5.1. Evolutionary Strategies
- 14.5.2. Evolutionary Programming
- 14.5.3. Algorithms Based on Differential Evolution

14.6. Evolutionary Computation Models (II)
- 14.6.1. Evolutionary Models Based on Estimation of Distributions (EDA)
- 14.6.2. Genetic Programming

14.7. Evolutionary Programming Applied to Learning Problems
- 14.7.1. Rules-Based Learning
- 14.7.2. Evolutionary Methods in Instance Selection Problems

14.8. Multi-Objective Problems
- 14.8.1. Concept of Dominance
- 14.8.2. Application of Evolutionary Algorithms to Multi-Objective Problems

14.9. Neural Networks (I)
- 14.9.1. Introduction to Neural Networks
- 14.9.2. Practical Example with Neural Networks

14.10. Neural Networks (II)
- 14.10.1. Use Cases of Neural Networks in Medical Research
- 14.10.2. Use Cases of Neural Networks in Economics
- 14.10.3. Use Cases of Neural Networks in Artificial Vision

Module 15. Artificial Intelligence: Strategies and applications

15.1. Financial Services
- 15.1.1. The Implications of Artificial Intelligence (AI) in Financial Services. Opportunities and Challenges
- 15.1.2. Case Uses
- 15.1.3. Potential Risks Related to the Use of AI
- 15.1.4. Potential Future Developments/uses of AI

15.2. Implications of Artificial Intelligence in the Healthcare Service
- 15.2.1. Implications of AI in the Healthcare Sector. Opportunities and Challenges
- 15.2.2. Case Uses

15.3. Risks Related to the Use of AI in the Health Service
- 15.3.1. Potential Risks Related to the Use of AI
- 15.3.2. Potential Future Developments/uses of AI

15.4. *Retail*
- 15.4.1. Implications of AI in the *Retail.* Opportunities and Challenges
- 15.4.2. Case Uses
- 15.4.3. Potential Risks Related to the Use of AI
- 15.4.4. Potential Future Developments/uses of AI

15.5. Industry
- 15.5.1. Implications of AI in Industry. Opportunities and Challenges
- 15.5.2. Case Uses

15.6. Potential risks related to the use of AI in industry
- 15.6.1. Case Uses
- 15.6.2. Potential Risks Related to the Use of AI
- 15.6.3. Potential Future Developments/uses of AI

15.7. Public Administration
- 15.7.1. AI implications for public administration. Opportunities and Challenges
- 15.7.2. Case Uses
- 15.7.3. Potential Risks Related to the Use of AI
- 15.7.4. Potential Future Developments/uses of AI

15.8. Educational
- 15.8.1. AI implications for education. Opportunities and Challenges
- 15.8.2. Case Uses
- 15.8.3. Potential Risks Related to the Use of AI
- 15.8.4. Potential Future Developments/uses of AI

15.9. Forestry and Agriculture
- 15.9.1. Implications of AI in Forestry and Agriculture. Opportunities and Challenges
- 15.9.2. Case Uses
- 15.9.3. Potential Risks Related to the Use of AI
- 15.9.4. Potential Future Developments/uses of AI

15.10 Human Resources
- 15.10.1. Implications of AI for Human Resources Opportunities and Challenges
- 15.10.2. Case Uses
- 15.10.3. Potential Risks Related to the Use of AI
- 15.10.4. Potential Future Developments/uses of AI

Module 16. Practical Applications of Artificial Intelligence in Design

16.1. Automatic Image Generation in Graphic Design
- 16.1.1. Fundamental Concepts of Image Generation
- 16.1.2. Tools and *Frameworks* for Automatic Graphic Generation
- 16.1.3. Social and Cultural Impact of Generative Design
- 16.1.4. Current Trends in the Field and Future Developments and Applications

16.2. Dynamic Personalization of User Interfaces Using AI
- 16.2.1. UI/UX Personalization Principles
- 16.2.2. Recommendation Algorithms in UI Customization
- 16.2.3. User Experience and Continuous Feedback
- 16.2.4. Practical Implementation in Real Applications

16.3. Generative Design: Applications in Industry and Art
- 16.3.1. Fundamentals of Generative Design
- 16.3.2. Generative Design in Industry
- 16.3.3. Generative Design in Contemporary Art
- 16.3.4. Challenges and Future Advances in Generative Design

