Professional Master's Degree
Artificial Intelligence in Architecture

tech technological university

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Professional Master's Degree
Artificial Intelligence in Architecture

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Technological University**
- Schedule: **at your own pace**
- Exams: **online**

Website: **www.techtitute.com/us/artificial-intelligence/professional-master-degree/master-artificial-intelligence-architecture**

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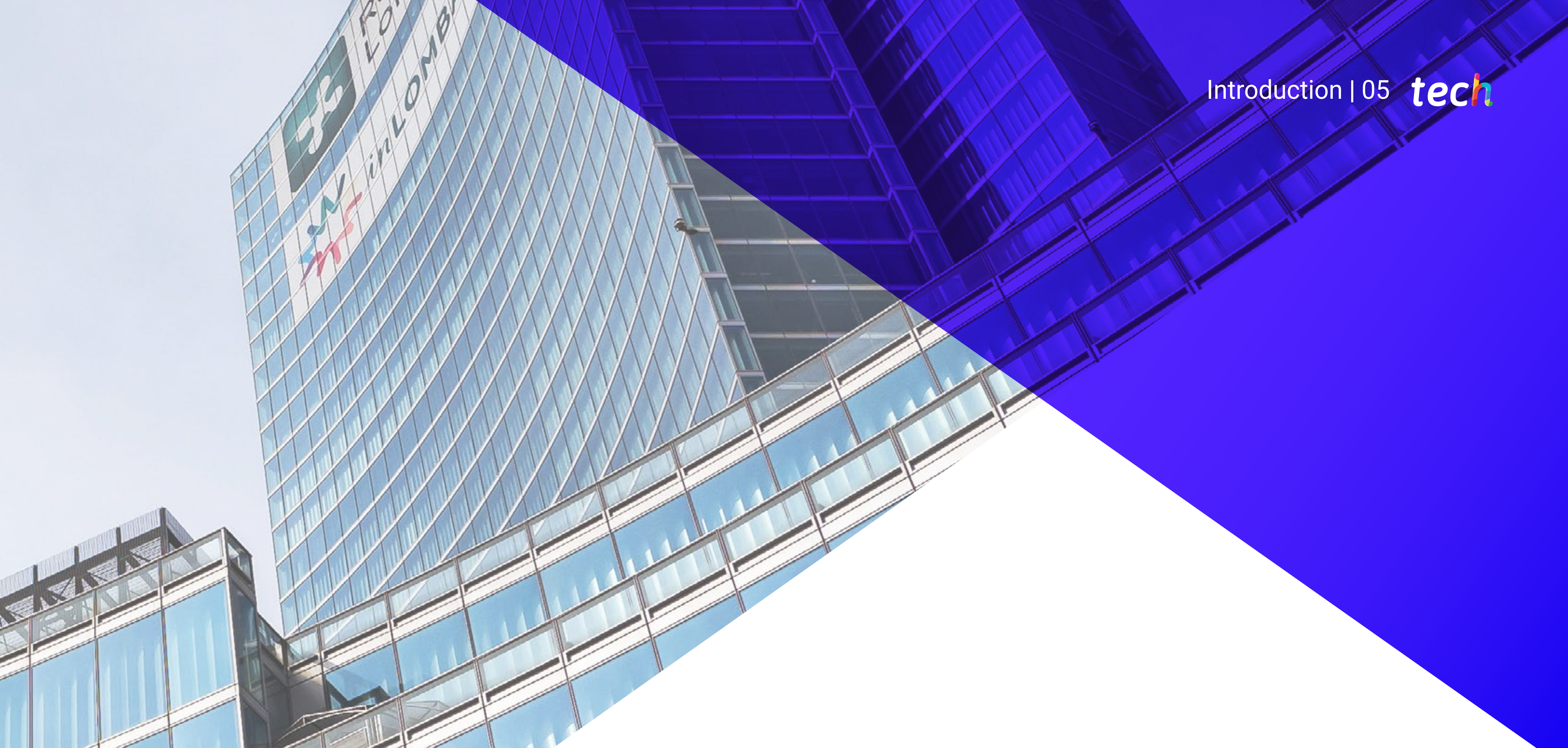
01

Introduction

Artificial Intelligence (AI) is revolutionizing architecture by introducing tools to optimize the design, planning and construction of buildings. In fact, there is a growing use of machine learning algorithms to generate architectural models, which not only maximize energy efficiency and sustainability, but also explore new aesthetic forms. It is also facilitating the creation of more inclusive spaces tailored to human needs, using data on user behavior and preferences to personalize the built environment. In this context, TECH has developed a completely virtual program, which adapts to the individual and work schedules of graduates. In addition, it employs an innovative learning methodology known as Relearning, which is unique to this university.



This 100% online Professional Master's Degree will allow you to optimize design and construction processes through tools such as generative modeling, predictive simulation and energy efficiency based on AI"

Artificial Intelligence (AI) is rapidly transforming architecture, offering new tools to design, plan and construct buildings in a more efficient and sustainable way. The use of AI in architecture has expanded, allowing architects to optimize designs through advanced simulations that consider variables such as natural light, ventilation and energy consumption.

This is how this Professional Master's Degree was created, designed to specialize architects in the use of advanced technologies to revolutionize the design and construction process. In this sense, it will analyze how Artificial Intelligence can optimize and transform traditional architectural practice. Through the use of tools such as AutoCAD and Fusion 360, as well as an introduction to generative modeling and parametric design, professionals will be able to integrate these innovations into their projects.

Likewise, the use of AI for space optimization and energy efficiency, key elements in contemporary architecture, will be discussed in depth. Using tools such as Autodesk Revit and Google DeepMind, it will be possible to design more sustainable environments through data analysis and advanced energy simulations. This approach will also be complemented by the introduction of smart urban planning, addressing the demands of sustainable design in increasingly complex and urban environments.

Finally, experts will cover cutting-edge technologies such as Grasshopper, MATLAB and laser scanning tools to develop innovative and sustainable projects. In addition, through simulation and predictive modeling, they will be able to anticipate and solve structural and environmental problems before they occur.

In this way, TECH has created a detailed, fully online university program, which provides graduates with access to educational materials through any electronic device with an Internet connection. This eliminates the need to travel to a physical location and adapt to a specific schedule. In addition, it integrates the revolutionary Relearning methodology, which is based on the repetition of essential concepts to improve the understanding of the content.

