Master's Degree

Artificial Intelligence in Pharmacy

tech global university

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Master's Degree

Artificial Intelligence in Pharmacy

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

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

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01

Introduction

Artificial Intelligence is transforming various sectors, and Pharmacy is no exception. According to a report by the World Health Organization, the integration of AI into healthcare systems can reduce medical errors and increase the efficiency of drug treatments, thereby improving patient outcomes. Given that the impact of emerging technologies on healthcare and medication management has been profound, TECH has developed this comprehensive postgraduate course, which will give professionals the opportunity to be at the forefront of this transformation; equipping them with the knowledge and skills needed to lead in an ever-changing sector. All this, with a 100% online and innovative methodology.

Thanks to the highest quality online training, you will be able to transform the way in which the challenges of the pharmaceutical sector are addressed. You will improve patient outcomes and optimize resource management!"

The importance of Artificial Intelligence in Pharmacy lies in its ability to optimize processes, improve accuracy in decision-making and offer a more personalized approach to healthcare, which has a direct impact on patients' quality of life. In this sense, it has contributed to the analysis of large volumes of data, the automation of routine or administrative tasks and advances in pharmaceutical research.

This Master's Degree in Artificial Intelligence in Pharmacy from TECH will offer a unique opportunity to address the most salient aspects of this constantly evolving sector. Through a comprehensive approach, professionals will be prepared to lead the implementation of innovative technologies in the pharmaceutical sector. They will gain an in-depth understanding of how AI is transforming everything from personalizing treatments to optimizing processes and improving patient safety. They will also know how to use advanced AI tools to manage large volumes of data, detect drug-drug interactions, design drugs and automate administrative processes, enabling them to provide a more efficient and accurate service to patients.

From this, specialists will not only have acquired a set of highly demanded skills, but will also have taken a decisive step towards a promising future in the pharmaceutical field. In turn, they will be prepared to be agents of change in the integration of Artificial Intelligence in Pharmacy, improving health outcomes and the patient experience through the use of
of technology.

TECH has also thought about the excellence and flexibility of the students, therefore, offers this postgraduate course in 100% online mode, providing the convenience to be trained at the time and place that best fits their daily obligations. Additionally, this is complemented with the Relearning methodology, created to internalize the concepts in a more agile and productive way, without having to invest many hours of study.

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

- The development of practical cases presented by experts with a deep mastery of Artificial Intelligence in Pharmacy
- 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

Thanks to the Relearning system, you will be able to master the academic contents in a more natural and progressive way, preparing you efficiently to be part of the technological revolution in healthcare"

This is the time to take the next step and secure a prominent position in one of the most innovative and promising areas of healthcare. Enroll now and learn at your own pace thanks to the online modality!"

By learning about AI in Pharmacy, you will be able to personalize treatments, optimize processes and improve pharmaceutical care. You will boost your future with the best academic tools provided by TECH!

In this Master's Degree, you will receive training from renowned experts and access up-to-date content on the use of AI in medication management, drug design and more.

The program's teaching staff includes professionals from the sector who contribute their work experience to this specializing 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 course. For this purpose, students will be assisted by an innovative interactive video system created by renowned experts.

02

Syllabus

This academic pathway will provide advanced training for professionals seeking to be at the forefront of technological innovation. Throughout the program, they will discover how AI tools are transforming Pharmacy, from the personalization of treatments to the optimization of processes in pharmaceutical management. In addition, the agenda will address key areas such as the use of AI in drug design, automation of administrative processes and improving the safety of drug dispensing. In this way, you will become familiar with the latest technologies used in research and development in the industry.

You will take the next step in your professional career, acquiring the necessary skills to become a reference in the Pharmacy of the future. Get ready to transform the pharmaceutical sector with AI!"

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

1.3.2. 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

1.4.2. 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 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. Creating a Personality: Language, Expressions and Content
- 1.10.3. Trends of Artificial Intelligence
- 1.10.4. Reflections

Module 2. Data Types and Life Cycle

2.1. Statistics
- 2.1.1. Statistics: Descriptive Statistics, Statistical Inferences
- 2.1.2.1 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. Sorting by Merge (Merge_Sort)
- 5.3.6. Sorting Quickly (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 Matrices
- 7.4.2. Numerical Evaluation Matrices
- 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. Operations
- 8.2.1. Sum
- 8.2.2. Product
- 8.2.3. Transfer

8.3. Layers
- 8.3.1. Input Layer
- 8.3.2. Hidden Layer
- 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. 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. 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. Graph Optimization with TensorFlow Operations

10.5. Loading and Preprocessing Data with TensorFlow
- 10.5.1. Loading Data Sets with TensorFlow
- 10.5.2. Pre-Processing Data with TensorFlow
- 10.5.3. Using TensorFlow Tools for Data Manipulation

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

10.8. Keras Pre-Processing Layers
- 10.8.1. Using the Keras Pre-Processing API
- 10.8.2. Pre-Processing Pipelined Construction with Keras
- 10.8.3. Using the Keras Pre-Processing API for Model Training

10.9. The TensorFlow Datasets Project
- 10.9.1. Using TensorFlow Datasets for Data Loading
- 10.9.2. Data Pre-Processing 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. Model Training with TensorFlow
- 10.10.4. Using 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
- 11.10.1. Edge Detection
- 11.10.1. 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. 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 Pre-Processing
- 12.7.3. Training a Transformers Model for Vision

12.8. Hugging Face's Transformers Library
- 12.8.1. Using Hugging Face's Transformers Library
- 12.8.2. Hugging Face's Transformers Library Application
- 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 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 Studies
- 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 Healthcare Service
- 15.2.1. Implications of Artificial Intelligence in the Healthcare Sector. Opportunities and Challenges
- 15.2.2. Case Studies

15.3. Risks Related to the Use of Artificial Intelligence in Health Services
- 15.3.1. Potential Risks Related to the Use of Artificial Intelligence
- 15.3.2. Potential Future Developments / Uses of Artificial Intelligence

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

15.5. Industry
- 15.5.1. Implications of Artificial Intelligence in Industry. Opportunities and Challenges
- 15.5.2. Case Studies

15.6. Potential Risks Related to the Use of Artificial Intelligence in the Industry
- 15.6.1. Case Studies
- 15.6.2. Potential Risks Related to the Use of Artificial Intelligence
- 15.6.3. Potential Future Developments / Uses of Artificial Intelligence

