Professional Master's Degree

Artificial Intelligence in Education

tech global university

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Professional Master's Degree
Artificial Intelligence in Education

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

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

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01

Introduction

Artificial Intelligence (AI) has become a useful tool in the field of Education. Thanks to these advanced technologies, teachers can adapt content and level of difficulty according to students' needs. Experts drive more efficient learning. In the same vein, Machine Learning serves to identify patterns in student performance that suggest learning difficulties, allowing for early intervention. Faced with this reality, TECH is developing a university program that will immerse teachers in innovation in their field. It is taught in a 100% online format, allowing students to have the flexibility to combine both their studies and the rest of their activities.

Through this 100% online program, you will integrate generative Artificial Intelligence tools in the planning, implementation and evaluation of educational activities"

In order to optimize educational projects, teachers use AI tools to enrich the students' experience. However, to achieve the expected results, professionals need to have a broad knowledge of AI application strategies in the classroom. They will be able to develop resources such as *chatbots*, dynamic learning games and even tools to assess student performance.

In this context, TECH implements this program in Artificial Intelligence in Education, where the associated ethical, legal and social considerations will also be addressed. With an eminently practical approach, teachers will acquire tangible skills to implement AI procedures in the educational environment. Graduates will delve deeper into teaching praxis by focusing on actors such as personalization of learning and continuous improvement, which are indispensable for adaptability in the educational process. Finally, the syllabus will analyze in detail the emerging trends in AI for Education, ensuring that participants are aware of the latest innovations in educational technology.

It should be noted that this university program is based on a 100% online methodology so that students can learn at their own pace. To do so, the only thing they will need to access the resources is a device with Internet access. The academic itinerary stands out for relying on the innovative *Relearning*method. This is a teaching model supported by the repetition of the most important content, in order to make the knowledge last in the students' minds. To enrich learning, the materials are complemented by a wide variety of multimedia resources (such as interactive summaries, supplementary readings or infographics) to reinforce knowledge and skills. In this way, students will learn gradually and naturally, without having to resort to extra efforts such as memorization.

This **Professional Master's Degree in Artificial Intelligence in Education** 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 Education
- The graphic, schematic and practical contents of the book provide theoretical and practical information on those disciplines that are essential for professional practice
- Practical exercises where self-assessment can be used 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

Want to facilitate instant feedback? With this university program you'll identify areas for improvement and offer personalized support"

Thanks to the revolutionary Relearning methodology, you will integrate all the knowledge in an optimal way to successfully achieve the results you are looking for"

You will drive innovation and continuous improvement in education through the responsible use of technology.

You will have an advanced and exclusive program and will be able to face the challenges of the educational landscape driven by Machine Learning.

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.

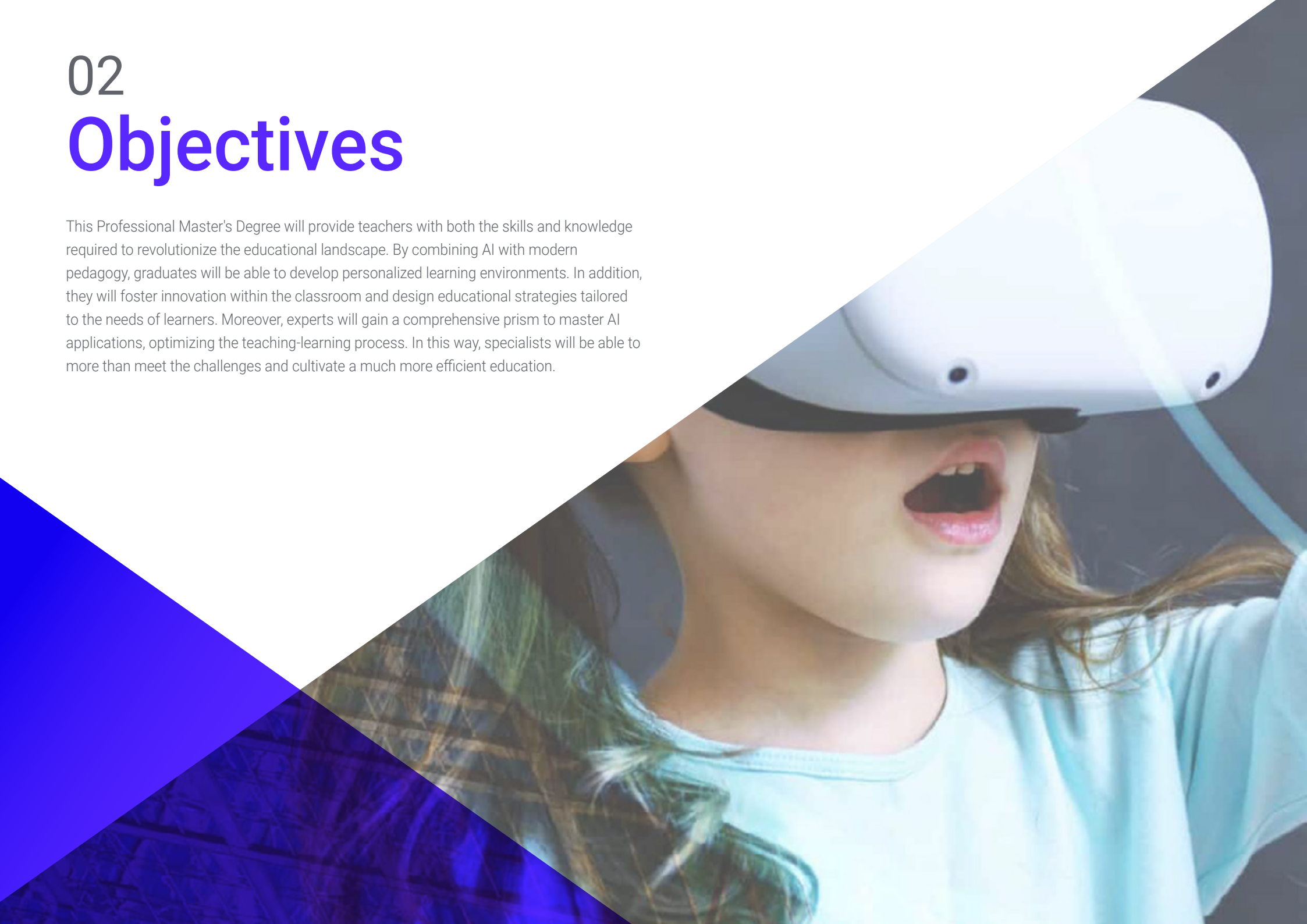
The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