16.4. Automatic Creation of Editorial *Layouts* with Algorithms
- 16.4.1. Principles of Automatic Editorial *Layout*
- 16.4.2. Content Distribution Algorithms
- 16.4.3. Optimization of Spaces and Proportions in Editorial Design
- 16.4.4. Automation of the Revision and Adjustment Process

16.5. Procedural Generation of Content in Videogames
- 16.5.1. Introduction to Procedural Generation in Videogames
- 16.5.2. Algorithms for the Automatic Creation of Levels and Environments
- 16.5.3. Procedural Narrative and Branching in Videogames
- 16.5.4. Impact of Procedural Generation on the Player Experience

16.6. Pattern Recognition in Logos with *Machine Learning*
- 16.6.1. Fundamentals of Pattern Recognition in Graphic Design
- 16.6.2. Implementation of *Machine Learning* Models for Logo Identification
- 16.6.3. Practical Applications in Graphic Design
- 16.6.4. Legal and Ethical Considerations in Logo Recognition

16.7. Optimization of Colors and Compositions with AI
- 16.7.1. Color Psychology and Visual Composition
- 16.7.2. Color Optimization Algorithms in Graphic Design
- 16.7.3. Automatic Composition of Visual Elements
- 16.7.4. Evaluation of the Impact of Automatic Optimization on User Perception

16.8. Predictive Analysis of Visual Trends in Design
- 16.8.1. Data Collection and Current Trends
- 16.8.2. *Machine Learning* Models for Trend Prediction
- 16.8.3. Implementation of Proactive Design Strategies
- 16.8.4. Principles in the Use of Data and Predictions in Design

16.9. AI-assisted Collaboration in Design Teams
- 16.9.1. Human-IA Collaboration in Design Projects
- 16.9.2. Platforms and Tools for AI-assisted Collaboration
- 16.9.3. Best Practices in AI-assisted Technology Integration
- 16.9.4. Future Perspectives on Human-AI Collaboration in Design

16.10. Strategies for the Successful Incorporation of AI in Design
- 16.10.1. Identification of AI-solvable Design Needs
- 16.10.2. Evaluation of Available Platforms and Tools
- 16.10.3. Effective Integration in Design Projects
- 16.10.4. Continuous Optimization and Adaptability

Module 17. Design-User Interaction and AI

17.1. Behavior-Based Design Contextual Suggestions
- 17.1.1. Understanding User Behavior in Design
- 17.1.2. AI-based Contextual Suggestion Systems
- 17.1.3. Strategies to Ensure User Transparency and Consent
- 17.1.4. Trends and Potential Improvements in Behavioral Personalization

17.2. Predictive Analysis of User Interactions
- 17.2.1. Importance of Predictive Analytics in User-Design Interactions
- 17.2.2. *Machine Learning* Models for Predicting User Behavior
- 17.2.3. Integration of Predictive Analytics in User Interface Design
- 17.2.4. Challenges and Dilemmas in Predictive Analytics

17.3. Adaptive Design to Different Devices with AI
- 17.3.1. Device Adaptive Design Principles
- 17.3.2. Content Adaptation Algorithms
- 17.3.3. Interface Optimization for Mobile and Desktop Experiences
- 17.3.4. Future Developments in Adaptive Design with Emerging Technologies

17.4. Automatic Generation of Characters and Enemies in Video Games
- 17.4.1. The need for Automatic Generation in the Development of Videogames
- 17.4.2. Algorithms for Character and Enemy Generation
- 17.4.3. Customization and Adaptability in Automatically Generated Characters
- 17.4.4. Development Experiences: Challenges and Lessons Learned

17.5. AI Improvement in Game Characters
- 17.5.1. Importance of Artificial Intelligence in Video Game Characters
- 17.5.2. Algorithms to Improve the Behavior of Characters
- 17.5.3. Continuous Adaptation and Learning of AI in Games
- 17.5.4. Technical and Creative Challenges in Character AI Enhancement

17.6. Custom Design in the Industry: Challenges and Opportunities
- 17.6.1. Transformation of Industrial Design with Customization
- 17.6.2. Enabling Technologies for Customized Design
- 17.6.3. Challenges in Implementing Customized Design at Scale
- 17.6.4. Opportunities for Innovation and Competitive Differentiation