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

- Development of practical cases presented by experts in Artificial Intelligence
- The graphic, schematic and practical contents with which it is conceived provide cutting- Therapeutics 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 will position yourself at the forefront of the industry, leading innovative and sustainable projects that integrate the latest technologies which will increase your competitiveness and opportunities in in the global labor market"

You will investigate the importance of cultural heritage preservation, using Artificial Intelligence to conserve and revitalize historic structures, thanks to an extensive library of multimedia resources"

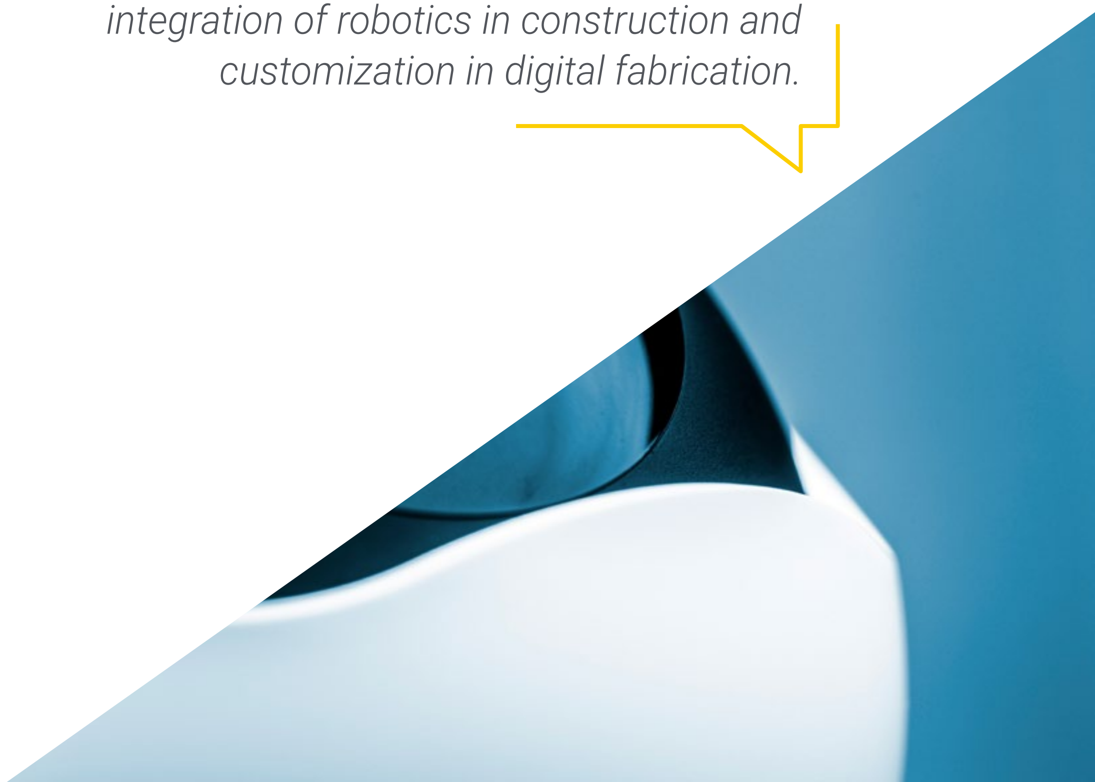
The program's teaching staff includes professionals from the industry who contribute their work experience to this program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive specialization programmed to prepare 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 course. For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced experts.

You will master platforms such as Autodesk Revit, SketchUp and Google DeepMind, developing skills to design more sustainable and efficient environments, with the world's best digital university, according to Forbes.

You will work with tools such as Grasshopper and Autodesk Fusion 360 to create adaptive and sustainable designs, exploring the integration of robotics in construction and customization in digital fabrication.



02
Objectives

This university program will aim to prepare professionals capable of integrating advanced Artificial Intelligence technologies in all phases of architectural design and construction. Therefore, it will specialize experts to optimize design processes through the use of generative modeling tools, predictive simulation and digital fabrication, with a special focus on sustainability and energy efficiency.

In addition, a deep understanding of the ethical implications and responsibility associated with the use of AI will be developed, preparing architects to lead innovative projects that respond to the current and future challenges of architecture.

Design Artificial Intelligence solutions to improve the sustainability of architectural projects and significantly optimize energy consumption"

General Objectives

- Understand the theoretical foundations of Artificial Intelligence
- Study the different types of data and understand the data life cycle
- 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
- Explore bio-inspired computing and its relevance in the development of intelligent systems
- Manage advanced Artificial Intelligence tools to optimize architectural processes such as parametric design
- Apply Generative Modeling techniques to maximize efficiency in infrastructure planning and improve energy performance of buildings

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

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

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
- 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

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
- Understand 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

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

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

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

- Develop 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, GANsand 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
- 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
- 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. AI-Assisted Design in Architectural Practice

- Utilize AutoCAD and Fusion 360 software to create generative and parametric models that optimize the architectural design process
- Have a holistic understanding of ethical principles in the use of AI in design, ensuring that architectural solutions are both responsible and sustainable

Module 17. Space Optimization and Energy Efficiency with AI

- Implement bioclimatic design strategies and AI-assisted technologies to improve the energy efficiency of architectural initiatives
- Acquire skills in the use of simulation tools to improve energy efficiency in urban planning and architecture

Module 18. Parametric Design and Digital Fabrication

- Handle tools such as Grasshopper and Autodesk 360 to create adaptive and customized designs that meet the clients' expectations
- Apply topological optimization and sustainable design strategies in parametric projects

Module 19. Simulation and Predictive Modeling with AI

- Employ programs such as TensorFlow, MATLAB or ANSYS to perform simulations that anticipate structural and environmental behavior in architectural projects
- Implement predictive modeling techniques to optimize urban planning and spatial management, using AI to improve accuracy and efficiency in strategic decision making