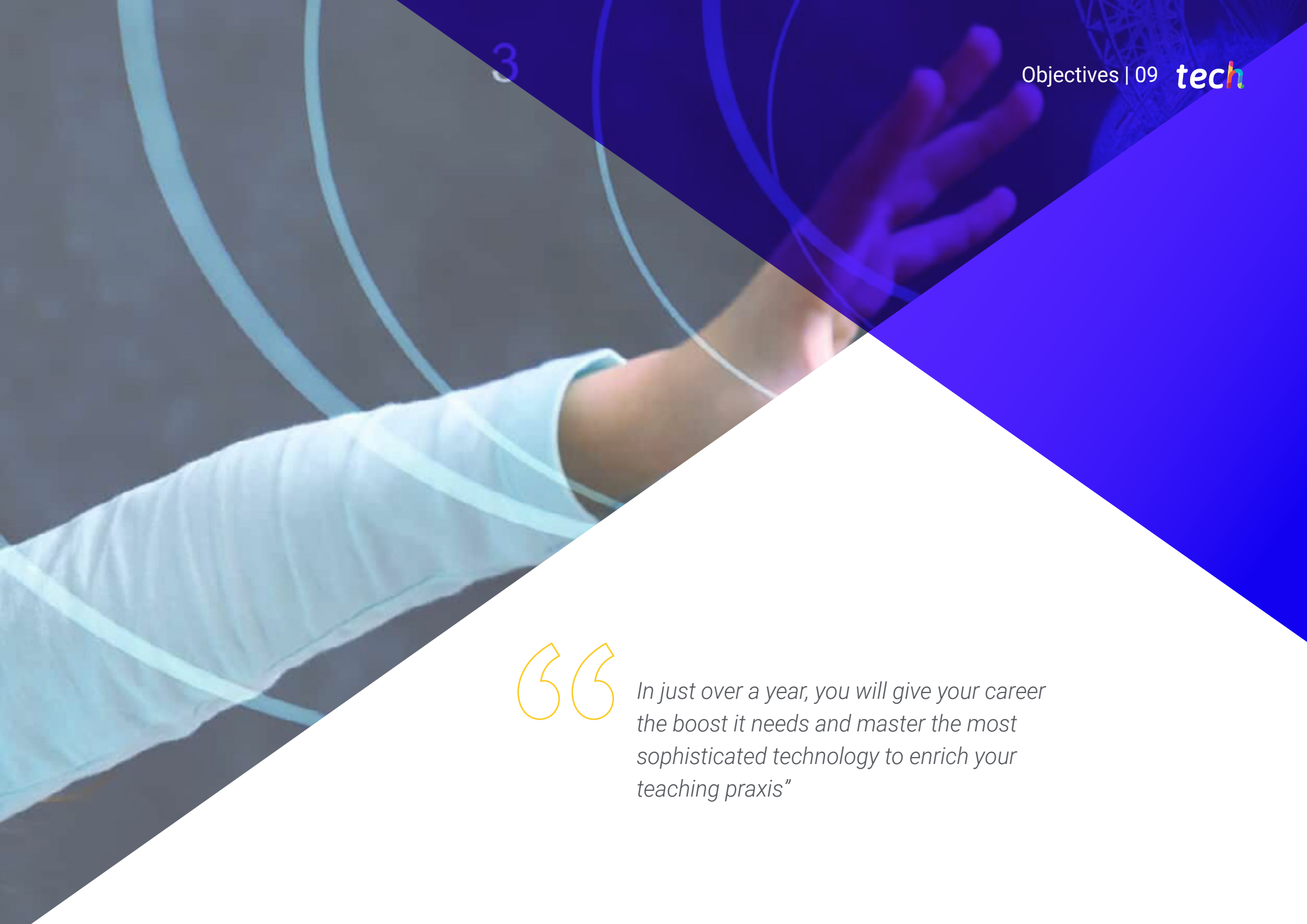
This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year For this purpose, the students will be assisted by an innovative interactive video system created by renowned and experienced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

02

Objectives

This Professional Master's Degree will provide teachers with both the skills and knowledge required to revolutionize the educational landscape. By combining AI with modern pedagogy, graduates will be able to develop personalized learning environments. In addition, they will foster innovation within the classroom and design educational strategies tailored to the needs of learners. Moreover, experts will gain a comprehensive prism to master AI applications, optimizing the teaching-learning process. In this way, specialists will be able to more than meet the challenges and cultivate a much more efficient education.





In just over a year, you will give your career the boost it needs and master the most sophisticated technology to enrich your teaching praxis"

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
- Understand the fundamental ethical principles related to the application of AI in educational settings
- Analyze the current legislative framework and the challenges associated with the implementation of AI in educational settings
- Encourage the responsible design and use of AI solutions in educational contexts, considering cultural diversity and gender equity
- Provide an in-depth understanding of the theoretical foundations of AI, including machine learning, neural networks, and natural language processing
- Understand the applications and impact of AI in teaching and learning, critically assessing its current and potential uses

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 Greedyalgorithms, 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 TensorFlowand 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. Data analysis and application of AI techniques for educational personalization

- Apply AI in the analysis and evaluation of educational data to drive continuous improvement in educational settings
- Define academic performance indicators based on educational data to measure and improve student performance
- Implement AI technologies and algorithms to perform predictive analytics on academic performance data
- Perform personalized diagnostics of learning difficulties through data analysis with AI, identifying particular educational needs and designing targeted interventions
- Address security and privacy in the processing of educational data when applying AI tools, ensuring regulatory and ethical compliance