17.7. Design for Sustainability through AI
- 17.7.1. Life Cycle Analysis and Traceability with Artificial Intelligence
- 17.7.2. Optimization of Recyclable Materials
- 17.7.3. Improvement of Sustainable Processes
- 17.7.4. Development of Practical Strategies and Projects

17.8. Integration of Virtual Assistants in Design Interfaces
- 17.8.1. Role of Virtual Assistants in Interactive Design
- 17.8.2. Development of Virtual Assistants Specialized in Design
- 17.8.3. Natural Interaction with Virtual Assistants in Design Projects
- 17.8.4. Implementation Challenges and Continuous Improvement

17.9. Continuous User Experience Analysis for Improvement
- 17.9.1. Cycle of Continuous Improvement in Interaction Design
- 17.9.2. Tools and Metrics for Continuous Analysis
- 17.9.3. Interaction and Adaptation in User Experience
- 17.9.4. Ensuring Privacy and Transparency in Handling Sensitive Data

17.10. Application of AI Techniques to Improve Usability
- 17.10.1. Intersection of AI and Usability
- 17.10.2. Sentiment and User Experience (UX) Analysis
- 17.10.3. Dynamic Interface Personalization
- 17.10.4. Workflow and Navigation Optimization

Module 18. Innovation in Design and AI Processes

18.1. Optimization of Manufacturing Processes with AI Simulations
- 18.1.1. Introduction to Manufacturing Process Optimization
- 18.1.2. AI Simulations for Production Optimization
- 18.1.3. Technical and Operational Challenges in the Implementation of AI Simulations
- 18.1.4. Future Perspectives: Advances in Process Optimization with AI

18.2. Virtual Prototyping: Challenges and Benefits
- 18.2.1. Importance of Virtual Prototyping in Design
- 18.2.2. Tools and Technologies for Virtual Prototyping
- 18.2.3. Challenges in Virtual Prototyping and Strategies for Overcoming them
- 18.2.4. Impact on Design Innovation and Agility

18.3. Generative Design: Applications in Industry and Artistic Creation
- 18.3.1. Architecture and Urban Planning
- 18.3.2. Fashion and Textile Design
- 18.3.3. Design of Materials and Textures
- 18.3.4. Automation in Graphic Design

18.4. Materials and Performance Analysis using Artificial Intelligence
- 18.4.1. Importance of Materials and Performance Analysis in Design
- 18.4.2. Artificial Intelligence Algorithms for Materials Analysis
- 18.4.3. Impact on Design Efficiency and Sustainability
- 18.4.4. Implementation Challenges and Future Applications

18.5. Mass Customization in Industrial Production
- 18.5.1. Transforming Production through Mass Customization
- 18.5.2. Enabling Technologies for Mass Customization
- 18.5.3. Logistical and Scale Challenges of Mass Customization
- 18.5.4. Economic Impact and Innovation Opportunities

18.6. Artificial Intelligence-assisted Design Tools
- 18.6.1. Design Aided Design by Gan Generation (Generative Adversarial Networks)
- 18.6.2. Collective Idea Generation
- 18.6.3. Context-aware Generation
- 18.6.4. Exploration of Non-linear Creative Dimensions

18.7. Human-robot Collaborative Design in Innovative Projects
- 18.7.1. Integration of Robots in Innovative Design Projects
- 18.7.2. Tools and Platforms for Human-Robot Collaboration
- 18.7.3. Challenges in the Integration of Robots in Creative Projects
- 18.7.4. Future Perspectives in Collaborative Design with Emerging Technologies

18.8. Predictive Maintenance of Products: AI Approach
- 18.8.1. Importance of Predictive Maintenance in Product Life Extension
- 18.8.2. *Machine Learning* Models for Predictive Maintenance
- 18.8.3. Practical Implementation in Various Industries
- 18.8.4. Evaluation of the Accuracy and Effectiveness of these Models in Industrial Environments

18.9. Automatic Generation of Typefaces and Visual Styles
- 18.9.1. Basics of Automatic Generation in Typeface Design
- 18.9.2. Practical Applications in Graphic Design and Visual Communication
- 18.9.3. AI-assisted Collaborative Design in the Creation of Typefaces
- 18.9.4. Exploration of Automatic Styles and Trends