Module 20. Heritage Preservation and Restoration with AI

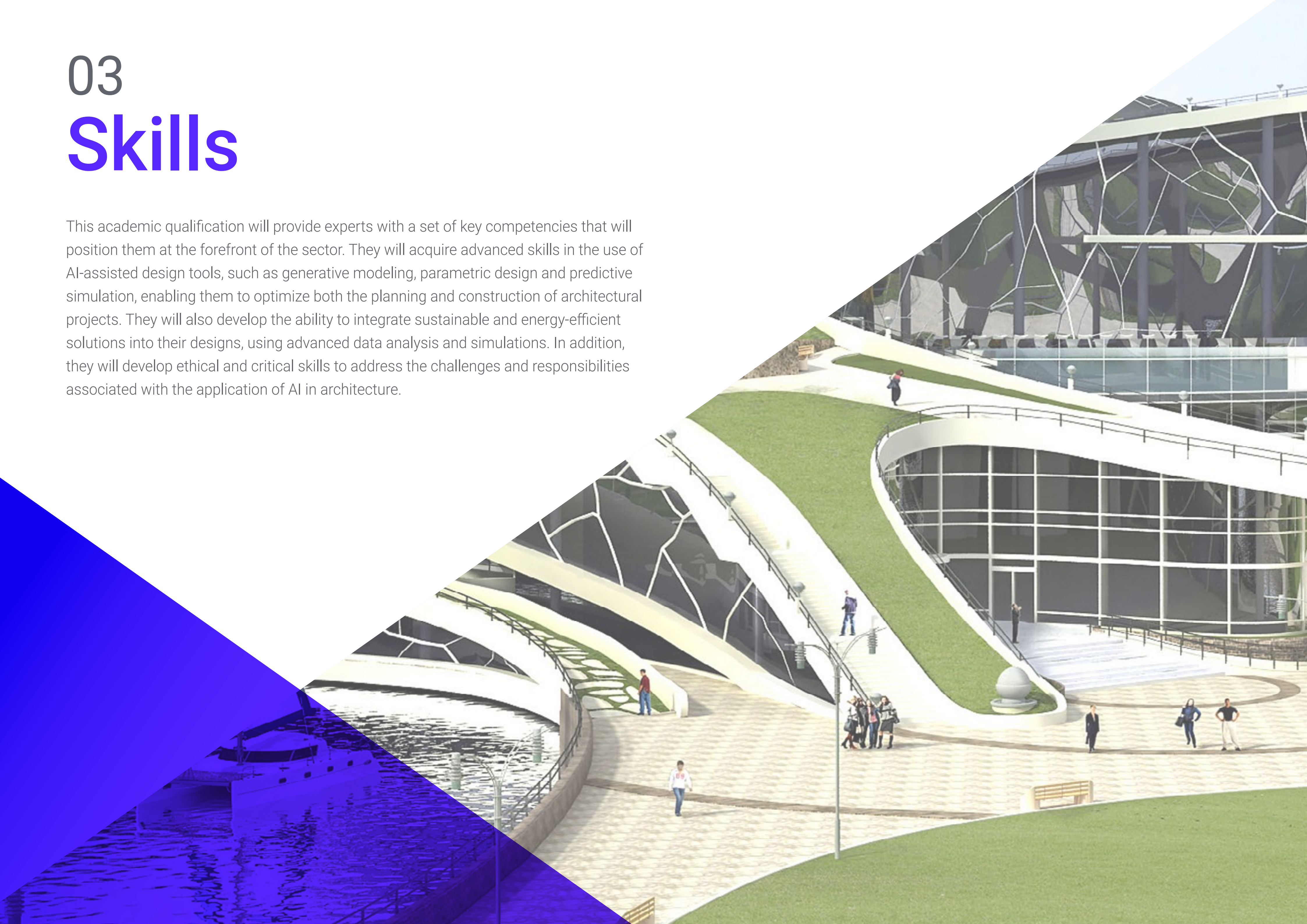
- Master the use of photogrammetry and laser scanning for both documentation and conservation of architectural heritage
- Develop skills to manage cultural heritage preservation projects, considering ethical implications and responsible use of AI

"The main objective will be to enable architects to effectively integrate Artificial Intelligence technologies into all phases of architectural design and construction"

03

Skills

This academic qualification will provide experts with a set of key competencies that will position them at the forefront of the sector. They will acquire advanced skills in the use of AI-assisted design tools, such as generative modeling, parametric design and predictive simulation, enabling them to optimize both the planning and construction of architectural projects. They will also develop the ability to integrate sustainable and energy-efficient solutions into their designs, using advanced data analysis and simulations. In addition, they will develop ethical and critical skills to address the challenges and responsibilities associated with the application of AI in architecture.



You will be able to analyze large volumes of data to analyze user behavior and to create infrastructures that combine functionality with aesthetic value”

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 AutoCAD and Fusion 360 for generative modeling and design optimization
- Apply AI to improve energy efficiency and urban planning
- Master parametric design techniques and robotics in construction
- Implement advanced simulations and predictive modeling in architectural projects

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
- Use AI for the restoration and conservation of cultural heritage
- Apply ethical principles in the use of AI in architecture
- Facilitate teamwork and collective design powered by AI
- Explore emerging trends and lead digital transformation in architecture
- Integrate AI to create sustainable and adaptive architectural solutions
- Utilize advanced techniques such as photogrammetry and laser scanning for documentation and preservation

You will be able to perform predictive simulations that anticipate structural and environmental behaviors, applying preservation and restoration techniques of architectural heritage using AI"

04

Course Management

The professors are renowned professionals in their respective fields, combining academic and practical experience in architecture and technology. In fact, it is composed of experts in Artificial Intelligence, architectural design, energy efficiency and heritage conservation from leading institutions and companies in the industry.

Therefore, they will provide advanced and up-to-date knowledge on innovative tools and techniques, as well as real cases and practical applications of AI in architecture. In addition, their multidisciplinary experience will ensure comprehensive specialization, providing graduates with a complete and practical perspective on how technology can transform the field of architecture.

A teaching team made up of leading experts in Artificial Intelligence applied to the field of Architecture will guide you throughout the academic itinerary"

Management

Dr. Peralta Martín-Palomino, Arturo

- CEO and CTO at Prometeus Global Solutions
- CTO at Korporate Technologies
- CTO at AI Shepherds 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
- Master's Degree in Executive MBA from the Isabel I University
- Master's Degree in Sales and Marketing Management, Isabel I University
- Expert Master's Degree in Big Data by Hadoop Training
- Master's Degree in Advanced Information Technologies from the University of Castilla La Mancha
- Member of: SMILE Research Group

Mr. Peralta Vide, Javier

- Technological Coordinator and Content Developer at Aranzadi Laley Formación
- Collaborator at CanalCreativo
- Collaborator at Dentsu
- Collaborator at Ai2
- Collaborator at BoaMistura
- Freelance Architect at Editorial Nivola, Biogen Technologies, Releaf, etc.
- Specialization by Revit Architecture Metropa School
- Graduate in Architecture and Urbanism by the University of Alcalá

Ms. Martínez Cerrato, Yésica

- Responsible for Technical Training at Securitas Seguridad España
- Education, Business and Marketing Specialist
- Product Manager in Electronic Security at Securitas Seguridad España
- Business Intelligence Analyst at Ricopia Technologies
- Computer Technician and Responsible for OTEC computer classrooms at the University of Alcalá de Henares
- Collaborator in the ASALUMA Association
- Degree in Electronic Communications Engineering at the Polytechnic School, University of Alcalá de Henares

05
Structure and Content

The content of the Professional Master's Degree will cover a wide range of topics designed to integrate advanced technology into the architectural process. Therefore, architects will dive into the use of Artificial Intelligence to improve architectural design, exploring tools such as AutoCAD, Fusion 360 and Grasshopper for generative modeling and parametric design. In addition, the program will focus on optimizing energy efficiency and space planning through data analysis and simulations, with software such as Autodesk Revit and Google DeepMind.