Module 17. Development of Artificial Intelligence projects in the classroom

- Plan and design educational projects that effectively integrate AI in educational environments, mastering specific tools for its development
- Design effective strategies to implement AI projects in learning environments, integrating them in specific subjects to enrich and improve the educational process
- Develop educational projects applying machine learning to improve the learning experience, integrating AI in the design of educational games in playful learning
- Create educational chatbots that assist students in their learning and doubt resolution processes, including intelligent agents in educational platforms to enhance interaction and teaching
- Perform continuous analysis of AI in Education projects to identify areas for improvement and optimization

Module 18. Teaching Practice with Generative Artificial Intelligence

- Master generative AI technologies for their application and effective use in educational environments, planning effective educational activities
- Create didactic materials using generative AI to improve the quality and variety of learning resources, as well as to measure student progress in innovative ways
- Use generative AI to correct activities and evaluative tests, streamlining and optimizing this process
- Integrate generative AI tools in pedagogical strategies to improve the effectiveness of the educational process and design inclusive learning environments, under the universal design approach
- Evaluate the effectiveness of generative AI in education, analyzing its impact on teaching and learning processes

Module 19. Innovations and Emerging Trends in AI for Education

- Master emerging AI tools and technologies applied to education for their effective use in learning environments
- Integrate Augmented and Virtual Reality in Education to enrich and enhance the learning experience
- Apply conversational AI to facilitate educational support and foster interactive learning among students
- Implement facial and emotional recognition technologies to monitor student engagement and well-being in the classroom
- Explore the integration of Blockchain and AI in Education to transform educational administration and validate certifications

Module 20. Ethics and legislation of Artificial Intelligence in Education

- Identify and apply ethical practices in the handling of sensitive data within the educational context, prioritizing responsibility and respect
- Analyze the social and cultural impact of AI in Education, assessing its influence on educational communities
- Understand legislation and policies related to the use of data in educational settings involving AI
- Define the intersection between AI, cultural diversity, and gender equity in the educational context
- Evaluate the impact of AI on educational accessibility, ensuring equity in access to knowledge

This Professional Master's Degree combines technical aspects of Artificial Intelligence with a practical approach in the development of educational projects"

03

Skills

This university program will allow graduates to obtain a competitive advantage, which will differentiate them from the rest. In this way, they will control aspects such as ethics, legislation and practical development of AI projects specifically designed for the educational field. In addition, professionals will acquire practical skills to apply to their projects, greatly enriching the experience of students in the classroom. Through this Professional Master's Degree, specialists will be able to overcome the challenges that arise during the exercise of their profession.

You will enter a constantly evolving field, where Artificial Intelligence innovation merges with learning in education"

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
- Develop critical skills to evaluate the ethical and social impact of AI in education
- Train in the design and implementation of AI projects in the educational environment
- Develop skills to integrate AI projects effectively and ethically into the educational syllabus

Specific Skills

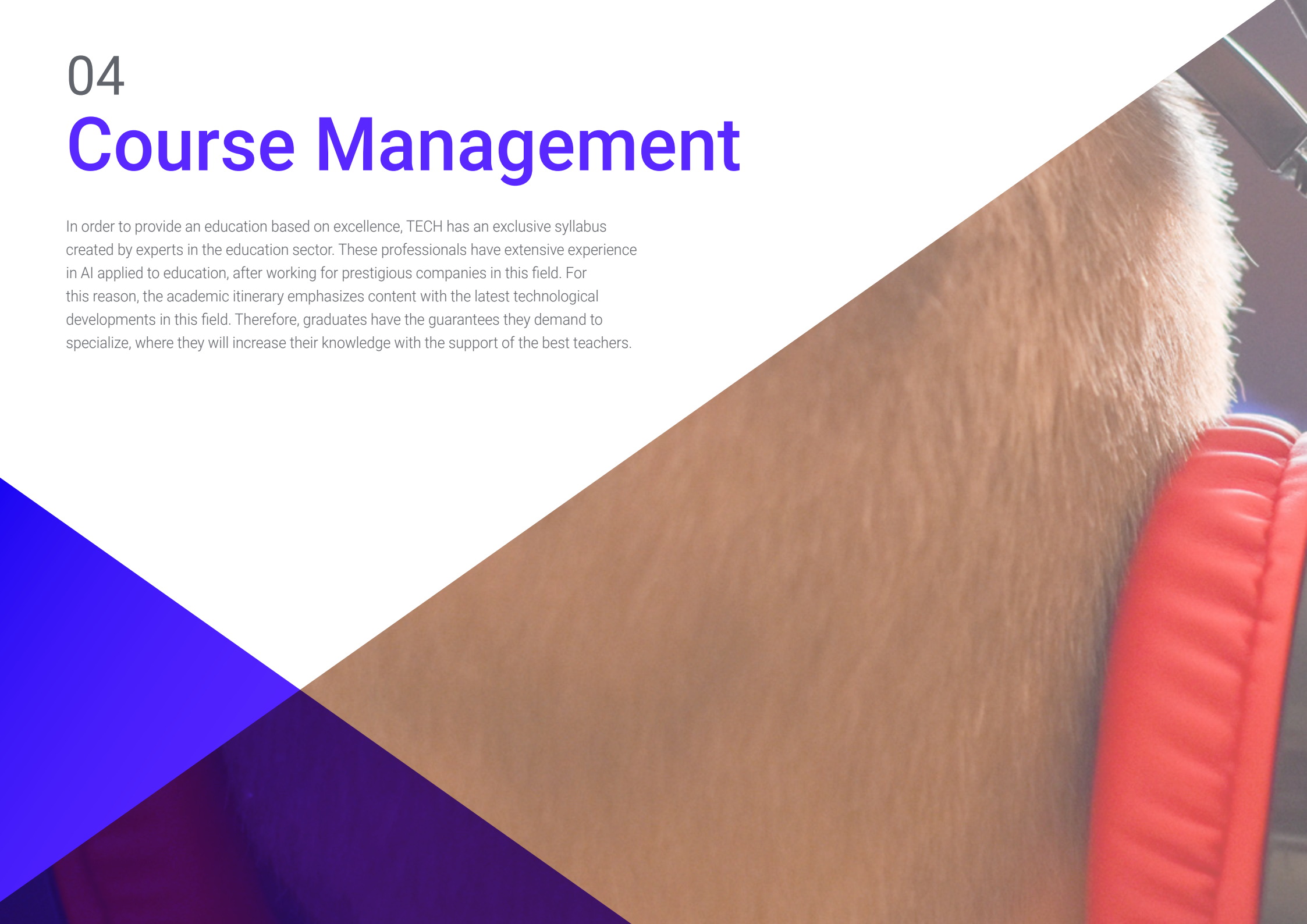
- Apply AI techniques and strategies to improve efficiency in the *retail* sector
- Delve into understanding and application of genetic algorithms
- Implement noise removal techniques using automatic encoders
- Effectively create training data sets for natural language processing (NLP) tasks
- Run grouping 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
- Develop critical skills to evaluate the ethical and social impact of AI in education
- Design and implement AI projects in educational contexts
- Apply generative AI in the educational context
- Create personalized and adaptive educational materials
- Use AI to improve educational assessment and feedback
- Effectively integrate emerging AI technologies into educational syllabus