18.10. IoT Integration to Monitor Products in Real Time
- 18.10.1. Transformation with IoT Integration in Product Design
- 18.10.2. Sensors and IoT Devices for Real-Time Monitoring
- 18.10.3. Data Analysis and IoT-based Decision Making
- 18.10.4. Implementation Challenges and Future Applications of IoT in Design

Module 19. Technologies Applied to Design and AI

19.1. Integration of Virtual Assistants in Design Interfaces
- 19.1.1. Role of Virtual Assistants in Interactive Design
- 19.1.2. Development of Virtual Assistants Specialized in Design
- 19.1.3. Natural Interaction with Virtual Assistants in Design Projects
- 19.1.4. Implementation Challenges and Continuous Improvement

19.2. Automatic visual error detection and correction with AI
- 19.2.1. Importance of Automatic Visual Error Detection and Correction
- 19.2.2. Algorithms and Models for Visual Error Detection
- 19.2.3. Automatic Correction Tools in Visual Design
- 19.2.4. Challenges in Automatic Error Detection and Correction and Strategies to Overcome them

19.3. AI Tools for Usability Evaluation of Interface Designs
- 19.3.1. Analysis of Interaction Data with Machine Learning Models
- 19.3.2. Automated Report Generation and Recommendations
- 19.3.3. Virtual User Simulations for Usability Testing
- 19.3.4. Conversational Interface for User Feedback

19.4. Optimization of Editorial Workflows with Algorithms
- 19.4.1. Importance of Optimizing Editorial Workflows
- 19.4.2. Algorithms for Editorial Automation and Optimization
- 19.4.3. Tools and Technologies for Editorial Optimization
- 19.4.4. Challenges in Implementation and Continuous Improvement in Editorial Workflows

19.5. Realistic Simulations in Video Game Design
- 19.5.1. Importance of Realistic Simulations in the Video Game Industry
- 19.5.2. Modeling and Simulation of Realistic Elements in Video Games
- 19.5.3. Technologies and Tools for Realistic Simulations in Videogames
- 19.5.4. Technical and Creative Challenges in Realistic Video Game Simulations

19.6. Automatic Generation of Multimedia Content in Editorial Design
- 19.6.1. Transformation with Automatic Multimedia Content Generation
- 19.6.2. Algorithms and Models for Automatic Multimedia Content Generation
- 19.6.3. Practical Applications in Publishing Projects
- 19.6.4. Challenges and Future Trends in the Automatic Generation of Multimedia Content

19.7. Adaptive and Predictive Design based on User Data
- 19.7.1. Importance of Adaptive and Predictive Design in User Experience
- 19.7.2. Collection and Analysis of User Data for Adaptive Design
- 19.7.3. Algorithms for Adaptive and Predictive Design
- 19.7.4. Integration of Adaptive Design in Platforms and Applications

19.8. Integration of Algorithms in the Improvement of Usability
- 19.8.1. Segmentation and Behavioral Patterns
- 19.8.2. Detection of Usability Problems
- 19.8.3. Adaptability to Changes in User Preferences
- 19.8.4. Automated a/b Testing and Analysis of Results

19.9. Continuous Analysis of User Experience for Iterative Improvements
- 19.9.1. Importance of Continuous Feedback in Product and Service Evolution
- 19.9.2. Tools and Metrics for Continuous Analysis
- 19.9.3. Case Studies Demonstrating Substantial Improvements Achieved through this Approach
- 19.9.4. Handling of Sensitive Data

19.10. AI-assisted Collaboration in Editorial Teams
- 19.10.1. Transformation of AI-assisted Collaboration in Editorial Teams
- 19.10.2. Tools and Platforms for AI-assisted Collaboration
- 19.10.3. Development of Virtual Assistants Specialized in Editing
- 19.10.4. Challenges in the Implementation and Future Applications of AI-assisted Collaboration

Module 20. Ethics and Environment in Design and AI

20.1. Environmental Impact in Industrial Design: Ethical Approach
- 20.1.1. Environmental Awareness in Industrial Design
- 20.1.2. Life Cycle Assessment and Sustainable Design
- 20.1.3. Ethical Challenges in Design Decisions with Environmental Impact
- 20.1.4. Sustainable Innovations and Future Trends