15.7. Public Administration
- 15.7.1. Implications of Artificial Intelligence in Public Administration. Opportunities and Challenges
- 15.7.2. Case Studies
- 15.7.3. Potential Risks Related to the Use of Artificial Intelligence
- 15.7.4. Potential Future Developments / Uses of Artificial Intelligence

15.8. Educational
- 15.8.1. Implications of Artificial Intelligence in Education. Opportunities and Challenges
- 15.8.2. Case Studies
- 15.8.3. Potential Risks Related to the Use of Artificial Intelligence
- 15.8.4. Potential Future Developments / Uses of Artificial Intelligence

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

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

Module 16. Management and Analysis of Biomedical Information and Scientific Literature with Artificial Intelligence

16.1. Introduction to the Use of AI for Biomedical Information
- 16.1.1. Importance of Biomedical Information in Pharmacy
- 16.1.2. Challenges in the Management and Analysis of the Scientific Literature
- 16.1.3. Role of AI in the Management of Large Volumes of Scientific Data
- 16.1.4. Examples of AI Tools such as Semantic Scholar in Biomedical Research

16.2. Biomedical Information Retrieval with AI
- 16.2.1. Advanced Searching Techniques in Scientific Databases
- 16.2.2. AI Algorithms to Improve Search Accuracy and Relevance
- 16.2.3. Personalization of Results through Machine Learning
- 16.2.4. Applications such as PubMed AI for Efficient Information Retrieval

16.3. Natural Language Processing (NLP) in Scientific Texts
- 16.3.1. NLP Applications in the Analysis of Biomedical Literature
- 16.3.2. Automatic Extraction of Key Information from Scientific Articles
- 16.3.3. Automatic Summarization and Generation of Structured Abstracts
- 16.3.4. Tools such as SciBERT for Scientific Text Processing

16.4. Biomedical Text Mining
- 16.4.1. Basic Concepts and Techniques in Text Mining
- 16.4.2. Identification of Trends and Patterns in Scientific Publications
- 16.4.3. Extraction of Relationships between Biomedical Entities
- 16.4.4. Examples such as MEDLINE and Text Mining Library for Text Mining

16.5. Ontologies and Semantic Annotations in Biomedicine
- 16.5.1. The Use and Creation of Ontologies in the Health Sciences
- 16.5.2. Semantic Annotation of Scientific Documents
- 16.5.3. AI for Semantic Enrichment and Contextual Searching
- 16.5.4. Tools such as BioPortal and UMLS for Ontological Management

16.6. Scientific Literature Recommender Systems
- 16.6.1. Recommendation Algorithms in Scientific Platforms
- 16.6.2. Personalization of Content for Researchers and Practitioners
- 16.6.3. AI in Predicting Future Relevance and Citations
- 16.6.4. Applications such as Mendeley Suggest and ResearchGate

16.7. Visualization of Biomedical Data and Knowledge
- 16.7.1. Visualization Techniques for Complex Biomedical Data
- 16.7.2. Knowledge Maps and Research Networks
- 16.7.3. AI Tools to Visualize Relationships and Trends
- 16.7.4. Examples such as VOSviewer and Cytoscape in Scientific Visualization

16.8. AI-Assisted Knowledge Discovery
- 16.8.1. Identification of New Hypotheses from Existing Data
- 16.8.2. Integration of Multidisciplinary Data with AI
- 16.8.3. Prediction of Unknown Drug Interactions and Pharmacological Effects
- 16.8.4. Cases such as IBM Watson Discovery and Elsevier's Entellect

16.9. Big Data Management in Biomedical Research
- 16.9.1. Challenges of Big Data in Biomedical Research
- 16.9.2. Efficient Storage and Processing of Massive Data
- 16.9.3. AI for Genomic and Proteomic Data Analysis
- 16.9.4. Tools such as Apache Hadoop and Spark in Biomedicine

16.10. Challenges and Future Perspectives in NLP for Scientific Literature
- 16.10.1. Specific NLP Challenges in Scientific and Biomedical Data
- 16.10.2. Limitations in Search and Analysis Automation
- 16.10.3. Recent Advances in NLP for Biomedical Sciences (BioGPT, BioBERT)
- 16.10.4. Future Applications of AI in Scientific Research and Publication

Module 17. Development of New Drugs with Artificial Intelligence

17.1. Identification of Therapeutic Targets with AI
- 17.1.1. Concept of Therapeutic Targets and Their Importance in Pharmacology
- 17.1.2. AI Algorithms for the Identification of Potential Targets
- 17.1.3. Neural Network Models in Therapeutic Target Prediction
- 17.1.4. Examples such as Insilico Medicine for Target Discovery

17.2. AI-Assisted Drug Design
- 17.2.1. AI-Assisted Molecular Design Techniques
- 17.2.2. Computational Modeling in Drug Design
- 17.2.3. Molecule Generation with Deep Learning
- 17.2.4. Applications such as Atomwise in Drug Discovery

17.3. Pharmaceutical Compound Optimization
- 17.3.1. Optimization Processes in Drug Development
- 17.3.2. AI Techniques for Improving Composite Properties
- 17.3.3. Molecular Simulation Tools in Drug Optimization
- 17.3.4. Examples of Platforms such as Schrodinger for Optimization

17.4. Simulation of Drug-Receptor Interactions
- 17.4.1. Importance of Drug-Receptor Interactions
- 17.4.2. Molecular Simulation Techniques in Pharmacology
- 17.4.3. AI Algorithms for Predicting Molecular Interactions
- 17.4.4. Tools such as Cresset for Interaction Simulation

17.5. Generation of Bioactive Compound Libraries
- 17.5.1. Creation of Compound Libraries in Drug Development
- 17.5.2. AI in the Generation and Classification of Compounds
- 17.5.3. Virtual Screening of Bioactive Compounds
- 17.5.4. Example of Tools such as Chemoinformatics from ChemAxon

17.6. Preclinical Hypothesis Validation with AI
- 17.6.1. Preclinical Stage Hypothesis Validation
- 17.6.2. AI Models for Testing in Preclinical Experimentation
- 17.6.3. Predictive Analytical Tools for Preclinical Analysis
- 17.6.4. Case of BenevolentAI in Preclinical Research

17.7. Prediction of Side Effects and Toxicity
- 17.7.1. Assessment of Side Effects by AI
- 17.7.2. Toxicity Models in Early Stages of Development
- 17.7.3. AI for Drug Safety and Toxicity Analysis
- 17.7.4. DeepChem Applications for Composite Toxicity