You will design and implement highly innovative educational strategies, through the integration of Artificial Intelligence"

04

Course Management

In order to provide an education based on excellence, TECH has an exclusive syllabus created by experts in the education sector. These professionals have extensive experience in AI applied to education, after working for prestigious companies in this field. For this reason, the academic itinerary emphasizes content with the latest technological developments in this field. Therefore, graduates have the guarantees they demand to specialize, where they will increase their knowledge with the support of the best teachers.



The diversity of talents and knowledge of the teaching staff will generate a dynamic learning environment. Train with the best!"

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: SMILE Research Group

Mr. Nájera Puente, Juan Felipe

- Data Analyst and Data Scientist
- Director of Studies and Research at the Council for Quality Assurance in Higher Education
- Production Programmer at Confiteca C.A
- Processes Consultant at Esefex Consulting
- Academic Planning Analyst at San Francisco de Quito University
- Professional Master's Degree in *Big Data* and Data Science at the International University of Valencia
- Industrial Engineer from San Francisco de Quito University

Professors

Ms. Martínez Cerrato, Yésica

- Education, Business and Marketing Specialist
- Responsible for Technical Training at Securitas Seguridad España
- Product Manager in Electronic Security at Securitas Seguridad España
- Business Intelligence Analyst at Ricopia Technologies
- Computer Technician and Head of 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

Composed of 20 modules, this university program stands out for its comprehensive and specialized approach. The syllabus goes beyond the technical aspects of AI in Education, delving into the associated ethical, legal and social considerations. In turn, the syllabus will provide students with state-of-the-art technological tools, so that their work as teachers integrates innovations such as Augmented Reality or Predictive Analytics. The training will also emphasize attention to the personalization of learning and continuous improvement, key aspects for adaptability in the educational process.

It includes clinical cases to bring the development of the program as close as possible to the reality of teaching care"

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

4.10. 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. 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 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. Graphics Optimization with TensorFlowOperations

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 API tfdata
- 10.6.1. Using the tfdataAPI 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 TransformersModels 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 Vision

12.8. Hugging Face's TransformersBookstore
- 12.8.1. Using the Hugging Face's TransformersLibrary
- 12.8.2. Hugging Face´s Transformers Library App
- 12.8.3. Advantages of Hugging Face´s Transformers Library

12.9. Other Transformers Libraries. Comparison
- 12.9.1. Comparison between Different TransformersLibraries
- 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. 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. Data analysis and application of AI techniques for educational personalization

16.1. Identification, Extraction and Preparation of Educational Data
- 16.1.1. Methods of Collection and Selection of Relevant Data in Educational Settings
- 16.1.2. Data Cleaning and Normalization Techniques for Educational Analyses
- 16.1.3. Importance of Data Integrity and Quality in Educational Research

16.2. Analysis and Evaluation of Educational Data with AI for Continuous Improvement in the Classroom
- 16.2.1. Use of Machine Learning Techniques to Interpret Educational Trends and Patterns
- 16.2.2. Evaluating the Impact of Pedagogical Strategies using Data Analytics
- 16.2.3. Integration of AI-based Feedback for the Optimization of the Teaching Process

16.3. Definition of Academic Performance Indicators from Educational Data
- 16.3.1. Establishment of Key Metrics for Evaluating Student Achievement
- 16.3.2. Comparative Analysis of Indicators to Identify Areas for Improvement
- 16.3.3. Correlation Between Academic Indicators and External Factors Using AI

16.4. AI Tools for Educational Decision Making and Monitoring
- 16.4.1. AI-based Decision Support Systems for Educational Administrators
- 16.4.2. Role of AI in Educational Resource Planning and Allocation
- 16.4.3. Optimization of Educational Processes through Predictive Analytics

16.5. AI Technologies and Algorithms for Predictive Analysis of Academic Achievement Data
- 16.5.1. Fundamentals of Predictive Modeling in Education
- 16.5.2. Use of Classification and Regression Algorithms to Predict Trends in Education
- 16.5.3. Case Studies of Successful Predictions in Educational Environments

16.6. Application of Data Analytics with AI for the Prevention and Solution of Educational Problems
- 16.6.1. Early Identification of Academic Risks through Predictive Analytics
- 16.6.2. Data-driven Intervention Strategies to Address Educational Challenges
- 16.6.3. Assessing the Impact of AI-based Solutions in Education

16.7. Personalized Diagnosis of Learning Difficulties from Data Analytics with AI
- 16.7.1. AI Techniques for the Identification of Learning Styles and Learning Difficulties
- 16.7.2. Integration of Data Analysis into Individualized Educational Support Plans
- 16.7.3. Case Studies of Diagnoses Improved by the Use of AI

16.8. Data Analysis and Application of AI for Identification of Special Educational Needs
- 16.8.1. AI Approaches to the Detection of Special Educational Needs
- 16.8.2. Personalization of Teaching Strategies Based on Data Analysis
- 16.8.3. Evaluation of the Impact of AI on Educational Inclusion