You will create innovative and creative architectural models using advanced simulation tools such as MATLAB"

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 Assistants
 1.8.2. Fundamental Parts for the Development of an Assistant: Intents, Entities and Dialogue 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. Creating 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 Its 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 Indexes
 2.7.3. Data Mining
2.8. 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

2.10. Regulatory Framework
- 2.10.1. Data Protection Law
- 2.10.2. Good Practices
- 2.10.3. Other Regulatory 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
4.10. 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. Mathematical Analysis Criteria for 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 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. Result Analysis
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. Union of Layers 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. Set 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. Transfer Learning Training
- 9.2.2. Feature Extraction
- 9.2.3. Deep Learning

9.3. Optimizers
 9.3.1. Stochastic Gradient Descent Optimizers
 9.3.2. Adam and RMSprop Optimizers
 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. Transfer Learning 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. Transfer Learning 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 Graphs 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 Graphs
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 Graphs
 10.4.1. Functions with TensorFlow
 10.4.2. Use of Graphs for Model Training
 10.4.3. Grap Optimization with TensorFlow Operations
10.5. Loading and Preprocessing Data with TensorFlow
 10.5.1. Loading Data Sets with TensorFlow
 10.5.2. Preprocessing Data with TensorFlow
 10.5.3. Using TensorFlow Tools for Data Manipulation
10.6. The Tfdata API
 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 File Upload with TensorFlow
 10.7.3. Using TFRecord files for training models

10.8. Keras Preprocessing Layers
- 10.8.1. Using the Keras Preprocessing API
- 10.8.2. Construction of preprocessing pipelined 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. Data preprocessing 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 Application
- 10.10.2. Building a Deep Learning App with TensorFlow
- 10.10.3. Training a Model 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. ResNet Architecture

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
- 11.10.2. Edge Detection
- 11.10.3. Rule-Based Segmentation Methods

Module 12. Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) 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. Transformer Models
- 12.6.1. Using Transformers Models for Natural Language Processing
- 12.6.2. Applying Transformers Models for Vision
- 12.6.3. Advantages of Transformers Models

12.7. Transformers for Vision
- 12.7.1. Use of Models for Vision
- 12.7.2. Image Data Preprocessing
- 12.7.3. Training a Transformers Model for Vision

12.8. Hugging Face's Transformers Library
- 12.8.1. Using the Hugging Face's Transformers Library
- 12.8.2. Application of the Hugging Face's Transformers Library
- 12.8.3. Advantages of Hugging Face's 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 Application
- 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. Noise Suppression of Automatic Encoders
- 13.5.1. Filter Application
- 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 Data Distributions
- 13.9.3. Use of Adversarial Networks

13.10. Implementation of the Models
- 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 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. AI-Assisted Design in Architectural Practice

16.1. Advanced AutoCAD Applications with AI
- 16.1.1. Integration of AutoCAD with AI Tools for Advanced Design
- 16.1.2. Automation of Repetitive Tasks in Architectural Design with AI
- 16.1.3. Case Studies where AI-Assisted AutoCAD has Optimized Architectural Projects

16.2. Advanced Generative Modeling with Fusion 360
- 16.2.1. Advanced Generative Modeling Techniques Applied to Complex Projects
- 16.2.2. Use of Fusion 360 for the Creation of Innovative Architectural Designs
- 16.2.3. Examples of Application of Generative Modeling in Sustainable and Adaptive Architecture

16.3. Optimization of Designs with AI in Optimus
- 16.3.1. Optimization Strategies of Architectural Designs using AI Algorithms in Optimus
- 16.3.2. Sensitivity Analysis and Exploration of Optimal Solutions in Real Projects
- 16.3.3. Review of Industry Success Stories using Optimus for AI-Based Optimization

16.4. Parametric Design and Digital Fabrication with Geomagic Wrap
- 16.4.1. Advances in Parametric Design with AI Integration using Geomagic Wrap
- 16.4.2. Practical Applications of Digital Fabrication in Architecture
- 16.4.3. Outstanding Architectural Projects using AI-Assisted Parametric Design for Structural Innovations

16.5. Adaptive and Context-Sensitive Design with AI Sensors
- 16.5.1. Implementation of Adaptive Design Using AI and Real-Time Data
- 16.5.2. Examples of Ephemeral Architecture and Urban Environments Designed with AI
- 16.5.3. Analysis of how Adaptive Design Influences the Sustainability and Efficiency of Architectural Projects

16.6. Simulation and Predictive Analytics in CATIA for Architects
- 16.6.1. Advanced Use of CATIA for Architectural Simulation
- 16.6.2. Structural Behavior Modeling and Energy Performance Optimization using AI
- 16.6.3. Implementation of Predictive Analytics in Architecturally Significant Projects

16.7. Personalization and UX in Design with IBM Watson Studio
- 16.7.1. IBM Watson Studio AI Tools for Architectural Personalization
- 16.7.2. User-Centered Design using AI Analysis
- 16.7.3. Case Studies of AI Use Cases for Customization of Architectural Spaces and Products

16.8. Collaboration and Collective Design Powered by AI
- 16.8.1. AI-Powered Collaborative Platforms for Design Projects
- 16.8.2. AI Methodologies that Foster Creativity and Collective Innovation
- 16.8.3. AI Methodologies that Foster Creativity and Collective Innovation

16.9. Ethics and Responsibility in AI-Assisted Design
- 16.9.1. Ethical Debates in the Use of AI in Architectural Design
- 16.9.2. Study on Bias and Fairness in AI Algorithms Applied to Design
- 16.9.3. Current Regulations and Standards for Responsible AI Design

16.10. Challenges and Future of AI-Assisted Design
- 16.10.1. Emerging Trends and Cutting-Edge Technologies in AI for Architecture
- 16.10.2. Analysis of the Future Impact of AI on the Architectural Profession
- 16.10.3. Foresight on Future Innovations and Developments in AI-Assisted Design

Module 17. Space Optimization and Energy Efficiency with AI

17.1. Space Optimization with Autodesk Revit and AI
- 17.1.1. Using Autodesk Revit and AI for Spatial Optimization and Energy Efficiency
- 17.1.2. Advanced Techniques for Improving Energy Efficiency in Architectural Designs
- 17.1.3. Case Studies of Successful Projects Combining Autodesk Revit with AI