17.8. Dose and Formulation Optimization
- 17.8.1. Principles of Formulation and Dose Optimization
- 17.8.2. AI in the Determination of Effective and Safe Dose
- 17.8.3. Predictive Models for Formulation Optimization
- 17.8.4. Genentech Example for Dose and Formulation Studies

17.9. In Silico Tests in Early Development Phases
- 17.9.1. Concept of in Silico Testing in Pharmaceutical Development
- 17.9.2. Algorithms for Simulation and Virtual Testing
- 17.9.3. AI in In Vitro and In Vivo Test Reduction
- 17.9.4. Example of Simulations Plus in In Silico Prediction

17.10. AI-Assisted Clinical Studies
- 17.10.1. AI-Assisted Clinical Study Design
- 17.10.2. Optimization of the Recruitment Phase in Clinical Trials
- 17.10.3. Response Modeling and Follow-Up in Clinical Trials
- 17.10.4. Cases such as Medidata Solutions in Clinical Trial Optimization

Module 18. Artificial Intelligence in Diagnostics and Personalized Therapies

18.1. Early Diagnosis of Diseases
- 18.1.1. Importance of Early Diagnosis in the Treatment of Diseases
- 18.1.2. AI Algorithms for Early Detection of Pathology
- 18.1.3. AI for Predictive Analysis of Risk Factors
- 18.1.4. Examples such as PathAI for Automated Diagnosis

18.2. AI-Based Personalized Therapies
- 18.2.1. Introduction to Personalized Medicine and Its Relevance
- 18.2.2. AI for Personalization of Treatments according to Patient Profile
- 18.2.3. Predictive Models for Personalized Dose Adjustment
- 18.2.4. Applications such as Tempus in Personalized Oncology

18.3. Biomarker Detection Using AI
- 18.3.1. Concept and Types of Biomarkers in Medicine
- 18.3.2. AI Algorithms for the Identification of Key Biomarkers
- 18.3.3. Importance of Biomarkers in Diagnosis and Treatment
- 18.3.4. Tools such as Freenome for Biomarker Detection

18.4. Genomic Medicine and Pharmacogenomics
- 18.4.1. Genomics and Pharmacogenomics for Personalization of Therapies
- 18.4.2. AI Applications in the Analysis of Genetic Profiling
- 18.4.3. AI in the Study of Genetic Variations for Personalized Medicine
- 18.4.4. Cases such as 23andMe in Personalized Genetic Analysis

18.5. AI in Immunotherapy and Oncology
- 18.5.1. Introduction to Immunotherapy and Its Impact on Cancer Treatment
- 18.5.2. Application of AI to Personalize Immune Therapies
- 18.5.3. AI Models for Optimizing Efficacy of Immunotherapies
- 18.5.4. Examples such as GNS Healthcare for Immunotherapy in Oncology

18.6. Personalized Pharmacological Counseling
- 18.6.1. Importance of Personalized Pharmacological Counseling
- 18.6.2. AI for Treatment Recommendations according to Specific Conditions
- 18.6.3. AI Models to Optimize Drug Selection
- 18.6.4. Example of IBM Watson for Oncology in Treatment Recommendations

18.7. Treatment Response Prediction
- 18.7.1. AI Techniques for Predicting Responses to Different Treatments
- 18.7.2. Predictive Models of Efficacy and Safety of Treatments
- 18.7.3. AI Algorithms for Treatment Personalization
- 18.7.4. Tools such as Foundation Medicine for Analysis of Treatment Response

18.8. Development of Algorithms for Specific Therapies
- 18.8.1. Principles of Algorithm Development for Targeted Therapies
- 18.8.2. AI for Identifying and Developing Targeted Therapies
- 18.8.3. Algorithms Personalized according to Disease Type
- 18.8.4. Applications such as Owkin in Federated Learning for Oncology

18.9. Remote Patient Monitoring
- 18.9.1. Importance of Remote Monitoring in Chronic Patients
- 18.9.2. AI for Monitoring Parameters and Vital Signs Remotely
- 18.9.3. Predictive Models to Anticipate Patient Complications
- 18.9.4. Tools such as Biofourmis for Remote Monitoring

18.10. AI in Portable Diagnostic Devices
- 18.10.1. Impact of Portable Devices on Health Diagnosis
- 18.10.2. AI Algorithms in Portable Devices Data Analysis
- 18.10.3. AI for Real-Time Detection of Health Conditions
- 18.10.4. Examples such as Butterfly iQ, AI-Assisted Portable Ultrasound

Module 19. Artificial Intelligence in Pharmaceutical Production and Distribution

19.1. Optimization of Manufacturing Processes with AI
- 19.1.1. Introduction to Pharmaceutical Manufacturing and Current Challenges
- 19.1.2. AI Algorithms to Improve Production Efficiency
- 19.1.3. Predictive Models to Reduce Manufacturing Times
- 19.1.4. Siemens Pharma Example for Process Automation

19.2. Quality Control in Drug Manufacturing
- 19.2.1. Importance of Quality Control in the Pharmaceutical Industry
- 19.2.2. AI Algorithms for Inspection and Defect Detection
- 19.2.3. AI to Ensure Consistency in Product Quality
- 19.2.4. Applications such as Aizon for Quality Analysis in Production

19.3. AI for Inventory and Distribution Management
- 19.3.1. Introduction to Inventory Management in Pharmaceuticals
- 19.3.2. AI Models for Inventory and Demand Optimization
- 19.3.3. Demand Forecasting Using Data Analytics
- 19.3.4. Tools such as SAP Integrated Business Planning

19.4. Predictive Maintenance in Production Plants
- 19.4.1. Concept of Predictive Maintenance and Its Benefits
- 19.4.2. AI Algorithms to Anticipate Machinery Failures
- 19.4.3. AI to Optimize Maintenance Cycles
- 19.4.4. Examples of Digital GE in Predictive Maintenance

19.5. Drug Counterfeit Detection
- 19.5.1. Impact of Drug Counterfeiting on Public Health
- 19.5.2. AI for Authentication of Pharmaceutical Products
- 19.5.3. Computer Vision Algorithms for Counterfeit Detection
- 19.5.4. Tools such as TruTag for Authenticity Verification

19.6. Automation in Packaging and Labeling
- 19.6.1. Packaging Processes in the Pharmaceutical Industry
- 19.6.2. AI for Optimization of Automated Labeling and Packaging
- 19.6.3. Computer Vision Techniques in Label Control
- 19.6.4. Rockwell Automation Applications in Packaging