20.2. Improving Visual Accessibility in Graphic Design with Responsibility
- 20.2.1. Visual Accessibility as an Ethical Priority in Graphic Design
- 20.2.2. Tools and Practices for the Improvement of Visual Accessibility
- 20.2.3. Ethical Challenges in the Implementation of Visual Accessibility
- 20.2.4. Professional Responsibility and Future Improvements in Visual Accessibility

20.3. Waste Reduction in the Design Process: Sustainable Challenges
- 20.3.1. Importance of Waste Reduction in Design
- 20.3.2. Strategies for Waste Reduction at Different Stages of Design
- 20.3.3. Ethical Challenges in Implementing Waste Reduction Practices
- 20.3.4. Corporate Commitments and Sustainable Certifications

20.4. Sentiment Analysis in Editorial Content Creation: Ethical Considerations
- 20.4.1. Analysis of Sentiment and Ethics in Editorial Content
- 20.4.2. Algorithms for Sentiment Analysis and Ethical Decisions
- 20.4.3. Impact on Public Opinion
- 20.4.4. Challenges in Sentiment Analysis and Future Implications

20.5. Integration of Emotion Recognition for Immersive Experiences
- 20.5.1. Ethics in the Integration of Emotion Recognition in Immersive Experiences
- 20.5.2. Emotion Recognition Technologies
- 20.5.3. Ethical Challenges in Creating Emotionally Aware Immersive Experiences
- 20.5.4. Future Perspectives and Ethics in the Development of Immersive Experiences

20.6. Ethics in Video Game Design: Implications and Decisions
- 20.6.1. Ethics and Responsibility in Videogame Design
- 20.6.2. Inclusion and Diversity in Video Games: Ethical Decisions
- 20.6.3. Microtransactions and Ethical Monetization in Videogames
- 20.6.4. Ethical Challenges in the Development of Narratives and Characters in Videogames

20.7. Responsible Design: Ethical and Environmental Considerations in the Industry
- 20.7.1. Ethical Approach to Responsible Design
- 20.7.2. Tools and Methods for Responsible Design
- 20.7.3. Ethical and Environmental Challenges in the Design Industry
- 20.7.4. Corporate Commitments and Certifications for Responsible Design

20.8. Ethics in the integration of AI in User Interfaces
- 20.8.1. Exploration of How Artificial Intelligence in User Interfaces Raises Ethical Challenges
- 20.8.2. Transparency and Explainability in AI Systems in User Interfaces
- 20.8.3. Ethical Challenges in the Collection and Use of User Interface Data
- 20.8.4. Future Perspectives on the Ethics of AI in User Interfaces

20.9. Sustainability in Design Process Innovation
- 20.9.1. Recognition of the Importance of Sustainability in the Innovation of Design Processes
- 20.9.2. Development of Sustainable Processes and Ethical Decision Making
- 20.9.3. Ethical Challenges in the Adoption of Innovative Technologies
- 20.9.4. Business Commitments and Sustainability Certifications in Design Processes

20.10. Ethical Aspects in the Application of Technologies in Design
- 20.10.1. Ethical Decisions in the Selection and Application of Design Technologies
- 20.10.2. Ethics in the Design of User Experiences with Advanced Technologies
- 20.10.3. Intersections of Ethics and Technologies in Design
- 20.10.4. Emerging Trends and the Role of Ethics in the Future Direction of Design with Advanced Technologies

Immerse yourself in a comprehensive and advanced program, unique in creating highly qualified professionals in the application of Artificial Intelligence in Design"

06

Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**

This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

> *Our program prepares you to face new challenges in uncertain environments and achieve success in your career"*

The case method is the most widely used learning system in the best faculties in the world. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question we face in the case method, an action-oriented learning method. Throughout the program, the studies will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