16.9. Personalization of Learning with AI from Academic Performance Data Analytics
- 16.9.1. Creating Adaptive Learning Pathways using AI
- 16.9.2. Implementation of Recommender Systems for Educational Resources
- 16.9.3. Individual Progress Measurement and Real-Time Adjustments via AI

16.10. Security and Privacy in the Processing of Educational Data
- 16.10.1. Ethical and Legal Principles in the Management of Educational Data
- 16.10.2. Data Protection and Privacy Techniques in AI-based Educational Systems
- 16.10.3. Case Studies on Security Breaches and their Impact on Education

Module 17. Development of Artificial Intelligence Projects in the Classroom

17.1. Planning and Design of AI Projects in Education
- 17.1.1. First Steps to Plan the Project
- 17.1.2. Knowledge Bases
- 17.1.3. Design of AI Projects in Education

17.2. Tools for the Development of Educational Projects with AI
- 17.2.1. Tools for the Development of Educational Projects
- 17.2.2. Tools for Educational Projects in History
- 17.2.3. Tools for Educational Projects in Mathematics
- 17.2.4. Tools for Educational Projects in English

17.3. Strategies for Implementing AI Projects in the Classroom
- 17.3.1. When to Implement an AI Project
- 17.3.2. Why Implement an AI Project
- 17.3.3. Strategies to be Implemented

17.4. Integration of IA Projects in Specific Subjects
- 17.4.1. Mathematics and AI
- 17.4.2. History and IA
- 17.4.3. Languages and IA
- 17.4.4. Other Subjects

17.5. Project 1: Developing educational projects using machine learning
- 17.5.1. First Steps
- 17.5.2. Requirements
- 17.5.3. Tools to be Used
- 17.5.4. Project definition

17.6. Project 2: Integration of AI in the Development of Educational Games
- 17.6.1. First Steps
- 17.6.2. Requirements
- 17.6.3. Tools to be Used
- 17.6.4. Project definition

17.7. Project 3: Development of Educational Chatbots for Student Assistance
- 17.7.1. First Steps
- 17.7.2. Requirements
- 17.7.3. Tools to be Used
- 17.7.4. Project definition

17.8. Project 4: Integration of Intelligent Agents in Educational Platforms
- 17.8.1. First Steps
- 17.8.2. Requirements
- 17.8.3. Tools to be Used
- 17.8.4. Project definition

17.9. Evaluating and Measuring the Impact of AI Projects in Education
- 17.9.1. Benefits of Working with AI in the Classroom
- 17.9.2. Actual Data
- 17.9.3. IA in Classroom
- 17.9.4. AI Statistics in Education

17.10. Analysis and Continuous Improvement of AI in Education Projects
- 17.10.1. Current Projects
- 17.10.2. Commissioning
- 17.10.3. What the Future Holds
- 17.10.4. Transforming the Aulas 360

Module 18. Teaching Practice with Generative Artificial Intelligence

18.1. Generative AI Technologies for Use in Education
- 18.1.1. Current Market
- 18.1.2. Technologies in Use
- 18.1.3. What is to Come
- 18.1.4. The Future of the Classroom

18.2. Application of Generative AI Tools in Educational Planning
- 18.2.1. Planning Tools
- 18.2.2. Tools and their Application
- 18.2.3. Education and AI
- 18.2.4. Evolution

18.3. Creation of Didactic Materials with Generative AI
- 18.3.1. AI and its Uses in the Classroom
- 18.3.2. Tools to Create Didactic Material
- 18.3.3. How to Work with the Tools
- 18.3.4. Commands

18.4. Development of Evaluation Tests using Generative AI
- 18.4.1. AI and its Uses in the Development of Evaluation Tests
- 18.4.2. Tools for the Development of Evaluation Tests
- 18.4.3. How to Work with the Tools
- 18.4.4. Commands

18.5. Enhanced Feedback and Communication with Generative AI
- 18.5.1. AI in Communication
- 18.5.2. Application of Tools in the Development of Communication in the Classroom
- 18.5.3. Advantages and Disadvantages

18.6. Correction of Evaluative Activities and Tests using Generative AI
- 18.6.1. AI and its Uses in the Correction of Evaluative Activities and Tests
- 18.6.2. Tools for the Correction of Evaluative Activities and Tests
- 18.6.3. How to Work with the Tools
- 18.6.4. Commands

18.7. Generation of Teacher Quality Assessment Surveys through Generative AI
- 18.7.1. AI and its Uses in the Generation of Teaching Quality Assessment Surveys using AI
- 18.7.2. Tools for the Generation of AI-based Teacher Quality Surveys
- 18.7.3. How to Work with the Tools
- 18.7.4. Commands

18.8. Integration of Generative AI Tools in Pedagogical Strategies
- 18.8.1. Applications of AI in Pedagogical Strategies
- 18.8.2. Correct Uses
- 18.8.3. Advantages and Disadvantages
- 18.8.4. Generative AI Tools in Pedagogical Strategies

18.9. Use of Generative AI for Universal Design for Learning
- 18.9.1. Generative AI, Why Now?
- 18.9.2. AI in Learning
- 18.9.3. Advantages and Disadvantages
- 18.9.4. Applications of AI in Learning

18.10. Evaluating the Effectiveness of Generative AI in Education
- 18.10.1. Effectiveness Data
- 18.10.2. Projects
- 18.10.3. Design Purposes
- 18.10.4. Evaluating the Effectiveness of AI in Education

Module 19. Innovations and Emerging Trends in AI for Education

19.1. Emerging AI Tools and Technologies in Education
- 19.1.1. Obsolete AI Tools
- 19.1.2. Current Tools
- 19.1.3. Future Tools

19.2. Augmented and Virtual Reality in Education
- 19.2.1. Augmented Reality Tools
- 19.2.2. Virtual Reality Tools
- 19.2.3. Application of Tools and their Uses
- 19.2.4. Advantages and Disadvantages