19.7. Logistics Optimization and Safe Distribution of Pharmaceuticals
- 19.7.1. Drug Logistics and Its Impact on Availability
- 19.7.2. AI Algorithms for Optimization of Distribution Routes
- 19.7.3. AI for Tracking Deliveries and Transport Conditions
- 19.7.4. Examples such as UPS Healthcare for Secure Distribution

19.8. AI for Cold Chain Improvement in Distribution
- 19.8.1. Importance of the Cold Chain for Sensitive Medicines
- 19.8.2. Predictive Models for Maintaining Optimal Temperatures
- 19.8.3. Real-Time Monitoring Algorithms
- 19.8.4. Tools such as Carrier Sensitech for Cold Chain Control

19.9. Automation of Stock Management in Pharmacies
- 19.9.1. Introduction to Stock Management in Pharmacies
- 19.9.2. AI Algorithms for Optimizing Product Replenishment
- 19.9.3. AI Systems for Demand and Consumption Forecasting
- 19.9.4. Applications such as Omnicell for Automated Inventory Management

19.10. Delivery Route Optimization with AI
- 19.10.1. Delivery Challenges in the Pharmaceutical Industry
- 19.10.2. Route Optimization Algorithms for Efficient Delivery
- 19.10.3. AI for Real-Time Dynamic Route Planning
- 19.10.4. Example of DHL SmartSensor for Drug Logistics

Module 20. Regulation, Safety and Ethics of Artificial Intelligence in Pharmaceuticals

20.1. AI Regulations for Pharmaceutical Products
- 20.1.1. Introduction to Regulatory Standards in AI Applied to Health Care
- 20.1.2. Main Regulatory Agencies (FDA, EMA) and Their Role in AI
- 20.1.3. Standards for the Approval of AI Technologies in Pharmaceuticals
- 20.1.4. Examples of AI Software Certification for Healthcare Products

20.2. Healthcare AI Regulatory Compliance
- 20.2.1. Key Concepts in AI Regulatory Compliance
- 20.2.2. Legal Requirements for the Development of AI in Pharmacy
- 20.2.3. AI Audits to Ensure Regulatory Compliance
- 20.2.4. Examples of AI Compliance under the European MDR

20.3. Data Security in AI Applications
- 20.3.1. Introduction to Data Security in the Healthcare Environment
- 20.3.2. Security Protocols for the Storage of Medical Data
- 20.3.3. AI for Threat Detection and Data Protection
- 20.3.4. Microsoft Azure Tools for Secure Data Management

20.4. Privacy and Ethics in AI Applications
- 20.4.1. Ethical Concepts in Patient Data Management
- 20.4.2. Responsible AI and Privacy Principles in Pharmacy
- 20.4.3. Tools for Anonymization of Sensitive Data
- 20.4.4. Examples of Privacy in Google Health

20.5. Transparency of Algorithms in AI for Health
- 20.5.1. Importance of Transparency in AI Applied to Health
- 20.5.2. Explainability of Algorithms and Their Interpretation in Healthcare
- 20.5.3. Methods to Ensure Transparency in AI Models
- 20.5.4. Application of IBM Explainable AI for Healthcare

20.6. Avoiding Biases in AI Systems
- 20.6.1. Identification of Biases in Medical and Pharmaceutical Data
- 20.6.2. Techniques for Minimizing Bias in AI Algorithms

20.6.3. Examples of Common Biases in AI for Pharmaceuticals
20.6.4. Use of Google's Fairness Toolkit to Reduce Biases
20.7. Auditing AI Systems in Pharmacy
20.7.1. Concept and Objectives of AI Auditing in Health Care
20.7.2. Audit Methods to Validate AI Systems
20.7.3. Audit Criteria to Ensure Quality and Ethics
20.7.4. Example of an AI Audit with TÜV SÜD
20.8. Informed Consent in AI Health Data
20.8.1. Importance of Consent in the Use of Personal Data
20.8.2. AI Tools for Informed Consent Management
20.8.3. AI in Obtaining and Secure Storage of Consents
20.8.4. Example of Consent Management in Epic Systems
20.9. AI for Pharmacy Fraud Detection
20.9.1. Impact of Fraud in the Pharmaceutical Industry
20.9.2. AI Algorithms for Identification of Fraudulent Activities
20.9.3. AI in the Prevention of Counterfeiting and Illegal Sale of Pharmaceuticals
20.9.4. Example of SAS Fraud Framework for Healthcare
20.10. Responsibility and Accountability in AI
20.10.1. Concept of Accountability in AI Applications
20.10.2. Definition of Roles and Responsibilities in AI for Health Care
20.10.3. AI for Tracking Decisions and Actions in Healthcare Processes
20.10.4. Initiatives such as Partnership on AI for Accountability Guidelines

With this program you will not only boost your theoretical knowledge, but also equip yourself with the practical tools to innovate, lead and transform the future of Pharmacy"

03

Teaching Objectives

The main objective of this postgraduate program is to train professionals to lead the integration of the most advanced technology in their field. Therefore, the program will provide students with the knowledge and skills necessary to transform pharmaceutical care, optimizing processes, improving the safety of treatments and personalizing the patient's experience. They will also master the use of AI tools to analyze large volumes of pharmacological and clinical data. Finally, they will become experts in identifying drug-drug interactions and designing innovative solutions that positively impact patient health.

The technological revolution is already here, and TECH will prepare you to be part of it! Join this innovative study and take your skills as a pharmacist to the next level"

General Objectives

- Analyze and apply artificial intelligence tools in pharmaceutical processes
- Optimize clinical and pharmacological data management through advanced technologies
- Identify drug-drug interactions through predictive AI models
- Design innovative strategies for the development of new drugs
- Leading digital transformation projects in the pharmaceutical field
- Implement technological solutions that improve safety in the dispensing of medicines
- Understand global trends in the integration of AI in healthcare systems
- Develop leadership skills in multidisciplinary teams focused on technological innovation

Specific Objectives

Module 1. Fundamentals of Artificial Intelligence

- Analyze the historical evolution of Artificial Intelligence, from its beginnings to its current state, identifying key milestones and developments
- Understand the functioning of neural networks and their application in learning models in Artificial Intelligence
- Master the principles and applications of genetic algorithms, analyzing their usefulness in solving complex problems
- Assess the importance of thesauri, vocabularies and taxonomies in structuring and processing data for Artificial Intelligence systems

Module 2. Data Types and 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
- Manage data collection processes, including methodology, tools and collection channels
- Assess 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
- Analyze the structure and characteristics of datasets, understanding their importance in the preparation and use of data for Artificial Intelligence models
- Manage supervised and unsupervised models, including methods and classification