17.2. Analysis of Energy Efficiency Data and Metrics with SketchUp and Trimble
- 17.2.1. Application of SketchUp and Trimble Tools for Detailed Energy Analysis
- 17.2.2. Developing Energy Performance Metrics using AI
- 17.2.3. Strategies for Setting Energy Efficiency Targets in Architectural Projects

17.3. Bioclimatic Design and AI-Optimized Solar Orientation
- 17.3.1. AI-Assisted Bioclimatic Design Strategies to Maximize Energy Efficiency
- 17.3.2. Examples of Buildings using AI-Guided Design to Optimize Thermal Comfort
- 17.3.3. Practical Applications of AI in Solar Orientation and Passive Design

17.4. AI-Assisted Sustainable Technologies and Materials with Cityzenit
- 17.4.1. Innovation in Sustainable Materials Supported by AI Analysis
- 17.4.2. Use of AI for the Development and Application of Recycled and Low Environmental Impact Materials
- 17.4.3. Study of Projects Employing Renewable Energy Systems Integrated with IA

17.5. Urban Planning and Energy Efficiency with WattPredictor and AI
- 17.5.1. AI Strategies for Energy Efficiency in Urban Design
- 17.5.2. Implementation of WattPredictor to Optimize Energy Use in Public Spaces
- 17.5.3. Successful Cases of Cities using AI to Improve Urban Sustainability

17.6. Intelligent Energy Management with Google DeepMind's Energy
- 17.6.1. Applications of DeepMind Technologies for Energy Management
- 17.6.2. Implementation of AI for Optimization of Energy Consumption in Large Buildings
- 17.6.3. Evaluation of Cases where AI has Transformed Energy Management in Communities and Buildings

17.7. AI-Assisted Energy Efficiency Certifications and Regulations
- 17.7.1. Use of AI to Ensure Compliance with Energy Efficiency Standards (LEED, BREEAM).
- 17.7.2. AI Tools for Energy Auditing and Certification of Projects
- 17.7.3. Impact of Regulations on AI-Supported Sustainable Architecture

17.8. Life Cycle Assessment and Environmental Footprint with Enernoc
- 17.8.1. AI Integration for Life Cycle Analysis of Building Materials
- 17.8.2. Use of Enernoc to Assess Carbon Footprint and Sustainability
- 17.8.3. Model Projects using AI to Assess Carbon Footprint and Sustainability

17.9. Energy Efficiency Education and Awareness with Verdigris
- 17.9.1. Role of AI in Energy Efficiency Education and Awareness
- 17.9.2. Use of Verdigris to Teach Sustainable Practices to Architects and Designers
- 17.9.3. Educational Initiatives and Programs using AI to Promote a Cultural Shift towards Sustainability

17.10. The Future of Space Optimization and Energy Efficiency with ENBALA
- 17.10.1. Exploration of Future Challenges and the Evolution of Energy Efficiency Technologies
- 17.10.2. Emerging Trends in AI for Space and Energy Optimization
- 17.10.3. Perspectives on how AI will Continue to Transform Architecture and Urban Design

Module 18. Parametric Design and Digital Fabrication

18.1. Advances in Parametric Design and Digital Fabrication with Grasshopper
- 18.1.1. Use of Grasshopper to Create Complex Parametric Designs
- 18.1.2. Integrating AI into Grasshopper to Automate and Optimize the Design
- 18.1.3. Flagship Projects Using Parametric Design for Innovative Solutions

18.2. Algorithmic Optimization in Design with Generative Design
- 18.2.1. Application of Generative Design for Algorithmic Optimization in Architecture
- 18.2.2. Use of AI to Generate Efficient and Novel Design Solutions
- 18.2.3. Examples of how Generative Design has improved the Functionality and Aesthetics of Architectural Projects

18.3. Digital Fabrication and Robotics in Construction with KUKA PRC
- 18.3.1. Implementation of Robotics Technologies such as KUKA PRC in Digital Manufacturing
- 18.3.2. Advantages of Digital Manufacturing in Precision, Speed and Cost Reduction
- 18.3.3. Digital Fabrication Case Studies Highlighting Successful Integration of Robotics in Architecture

18.4. Adaptive Design and Manufacturing with Autodesk Fusion 360
- 18.4.1. Using Fusion 360 to Design Adaptive Architectural Systems
- 18.4.2. Implementing AI in Fusion 360 for Mass Customization
- 18.4.3. Innovative Projects Demonstrating the Potential for Adaptability and Customization

18.5. Sustainability in Parametric Design with Topology Optimization
- 18.5.1. Application of Topology Optimization Techniques to Improve Sustainability
- 18.5.2. Integration of AI to Optimize Material Use and Energy Efficiency
- 18.5.3. Examples of how Topological Optimization has Improved the Sustainability of Architectural Projects

18.6. Interactivity and Spatial Adaptability with Autodesk Fusion 360
- 18.6.1. Integration of Sensors and Real-Time Data to Create Interactive Architectural Environments
- 18.6.2. Use of Autodesk Fusion 360 in Adapting the Design in Response to Environmental or Usage Changes
- 18.6.3. Examples of Architectural Projects that Use Spatial Interactivity to Enhance the User Experience

18.7. Efficiency in Parametric Design
- 18.7.1. Application of Parametric Design to Optimize Sustainability and Energy Efficiency of Buildings
- 18.7.2. Use of Simulations and Life-Cycle Analysis Integrated with AI to Improve Green Decision Making
- 18.7.3. Cases of Sustainable Projects where Parametric Design has been Crucial

18.8. Mass Customization and Digital Fabrication with Magic (Materialize)
- 18.8.1. Exploring the Potential of Mass Customization through Parametric Design and Digital Fabrication
- 18.8.2. Application of Tools such as Magic to Customize Design in Architecture and Interior Design
- 18.8.3. Outstanding Projects that Showcase Digital Fabrication in the Customization of Spaces and Furnishings

18.9. Collaboration and Collective Design using Ansys Granta
- 18.9.1. Using Ansys Granta to Facilitate Collaboration and Decision Making in Distributed Design
- 18.9.2. Methodologies to Improve Innovation and Efficiency in Collaborative Design Projects
- 18.9.3. Examples of How AI-enhanced Collaboration can Lead to Innovative and Sustainable Results

18.10. Challenges and the Future of Digital Fabrication and Parametric Design
- 18.10.1. Identification of Emerging Challenges in Parametric Design and Digital Manufacturing
- 18.10.2. Future Trends and the Role of AI in the Evolution of these Technologies
- 18.10.3. Discussion of how Continuous Innovation will Affect Architectural Practice and Design in the Future