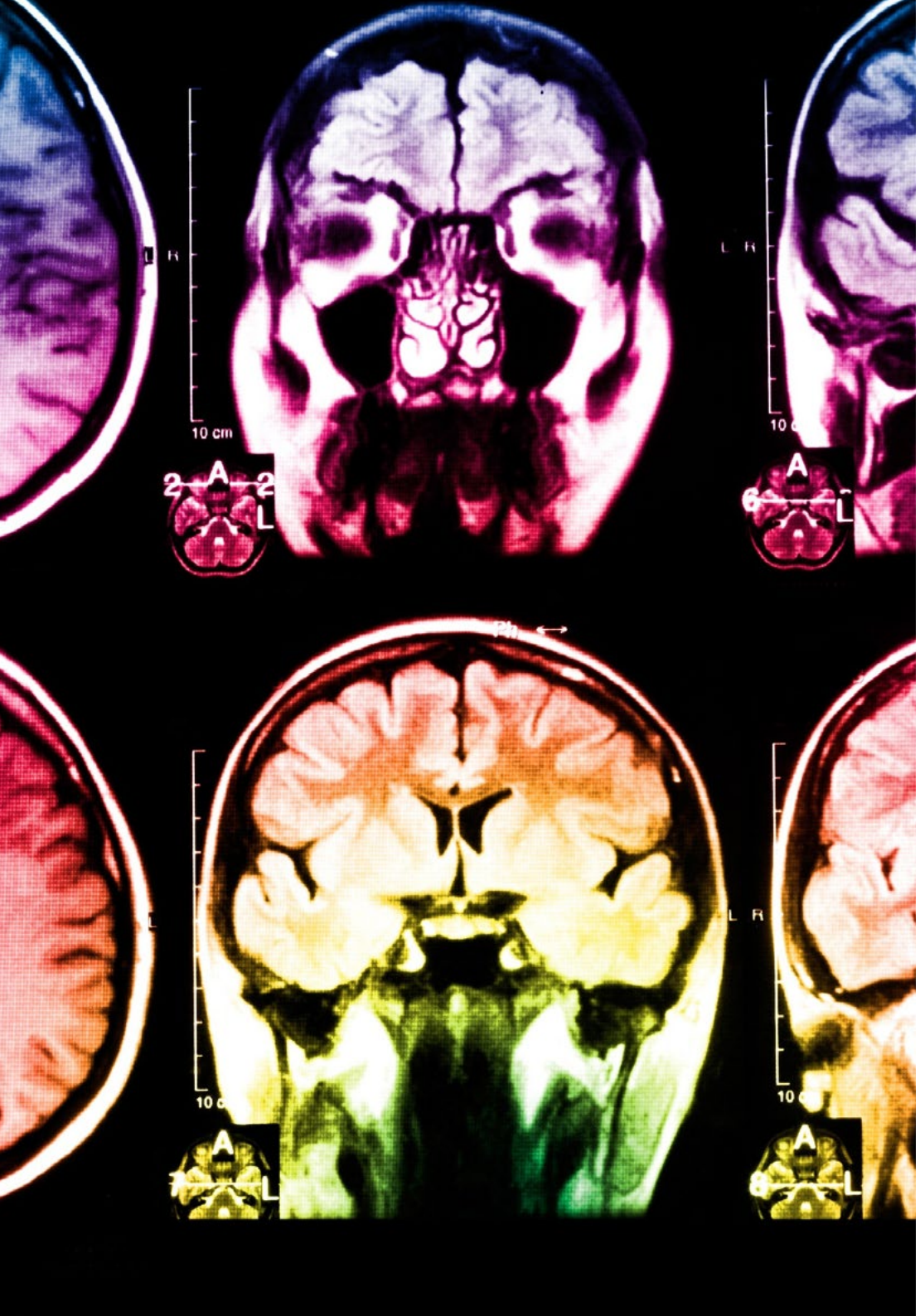
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. With this methodology we have trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, markets, and financial instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