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

Module 10. Model Customization and Training with TensorFlow

- Master the fundamentals of TensorFlow and its integration with NumPy for efficient data management and calculations
- Customize models and training algorithms using the advanced capabilities of TensorFlow
- 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

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
- Address 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 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
- Delve into 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
- Delve and apply convolutional autoencoders for efficient visual data representations
- 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 social adaptation algorithms as a key approach in bio-inspired computing
- Examine models of evolutionary computation in the context of optimization
- 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 Artificial Intelligence in the health care setting
- Assess the potential risks associated with the use of Artificial Intelligence 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 Artificial Intelligence technologies in the education sector
- Apply artificial intelligence techniques in forestry and agriculture to improve productivity

Module 16. Management and Analysis of Biomedical Information and Scientific Literature with Artificial Intelligence

- Master natural language processing (NLP) tools to analyze large volumes of scientific and biomedical literature
- Implement text-mining techniques to identify key trends and relationships in scientific publications
- Use advanced information retrieval systems such as PubMed AI to optimize biomedical database searches
- Apply ontologies and semantic annotations to improve understanding and organization of biomedical data

Module 17. Development of New Drugs with Artificial Intelligence

- Identify therapeutic targets using artificial intelligence algorithms and computational modeling
- Design and optimize molecules using deep learning and molecular simulation techniques
- Perform in silico testing to evaluate drug-receptor interactions, toxicity and efficacy at preclinical stages
- Integrate AI in virtual screening and generation of bioactive compound libraries

Module 18. Artificial Intelligence in Diagnostics and Personalized Therapies

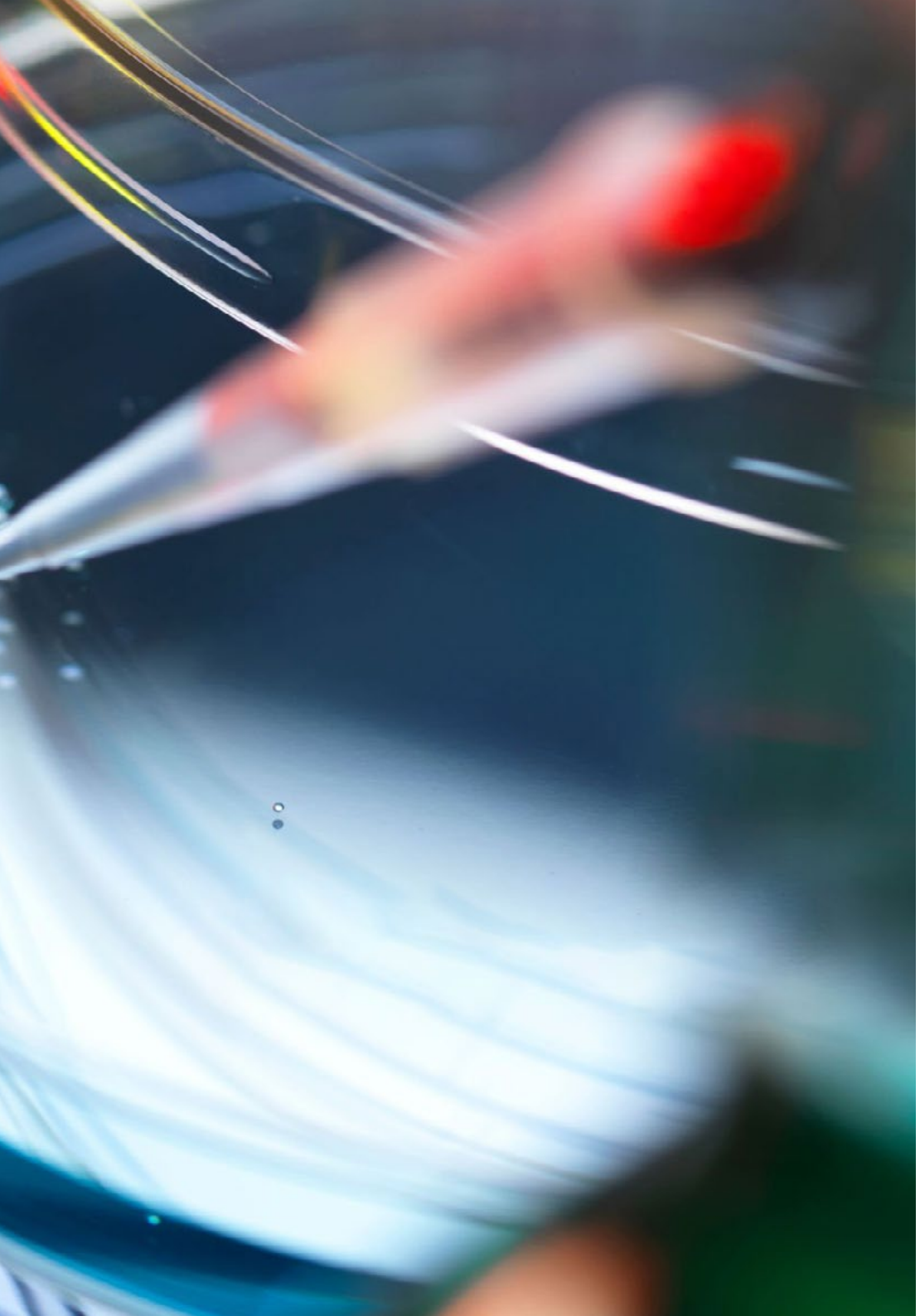
- Apply AI for early diagnosis of diseases and identification of key biomarkers
- Design personalized therapies based on genomic and pharmacogenomic profiling
- Use predictive models to tailor treatments and personalize drug doses
- Implement advanced algorithms to optimize immunological therapies and oncological treatments

Module 19. Artificial Intelligence in Pharmaceutical Production and Distribution

- Optimize manufacturing processes through artificial intelligence algorithms, improving efficiency and reducing costs
- Implement automated systems for quality control, packaging and labeling in the pharmaceutical industry
- Manage inventories and optimize distribution logistics through AI, ensuring the safety and traceability of drugs
- Detect counterfeits and guarantee the authenticity of pharmaceutical products using AI tools

Module 20. Regulation, Safety and Ethics of Artificial Intelligence in Pharmaceuticals

- Understand the international regulations governing the implementation of AI in the pharmaceutical sector
- Apply protocols to ensure data privacy and security in AI applications
- Identify and mitigate biases in artificial intelligence systems, ensuring fairness and transparency
- Manage ethical accountability and explainability of algorithms in clinical and pharmaceutical settings



TECH will provide you with the professional and personal growth you need to move towards a better working future. Join now for a unique academic experience!"