Module 19. Simulation and Predictive Modeling with AI

19.1. Advanced Simulation Techniques with MATLAB in Architecture
- 19.1.1. Using MATLAB for Advanced Architectural Simulations
- 19.1.2. Integration of Predictive Modeling and Big Data Analytics
- 19.1.3. Case Studies where MATLAB has Been Instrumental in Architectural Simulation

19.2. Advanced Structural Analysis with ANSYS
- 19.2.1. Implementation of ANSYS for Advanced Structural Simulations in Architectural Projects
- 19.2.2. Integration of Predictive Models to Evaluate Structural Safety and Structural Durability
- 19.2.3. Projects Highlighting the Use of Structural Simulations in High Performance Architecture

19.3. Modeling Space Use and Human Dynamics with AnyLogic
- 19.3.1. Using AnyLogic to Model the Dynamics of Space Use and Human Mobility
- 19.3.2. Application of AI for Predicting and Improving Space Use Efficiency in Urban and Architectural Environments
- 19.3.3. Case Studies Showing how Simulation Influences Urban and Architectural Planning

19.4. Predictive Modeling with TensorFlow in Urban Planning
- 19.4.1. Implementation of TensorFlow for Modeling Urban Dynamics and Structural Behavior
- 19.4.2. Use of AI for Predicting Future Outcomes in City Design
- 19.4.3. Examples of how Predictive Modeling Influences Urban Planning and Design

19.5. Predictive Modeling and Generative Design with GenerativeComponents
- 19.5.1. Using GenerativeComponents to Merge Predictive Modeling and Generative Design
- 19.5.2. Applying Machine Learning Algorithms to Create Innovative and Efficient Designs
- 19.5.3. Examples of Architectural Projects that have Optimized their Design using these Advanced Technologies

19.6. Environmental Impact and Sustainability Simulation with COMSOL
- 19.6.1. Application of COMSOL for Environmental Simulations in Large-Scale Projects
- 19.6.2. Use of AI for Analyzing and Improving the Environmental Impact of Buildings
- 19.6.3. Projects Showing how Simulation Contributes to Sustainability

19.7. Simulation of Environmental Behavior with COMSOL
- 19.7.1. Application of COMSOL Multiphysics for Environmental and Thermal Behavior Simulations
- 19.7.2. Use of AI to Optimize Design Based on Daylighting and Acoustic Simulations
- 19.7.3. Examples of Successful Implementations that have Improved Sustainability and Comfort

19.8. Innovation in Simulation and Predictive Modeling
- 19.8.1. Exploration of Emerging Technologies and Their Impact on Simulation and Modeling
- 19.8.2. Discussion of how AI is Changing Simulation Capabilities in Architecture
- 19.8.3. Evaluation of Future Tools and Their Potential Applications in Architectural Design

19.9. Simulation of Construction Processes with CityEngine
- 19.9.1. Application of CityEngine to Simulate Construction Sequences and Optimize On-Site Workflow
- 19.9.2. AI Integration for Modeling Construction Logistics and Coordinating Activities in Real Time
- 19.9.3. Case Studies Showing Improved Efficiency and Safety in Construction through Advanced Simulations

19.10. Challenges and Future of Simulation and Predictive Modeling
- 19.10.1. Assessment of Current Challenges in Simulation and Predictive Modeling in Architecture
- 19.10.2. Emerging Trends and the Future of these Technologies in Architectural Practice
- 19.10.3. Discussion on the Impact of Continued Innovation in Simulation and Predictive Modeling in Architecture and Construction

Module 20. Heritage Preservation and Restoration with AI

20.1. AI Technologies in Heritage Restoration with Photogrammetry
- 20.1.1. Use of Photogrammetry and AI for Accurate Heritage Documentation and Restoration
- 20.1.2. Practical Applications in the Restoration of Historic Buildings
- 20.1.3. Outstanding Projects Combining Advanced Techniques and Respect for Authenticity

20.2. Predictive Analysis for Conservation with Laser Scanning
- 20.2.1. Implementation of Laser Scanning and Predictive Analysis in Heritage Conservation
- 20.2.2. Use of AI to Detect and Prevent Deterioration in Historic Structures
- 20.2.3. Examples of how these Technologies have Improved Accuracy and Effectiveness in Conservation

20.3. Cultural Heritage Management with Virtual Reconstruction
- 20.3.1. Application of AI-Assisted Virtual Reconstruction Techniques
- 20.3.2. Strategies for Digital Heritage Management and Preservation
- 20.3.3. Success Stories in the use of Virtual Reconstruction for Education and Preservation

20.4. Preventive Conservation and AI-Assisted Maintenance
- 20.4.1. Use of AI Technologies to Develop Strategies for Preventive Conservation and Maintenance of Historic Buildings
- 20.4.2. Implementation of AI-Based Monitoring Systems for Early Detection of Structural Problems
- 20.4.3. Examples of how AI Contributes to the Long-Term Conservation of Cultural Heritage

20.5. Digital Documentation and BIM in Heritage Preservation
- 20.5.1. Application of Advanced Digital Documentation Techniques, including BIM and Augmented Reality, assisted by AI
- 20.5.2. Use of BIM Models for Efficient Heritage Management and Restoration
- 20.5.3. Case Studies on the Integration of Digital Documentation in Restoration Projects

20.6. AI-Assisted Preservation Management and Policies
- 20.6.1. Use of AI-Based Tools for Management and Policy Formulation in Heritage Preservation
- 20.6.2. Strategies for Integrating AI into Conservation-Related Decision Making
- 20.6.3. Discussion of how AI can Improve Collaboration between Institutions for Heritage Preservation

20.7. Ethics and Responsibility in AI Restoration and Preservation
 20.7.1. Ethical Considerations in the Application of AI in Heritage Restoration
 20.7.2. Debate on the Balance between Technological Innovation and Respect for Historical Authenticity
 20.7.3. Examples of how AI can be used Responsibly in Heritage Restoration
20.8. Innovation and the Future of Heritage Preservation with AI
 20.8.1. Perspectives on Emerging AI Technologies and their Application in Heritage Preservation
 20.8.2. Assessment the Potential of AI to Transform Restoration and Conservation
 20.8.3. Discussion of the Future of Heritage Preservation in an Era of Rapid Technological Innovation
20.9. Cultural Heritage Education and Awareness with GIS
 20.9.1. Importance of Public Education and Awareness in the Preservation of Cultural Heritage
 20.9.2. Use of Geographic Information Systems (GIS) to Promote the Appreciation and Knowledge of Heritage
 20.9.3. Successful Education and Outreach Initiatives using Technology to Teach about Cultural Heritage
20.10. Challenges and the Future of Heritage Preservation and Restoration
 20.10.1. Identification of Current Challenges in Cultural Heritage Preservation
 20.10.2. Role of Technological Innovation and AI in Future Conservation and Restoration Practices
 20.10.3. Perspectives on how Technology will Transform Heritage Preservation in the Coming Decades

You will delve into the use of digital fabrication techniques and robotics applied to construction, as well as the preservation of architectural heritage, through the best teaching materials on the academic market."