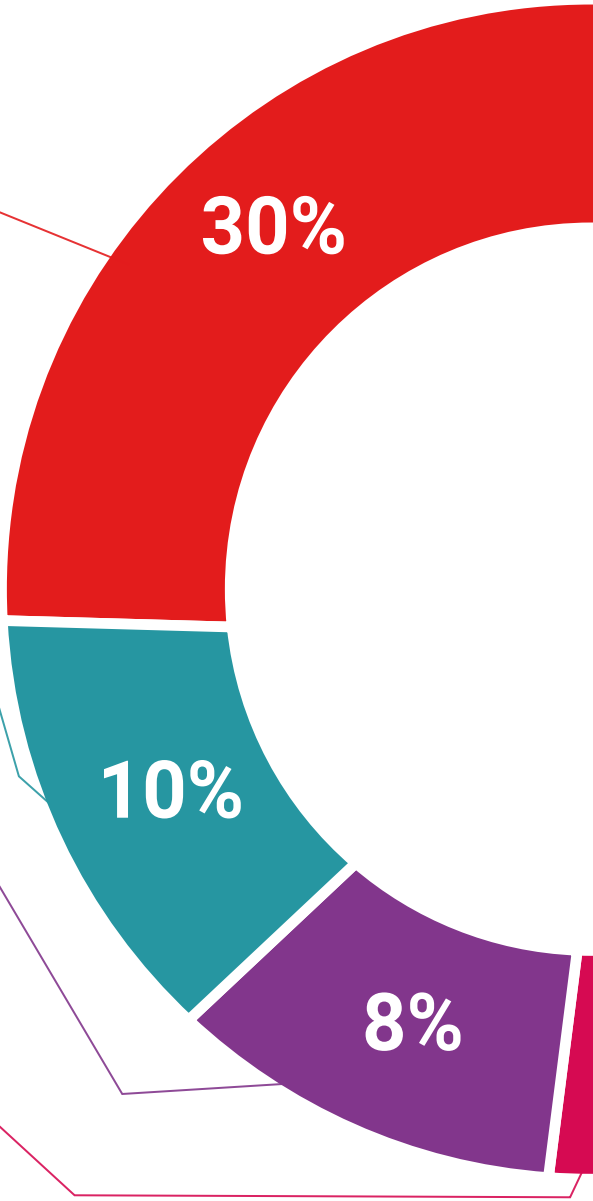
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

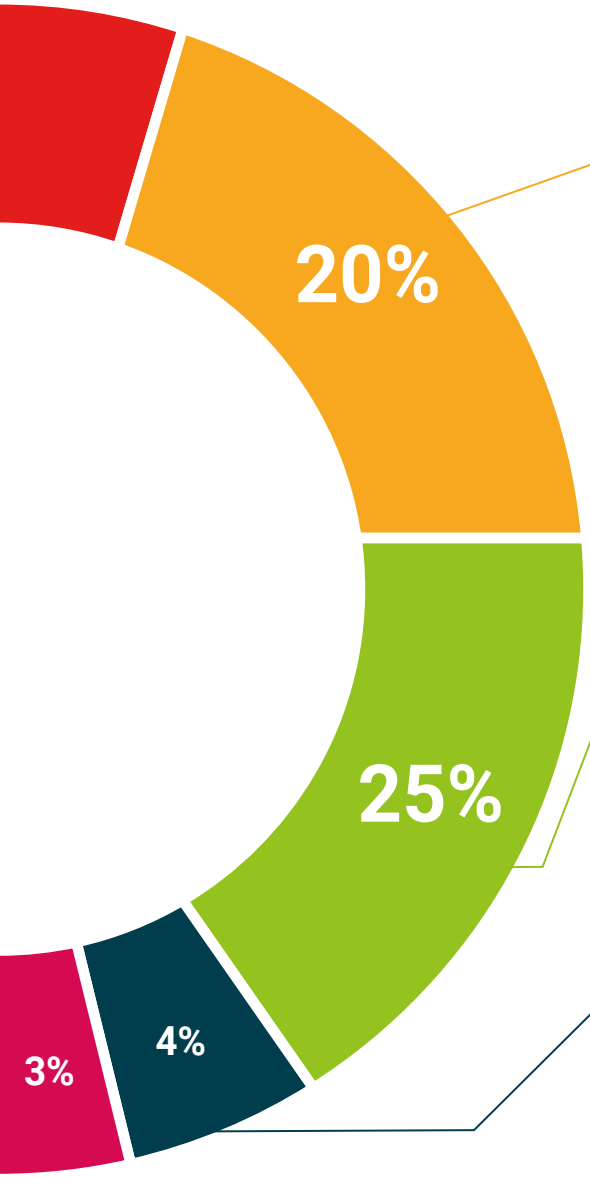
Practising Skills and Abilities

They will carry out activities to develop specific competencies and skills in each thematic area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.





Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

07

Certificate

The Professional Master's Degree in Artificial Intelligence in Design guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree diploma issued by TECH Technological University.

Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"

This **Professional Master's Degree in Artificial Intelligence in Design** contains the most complete and up-to-date program on the market.

After the student has passed the assessments, they will receive their corresponding **Professional Master's Degree** issued by **TECH Technological University** via tracked delivery*.