04

Career Opportunities

This Master's Degree opens the door to a wide range of opportunities in a sector that is revolutionizing healthcare. With the growing demand for experts capable of integrating technology into the pharmaceutical field, graduates will position themselves as leaders in a highly competitive labor market. In fact, among the most outstanding opportunities are roles in drug research and development departments, where they will be able to apply predictive models to accelerate the design of innovative drugs. In addition, they will be able to assume strategic functions in the management of large volumes of pharmacological data to optimize processes.

The future of Pharmacy is in technology! By opting for this program, you will acquire a competitive advantage to stand out in a constantly evolving environment. Make the future your present!"

Graduate Profile

Graduates will distinguish themselves as visionary professionals, capable of integrating advanced technological solutions in the pharmaceutical field. In this way, this highly qualified expert will be prepared to face the current challenges of the sector and lead the digital transformation in pharmacy. Thanks to their technical skills in the use of artificial intelligence tools, they will be able to design innovative strategies to optimize processes, personalize treatments and improve the management of clinical and pharmacological data. Moreover, you will possess a global understanding of AI applications in healthcare systems, which will enable you to implement effective solutions in different international contexts.

Are you ready to excel in a dynamic industry? Thanks to this program, you will provide solutions that make a difference, positioning yourself as a leader in the Pharmacy of the future.

- **Critical Thinking and Problem Solving:** Analyze and solve complex challenges related to the integration of Artificial Intelligence in pharmaceutical processes
- **Effective Communication Skills:** Convey innovative ideas and leading multidisciplinary teams in technological and pharmaceutical environments
- **Time Management and Autonomous Learning:** Manage changing environments and keep up to date on emerging technologies
- **Teamwork Skills:** Collaborate with professionals from different areas in the implementation of advanced technological solutions

After completing the program, you will be able to use your knowledge and skills in the following positions:

1. **Pharmaceutical Data Analyst:** Specialist in the management and analysis of large volumes of clinical and pharmacological data using Artificial Intelligence tools.
   Responsibilities: Extract key information from pharmaceutical databases and design strategies for treatment optimization.
2. **Consultant in Pharmaceutical Digital Transformation:** Expert advisor in the implementation of innovative technological solutions in the pharmaceutical sector.
   Responsibilities: Design digitization projects and train teams in the use of Artificial Intelligence tools.
3. **Head of Innovation in Pharmacy:** Leader in the development and implementation of technological strategies to improve pharmaceutical processes.
   Responsibilities: Identify opportunities for innovation and lead projects that transform pharmaceutical care.
4. **Director of Technological Projects in Pharmacy:** In charge of planning and managing technological initiatives to optimize processes in pharmacies and laboratories.
   Responsibilities: Coordinate multidisciplinary teams and supervise the execution of technological projects.
5. **AI-Assisted Drug Development Specialist:** Professional dedicated to the design and optimization of new drugs using Artificial Intelligence algorithms.
   Responsibilities: Use predictive models to accelerate drug development and improve drug efficacy.
6. **Innovation Manager in Pharmaceutical Biotechnology:** Expert in leading Artificial Intelligence initiatives in biotech companies in the pharmaceutical sector.
   Responsibilities: Analyze biotech processes and propose AI-based solutions to optimize results.
7. **Coordinator of Intelligent Systems in Hospitals:** Responsible for integrating intelligent technologies in the pharmaceutical management of hospital centers.
   Responsibilities: Implement AI systems to improve drug logistics and patient safety.
8. **Researcher in AI and Pharmaceutical Health:** Professional focused on the development of studies that combine Artificial Intelligence with advances in Pharmacy.
   Responsibilities: Design research on new applications of AI in the pharmaceutical sector and analyze their results.
9. **Director of Digital Pharmaceutical Operations:** Manager of digitalization and automation of processes in pharmacy chains and laboratories.
   Responsibilities: Oversee the implementation of technology to optimize operations and reduce costs.
10. **Specialist in Personalization of Pharmaceutical Treatments:** In charge of designing personalized therapies through data analysis and the use of intelligent algorithms.
    Responsibilities: Apply AI models to tailor treatments to specific patient needs.

Academic and Research Opportunities

In addition to all the jobs you will be qualified for by studying this TECH Master's Degree, you will also be able to pursue a solid academic and research career. After completing this university program, you will be ready to continue your studies associated with this field of knowledge and thus progressively achieve other scientific merits.

?

Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.

TECH will prepare you to face new challenges in uncertain environments and achieve success in your career"

The student: the priority of all TECH programs

In TECH's study methodology, the student is the main protagonist.
The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

"At TECH you will NOT have live classes (which you might not be able to attend)"

The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

> *TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want"*

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.

Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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