19.3. Conversational AI for Educational Support and Interactive Learning
- 19.3.1. Conversational AI, Why Now?
- 19.3.2. AI in Learning
- 19.3.3. Advantages and Disadvantages
- 19.3.4. Applications of AI in Learning

19.4. Application of AI for Improving Knowledge Retention
- 19.4.1. AI as a Support Tool
- 19.4.2. Guidelines to Follow
- 19.4.3. AI Performance in Knowledge Retention
- 19.4.4. AI and Support Tools

19.5. Facial and Emotional Recognition Technologies for Tracking Learner Engagement and Well-Being
- 19.5.1. Facial and Emotional Recognition Technologies on the Market Today
- 19.5.2. Uses
- 19.5.3. Applications
- 19.5.4. Margin of Error
- 19.5.5. Advantages and Disadvantages

19.6. Blockchain and AI in Education to Transform Educational Administration and Certification
- 19.6.1. What is the Blockchain
- 19.6.2. Blockchain and its Applications
- 19.6.3. Blockchain as a Transformative Element
- 19.6.4. Educational Administration and Blockchain

19.7. Emerging AI Tools to Enhance the Learning Experience
- 19.7.1. Current Projects
- 19.7.2. Commissioning
- 19.7.3. What the Future Holds
- 19.7.4. Transforming the Aulas 360

19.8. Strategies for Developing Pilots with Emerging AI
- 19.8.1. Advantages and Disadvantages
- 19.8.2. Strategies to be Developed
- 19.8.3. Key Points
- 19.8.4. Pilot Projects

19.9. Analysis of Successful AI Innovation Cases
- 19.9.1. Innovative Projects
- 19.9.2. Application of AI and its Benefits
- 19.9.3. AI in the Classroom, Successful Cases

19.10. Future of AI in Education
- 19.10.1. AI History in Education
- 19.10.2. Where is AI going in the Classroom?
- 19.10.3. Future Projects

Module 20. Ethics and legislation of Artificial Intelligence in Education

20.1. Identification and Ethical Treatment of Sensitive Data in the Educational Context
- 20.1.1. Principles and Practices for the Ethical Handling of Sensitive Data in Education
- 20.1.2. Challenges in Protecting the Privacy and Confidentiality of Student Data
- 20.1.3. Strategies for Ensuring Transparency and Informed Consent in Data Collection

20.2. Social and Cultural Impact of AI in Education
- 20.2.1. Analysis of the Effect of AI on Social and Cultural Dynamics in Educational Environments
- 20.2.2. Exploration of how AI can Perpetuate or Mitigate Social Biases and Inequalities
- 20.2.3. Assessing the Social Responsibility of Developers and Educators in the implementation of AI

20.3. AI Legislation and Data Policy in Educational Settings

20.3.1. Review of Current Data and Privacy Laws and Regulations Applicable to AI in Education
20.3.2. Impact of Data Policies on Educational Practice and Technological Innovation
20.3.3. Development of Institutional Policies for the Ethical Use of AI in Education
20.4. Assessing the Ethical Impact of AI
20.4.1. Methods for Assessing the Ethical Implications of AI Applications in Education
20.4.2. Challenges in Measuring the Social and Ethical Impact of AI
20.4.3. Creating Ethical Frameworks to Guide the Development and Use of AI in Education
20.5. Challenges and Opportunities of AI in Education
20.5.1. Identification of Major Ethical and Legal Challenges in the Use of AI in Education
20.5.2. Exploration of Opportunities for Improving Teaching and Learning through AI
20.5.3. Balancing Technological Innovation and Ethical Considerations in Education
20.6. Ethical Application of AI Solutions in the Educational Environment
20.6.1. Principles for Ethical Design and Deployment of AI Solutions in Education
20.6.2. Case Studies on Ethical Applications of AI in Different Educational Contexts
20.6.3. Strategies for Involving All Stakeholders in Ethical AI Decision-Making
20.7. AI, Cultural Diversity and Gender Equity
20.7.1. Analysis of the Impact of AI on the Promotion of Cultural Diversity and Gender Equity in Education
20.7.2. Strategies for Developing Inclusive and Diversity-Sensitive AI Systems
20.7.3. Assessment of how AI can Influence the Representation and Treatment of Different Cultural and Gender Groups
20.8. Ethical Considerations for the use of AI Tools in Education
20.8.1. Ethical Guidelines for the Development and Use of AI Tools in the Classroom
20.8.2. Discussion on the Balance between Automation and Human Intervention in Education
20.8.3. Analysis of Cases where the use of AI in Education has Raised Significant Ethical Issues
20.9. Impact of AI on Educational Accessibility
20.9.1. Exploration of how AI can Enhance or Limit Accessibility in Education
20.9.2. Analysis of AI Solutions designed to Increase Inclusion and Access to Education for All
20.9.3. Ethical Challenges in Implementing AI Technologies to Improve Accessibility
20.10. Global Case Studies in AI and Education
20.10.1. Analysis of International Case Studies on the Use of AI in Education
20.10.2. Comparison of Ethical and Legal Approaches in Different Educational Cultural Contexts
20.10.3. Lessons Learned and Best Practices from Global Cases in AI and Education

All this, in a 100% online education, without fixed schedules and with the syllabus available from the first day. Enroll now!"