The certificate issued by **TECH Technological University** will reflect the qualification obtained in the Professional Master's Degree, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees. .

Title: **Professional Master's Degree in Artificial Intelligence in Design**

Official Nº of Hours: **2,250 h.**

tech technological university

Awards the following

CERTIFICATE

to

Mr./Ms. _____, with identification number _____.

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Artificial Intelligence in Design

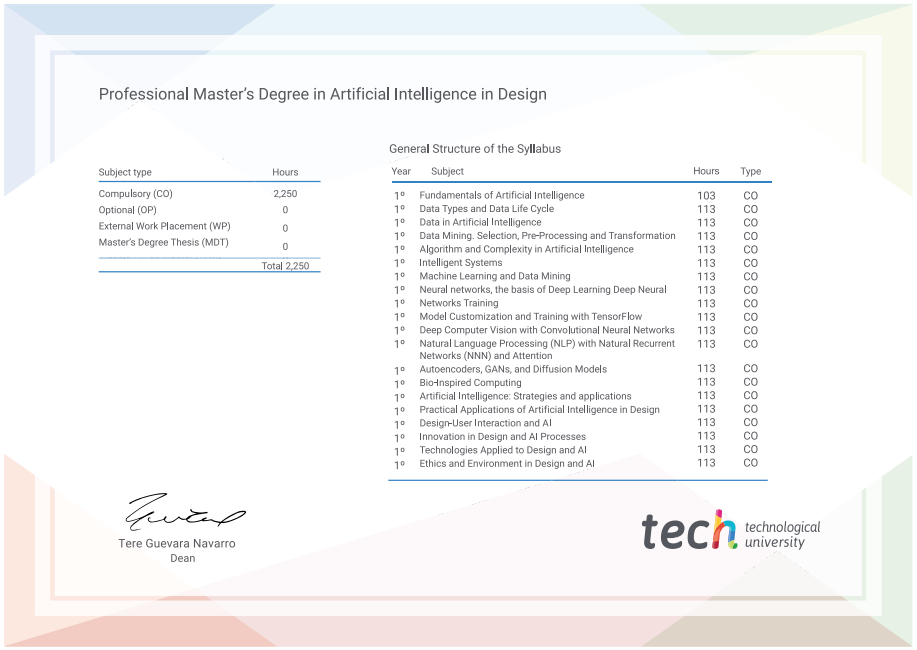
This is a qualification awarded by this University, equivalent to 2,250 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH is a Private Institution of Higher Education recognized by the Ministry of Public Education as of June 28, 2018.

June 17, 2020

Tere Guevara Navarro
Dean

Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Artificial Intelligence in Design

Subject type	Hours
Compulsory (CO)	2,250
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 2,250

General Structure of the Syllabus

Year	Subject	Hours	Type
1º	Fundamentals of Artificial Intelligence	103	CO
1º	Data Types and Data Life Cycle	113	CO
1º	Data in Artificial Intelligence	113	CO
1º	Data Mining. Selection, Pre-Processing and Transformation	113	CO
1º	Algorithm and Complexity in Artificial Intelligence	113	CO
1º	Intelligent Systems	113	CO
1º	Machine Learning and Data Mining	113	CO
1º	Neural networks, the basis of Deep Learning Deep Neural	113	CO
1º	Networks Training	113	CO
1º	Model Customization and Training with TensorFlow	113	CO
1º	Deep Computer Vision with Convolutional Neural Networks	113	CO
1º	Natural Language Processing (NLP) with Natural Recurrent Networks (NNN) and Attention	113	CO
1º	Autoencoders, GANs, and Diffusion Models	113	CO
1º	Bio-Inspired Computing	113	CO
1º	Artificial Intelligence: Strategies and applications	113	CO
1º	Practical Applications of Artificial Intelligence in Design	113	CO
1º	Design-User Interaction and AI	113	CO
1º	Innovation in Design and AI Processes	113	CO
1º	Technologies Applied to Design and AI	113	CO
1º	Ethics and Environment in Design and AI	113	CO

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*Apostille Convention. In the event that the student wishes to have their paper certificate issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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Professional Master's Degree

Artificial Intelligence in Design

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Dedication: **16h/week**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree
Artificial Intelligence in Design

tech technological university