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 has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. 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 that you are presented with in the case method, an action-oriented learning method. Throughout the course, students 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

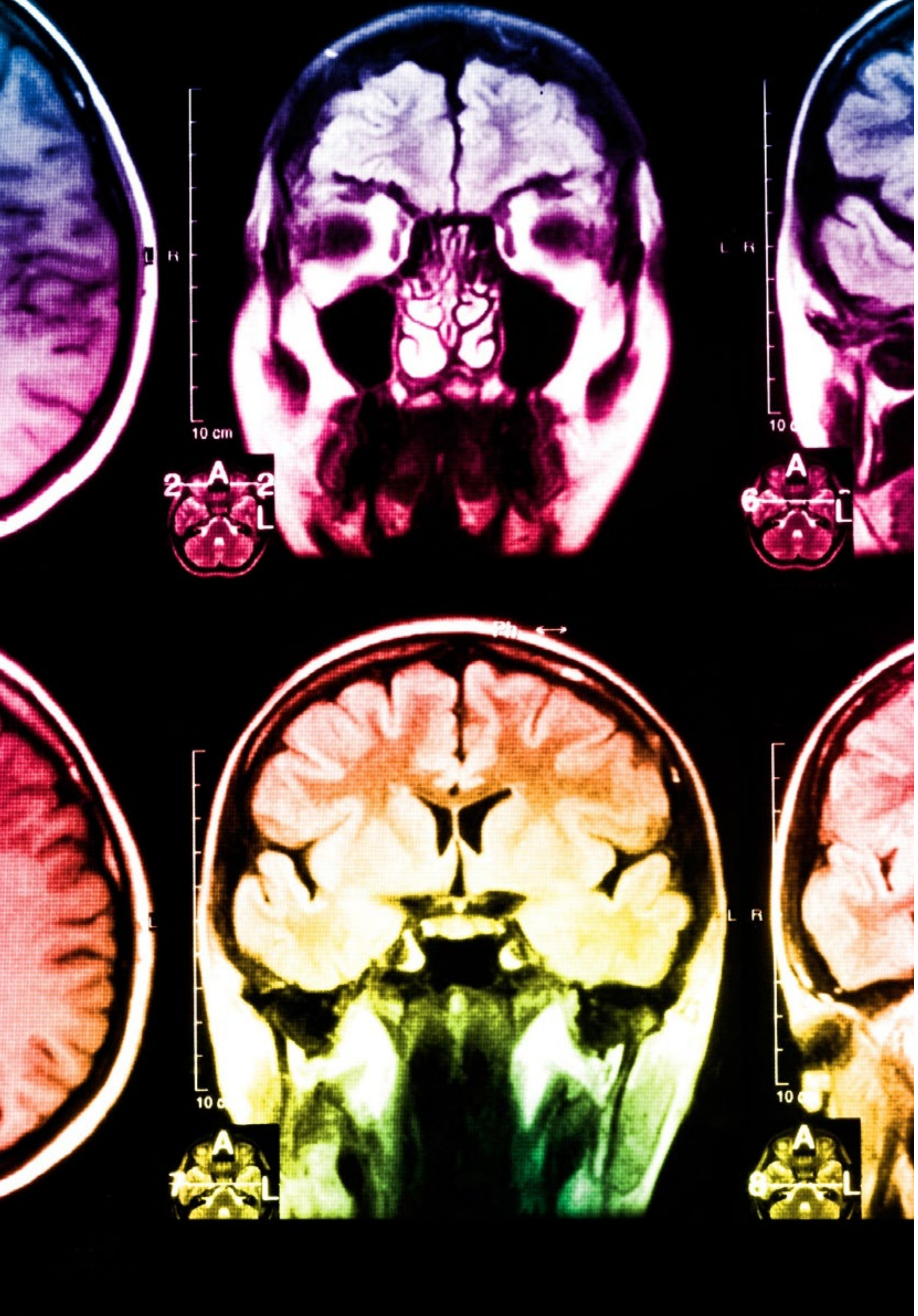
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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. This methodology has 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, and financial markets and 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.

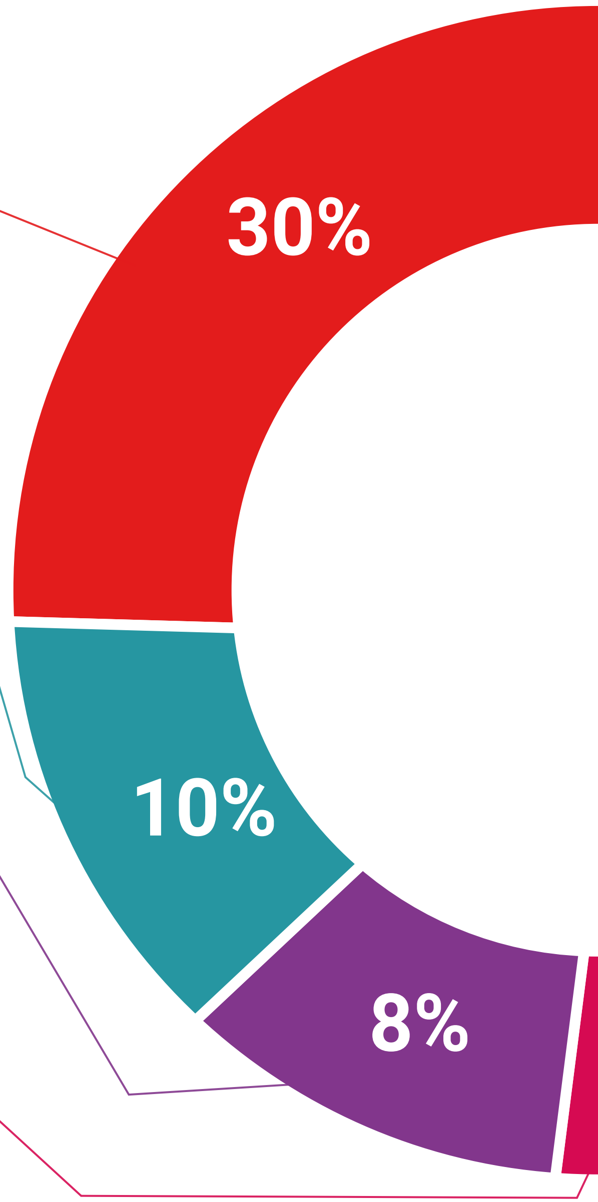
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