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

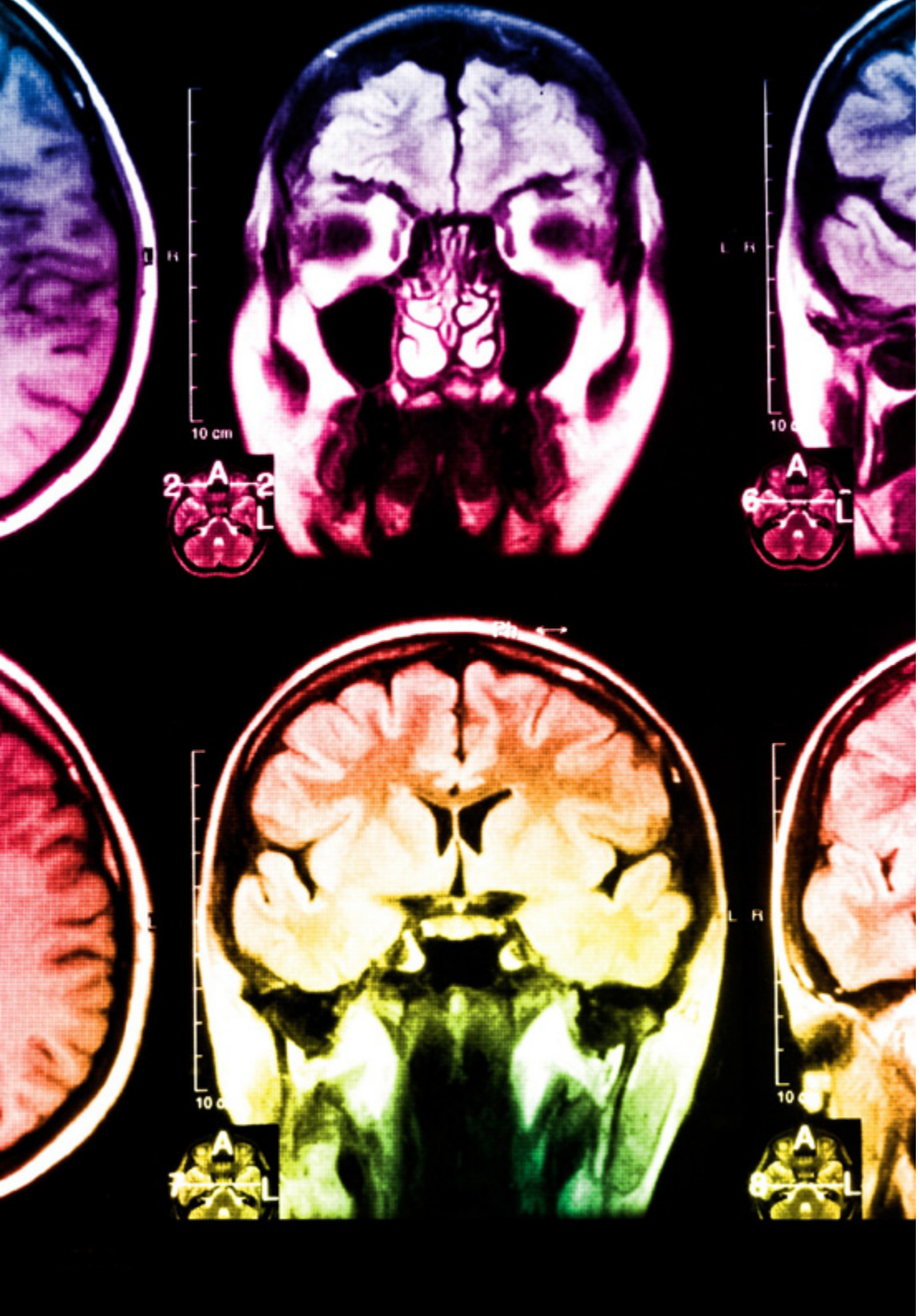
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

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.

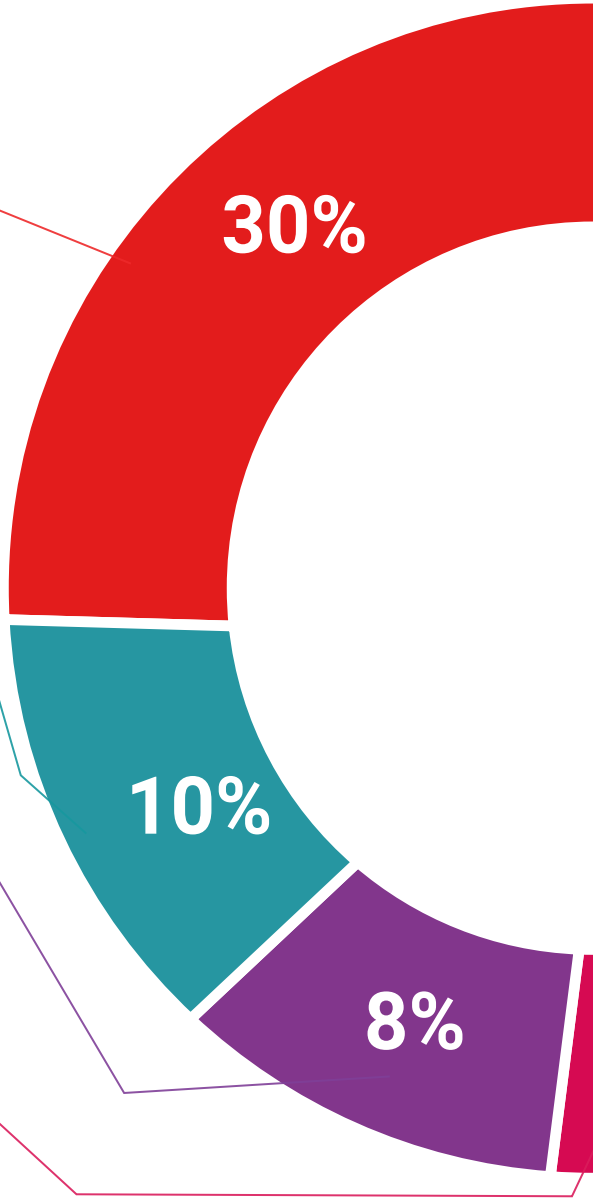
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