A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

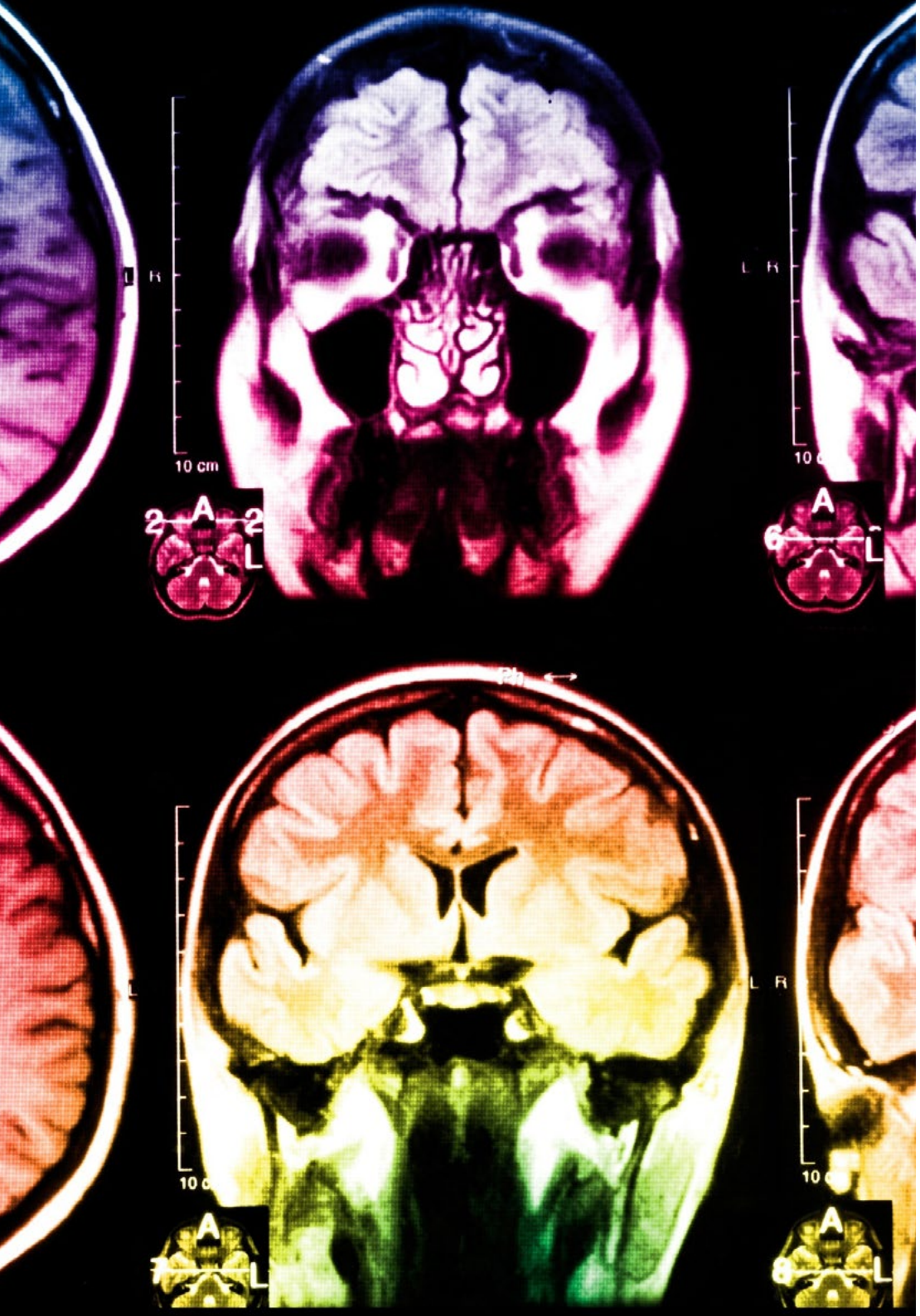
In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.

The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule"

The effectiveness of the method is justified by four fundamental achievements:

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.



The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the quality of teaching, quality of materials, course structure and objectives is excellent. Not surprisingly, the institution became the best rated university by its students on the Global Score review platform, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.

As such, the best educational materials, thoroughly prepared, will be available in this program:

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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.

Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.

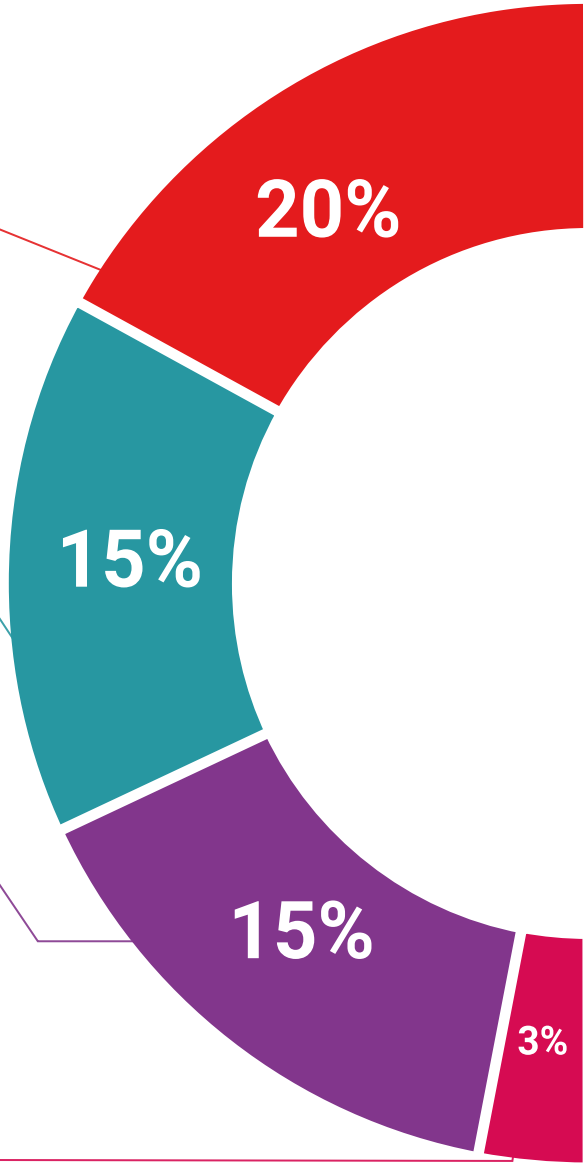
Interactive Summaries

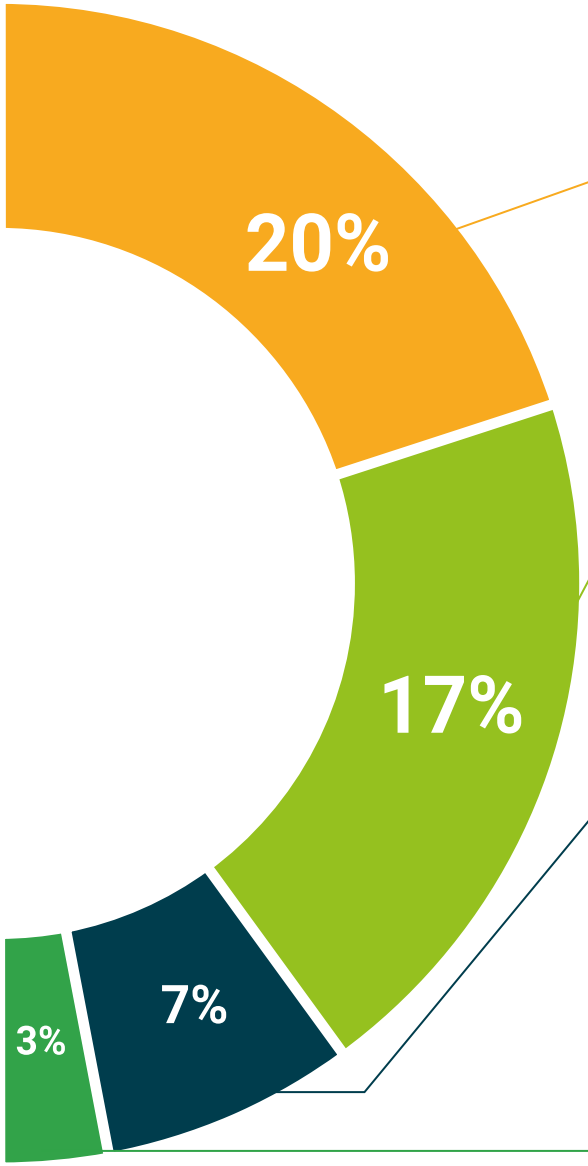
We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

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

Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.