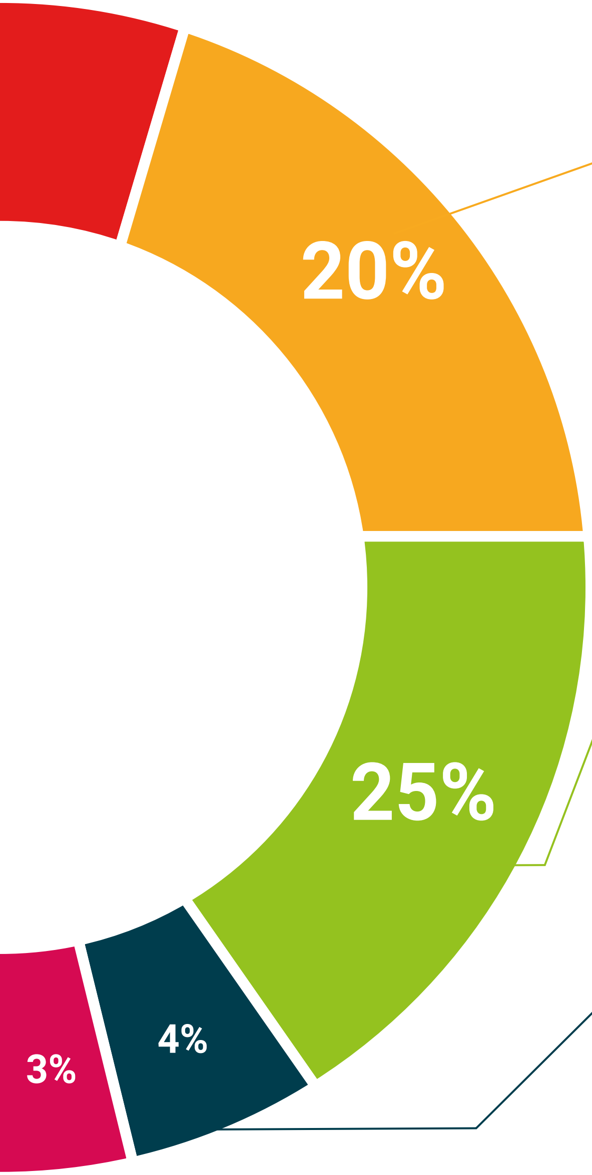
Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject 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 Architecture guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree 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 Architecture** contains the most complete and up-to-date scientific 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 diploma 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 Architecture**

Modality: **online**

Duration: **12 months**


tech technological university

Awards the following

DIPLOMA

to

Mr./Ms. _______________, with identification number ____________.

For having successfully passed and accredited the following program

PROFESSIONAL MASTER'S DEGREE

in

Artificial Intelligence in Architecture

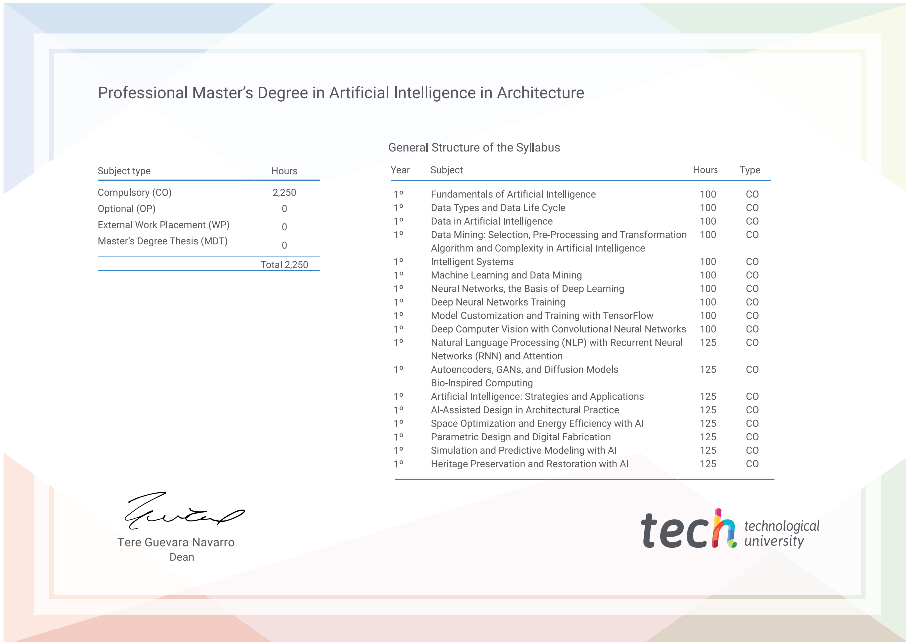
This is a qualification awarded by this University, equivalent to 2,250 hours, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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 Architecture

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	100	CO
1º	Data Types and Data Life Cycle	100	CO
1º	Data in Artificial Intelligence	100	CO
1º	Data Mining: Selection, Pre-Processing and Transformation Algorithm and Complexity in Artificial Intelligence	100	CO
1º	Intelligent Systems	100	CO
1º	Machine Learning and Data Mining	100	CO
1º	Neural Networks, the Basis of Deep Learning	100	CO
1º	Deep Neural Networks Training	100	CO
1º	Model Customization and Training with TensorFlow	100	CO
1º	Deep Computer Vision with Convolutional Neural Networks	100	CO
1º	Natural Language Processing (NLP) with Recurrent Neural Networks (RNN) and Attention	125	CO
1º	Autoencoders, GANs, and Diffusion Models Bio-Inspired Computing	125	CO
1º	Artificial Intelligence: Strategies and Applications	125	CO
1º	AI-Assisted Design in Architectural Practice	125	CO
1º	Space Optimization and Energy Efficiency with AI	125	CO
1º	Parametric Design and Digital Fabrication	125	CO
1º	Simulation and Predictive Modeling with AI	125	CO
1º	Heritage Preservation and Restoration with AI	125	CO

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

technological university

Professional Master's Degree
Artificial Intelligence in Architecture

- Modality: **online**
- Duration: **12 months.**
- Certificate: **TECH Technological University**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree
Artificial Intelligence in Architecture

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