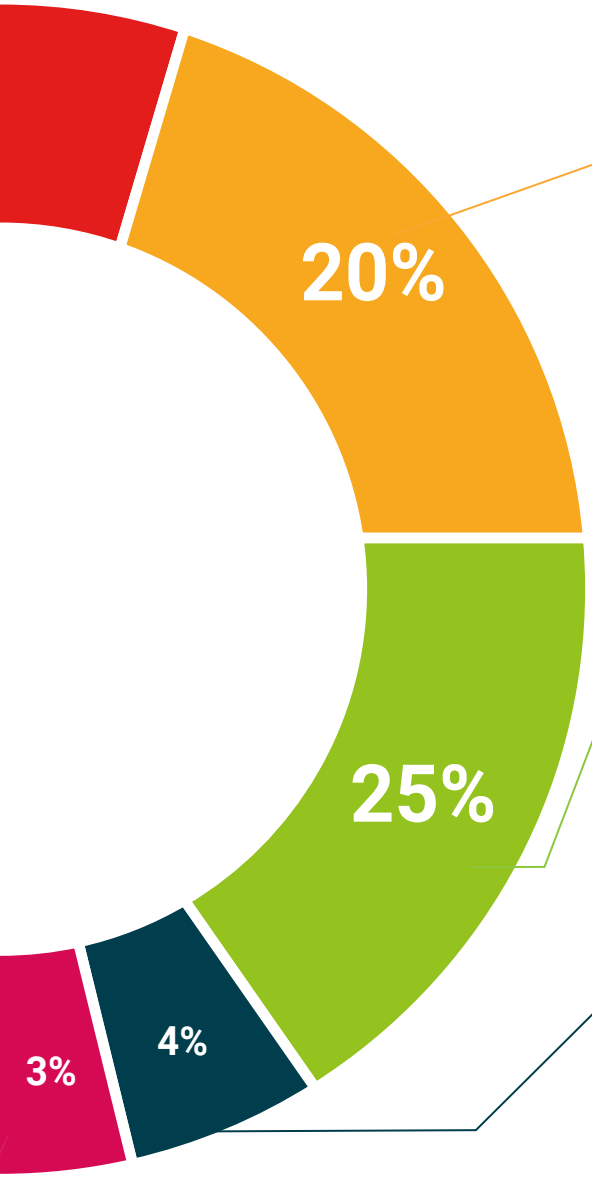
Practising Skills and Abilities

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 Education guarantees students, in addition to the most rigorous and up-to-date education, access to a Professional Master's Degree issued by TECH Global University.

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

This program will allow you to obtain your **Professional Master's Degree diploma in Artificial Intelligence in Education** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

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

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

Mr./Ms. _____, with identification document _____
has successfully passed and obtained the title of:

Professional Master's Degree in Artificial Intelligence in Education

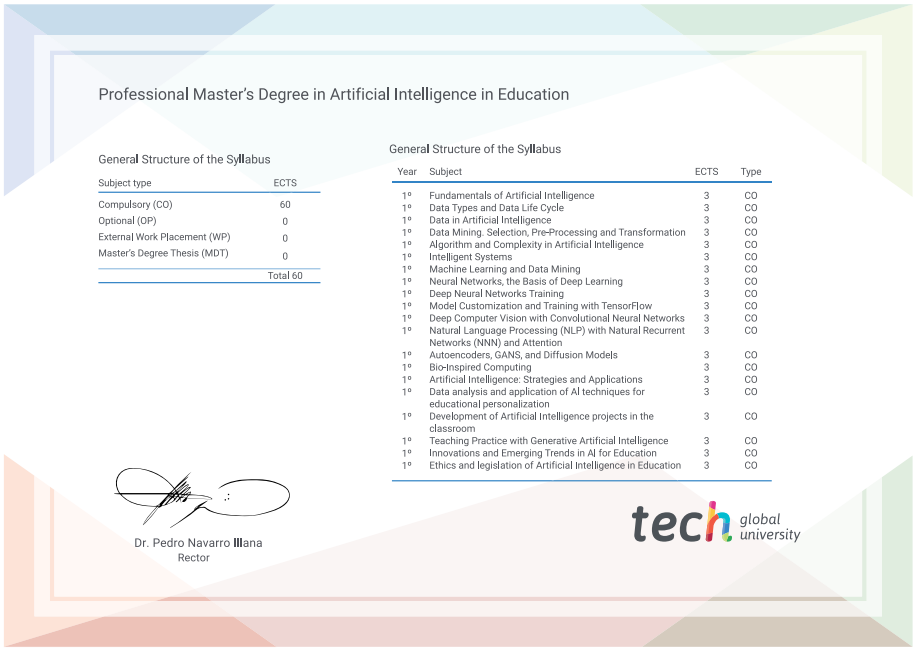
This is a program of 1,500 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

Unique TECH Code: AFWORD23S techtitute.com/certificates


Professional Master's Degree in Artificial Intelligence in Education

General Structure of the Syllabus

Subject type	ECTS
Compulsory (CO)	60
Optional (OP)	0
External Work Placement (WP)	0
Master's Degree Thesis (MDT)	0
	Total 60

General Structure of the Syllabus

Year	Subject	ECTS	Type
1º	Fundamentals of Artificial Intelligence	3	CO
1º	Data Types and Data Life Cycle	3	CO
1º	Data in Artificial Intelligence	3	CO
1º	Data Mining. Selection, Pre-Processing and Transformation	3	CO
1º	Algorithm and Complexity in Artificial Intelligence	3	CO
1º	Intelligent Systems	3	CO
1º	Machine Learning and Data Mining	3	CO
1º	Neural Networks, the Basis of Deep Learning	3	CO
1º	Deep Neural Networks Training	3	CO
1º	Model Customization and Training with TensorFlow	3	CO
1º	Deep Computer Vision with Convolutional Neural Networks	3	CO
1º	Natural Language Processing (NLP) with Natural Recurrent Networks (NNN) and Attention	3	CO
1º	Autoencoders, GANS, and Diffusion Models	3	CO
1º	Bio-Inspired Computing	3	CO
1º	Artificial Intelligence: Strategies and Applications	3	CO
1º	Data analysis and application of AI techniques for educational personalization	3	CO
1º	Development of Artificial Intelligence projects in the classroom	3	CO
1º	Teaching Practice with Generative Artificial Intelligence	3	CO
1º	Innovations and Emerging Trends in AI for Education	3	CO
1º	Ethics and legislation of Artificial Intelligence in Education	3	CO

Dr. Pedro Navarro Illana
Rector

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

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Professional Master's Degree
Artificial Intelligence in Education

- Modality: **online**
- Duration: **12 months**
- Certificate: **TECH Global University**
- Credits: **60 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Professional Master's Degree

Artificial Intelligence in Education

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