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 for future difficult decisions.

Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.

06

Teaching Staff

This Master's Degree is distinguished by a teaching staff made up of internationally renowned professionals in the field of pharmacology, artificial intelligence and technology applied to the health sector. Each one is highly qualified and has extensive experience in both academia and industry, which guarantees practical, up-to-date and cutting-edge training. Mentors not only have a solid theoretical background, but also bring real cases and knowledge directly applied to the latest market trends.

TECH's highly qualified teachers not only ensure excellent training, but also an enriching academic experience"

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

Professors

Mr. Popescu Radu, Daniel Vasile

- Independent Specialist in Pharmacology, Nutrition and Dietetics
- Freelance Producer of Teaching and Scientific Content
- Nutritionist and Community Dietitian
- Community Pharmacist
- Researcher
- Master's Degree in Nutrition and Health at the Open University of Catalonia
- Master's Degree in Psychopharmacology from the University of Valencia
- Pharmacist from the Complutense University of Madrid
- Nutritionist-Dietitian by the European University Miguel de Cervantes

Mr. Del Rey Sánchez, Alejandro

- Responsible for implementation of programs to improve tactical care in emergencies
- Degree in Industrial Organization Engineering
- Certification in Big Data and Business Analytics
- Certification in Microsoft Excel Advanced, VBA, KPI and DAX
- Certification in CIS Telecommunication and Information Systems

Ms. Del Rey Sánchez, Cristina

- Talent Management Administrative Officer at Securitas Seguridad España, S.L.
- Extracurricular Activities Center Coordinator
- Support classes and pedagogical interventions with Primary and Secondary Education students
- Postgraduate in Development, Delivery and Tutoring of e-Learning Training Actions
- Postgraduate in Early Childhood Care
- Degree in Pedagogy from the Complutense University of Madrid

Mr. Martín-Palomino Sahagún, Fernando

- Chief Technology Officer and R+D+i Director at AURA Diagnostics (medTech)
- Business Development at SARLIN
- Chief Operating Officer at Alliance Diagnostics
- Director of Innovation at Alliance Medical
- Chief Information Officer at Alliance Medical
- Field Engineer & Project Management in Digital Radiology at Kodak
- MBA from the Polytechnic University of Madrid
- Executive Master in Marketing and Sales at ESADE
- Telecommunications Engineer from the University Alfonso X El Sabio

Dr. Carrasco González, Ramón Alberto

- Head of Business Intelligence (Marketing) at the Caja General de Ahorros de Granada and Banco Mare Nostrum
- Head of Information Systems (Data Warehousing and Business Intelligence) at Caja General de Ahorros de Granada and Banco Mare Nostrum.
- Specialist and Research in Computer Science and Artificial Intelligence
- Doctor in Artificial Intelligence by the University of Granada
- Higher Engineering Degree in Computer Science from the University of Granada

07

Certificate

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

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

This private qualification will allow you to obtain a **Master's Degree diploma in Artificial Intelligence in Pharmacy** 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** private qualification 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: **Master's Degree in Artificial Intelligence in Pharmacy**

Modality: **online**

Duration: **12 months**

Accreditation: **60 ECTS**


tech global university

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

Master's Degree in Artificial Intelligence in Pharmacy

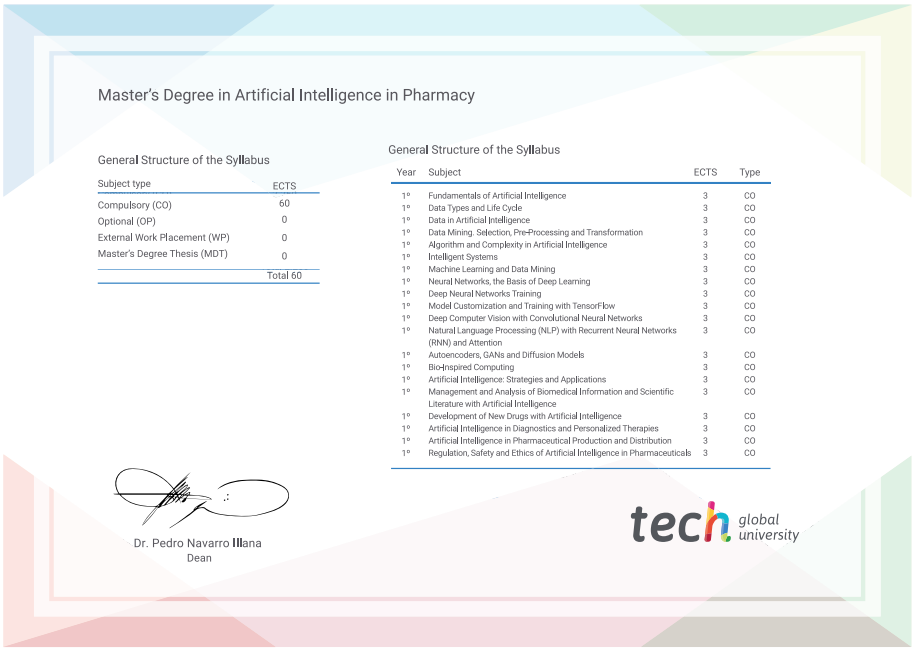
This is a private qualification of 1,800 hours of duration equivalent to 60 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

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
Dean

This qualification must always be accompanied by the university degree issued by the competent authority to practice professionally in each country. Unique TECH Code: AFWORD23S techtitute.com/certificates


Master's Degree in Artificial Intelligence in Pharmacy

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 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 Recurrent Neural Networks (RNN) 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	Management and Analysis of Biomedical Information and Scientific Literature with Artificial Intelligence	3	CO
1º	Development of New Drugs with Artificial Intelligence	3	CO
1º	Artificial Intelligence in Diagnostics and Personalized Therapies	3	CO
1º	Artificial Intelligence in Pharmaceutical Production and Distribution	3	CO
1º	Regulation, Safety and Ethics of Artificial Intelligence in Pharmaceuticals	3	CO

Dr. Pedro Navarro Illana
Dean

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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.

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Master's Degree

Artificial Intelligence in Pharmacy

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

Master's Degree

Artificial Intelligence in Pharmacy

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