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Business AI Certificate: Non-Credit Course Module Exploration

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Abstract

As artificial intelligence (AI) progresses, it's crucial for business education to evolve accordingly, providing tomorrow's workforce with desired AI credentials to ensure they remain productive and competitive. This paper presents a non-credit curriculum for the AI Applications in Business Certificate, comprising four courses: *Introduction to Business Data, Analytics, and Artificial Intelligence; Natural Language Processing; Predictive Analytics; and Machine Learning for Business*. Each course consists of five online modules delivered through tools and no-code AI platforms aimed at facilitating students in acquiring AI credentials.

Key Word: AI Business Certificate, Predictive Analytics, Machine Learning, Natural Language Processing, and Non-Credit

Introduction

Artificial intelligence (AI) describes a system's ability to interpret internal and external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation [1]. As AI continues to evolve, it is becoming deeply embedded across industries, transforming business operations, decision-making, and customer engagement. To remain competitive, today's professionals must develop the skills to understand and apply AI technologies effectively [2-4]. According to Gartner [5], a leading marketing research company, the effective use of AI will require new skills, and employees who are more skilled at driving value from AI are more likely to be high performers in the workforce compared with those lacking AI skills. Yet, most existing AI curricula are designed for technical audiences, often requiring extensive knowledge of mathematics, programming, and data science which are barriers that exclude many business professionals and students without STEM backgrounds. Therefore, there is an urgent need for AI education that bridges this gap—offering application-focused learning tailored to non-technical learners.

For business professionals and AI users, the key is to cultivate a high-level understanding of AI: just as individuals have adapted to using a smartphone's camera without deep knowledge of optics, they can likewise grasp AI technologies without requiring extensive expertise as a data scientist. The *AI Applications in Business Certificate* elaborated in this paper addresses this need by equipping learners with practical, high-level AI literacy, enabling them to leverage AI for goals such as cost reduction, revenue growth, operational efficiency, and customer satisfaction. Rather than focusing on how to build AI systems, the program emphasizes how to use them—empowering learners to adopt no-code or low-code AI platforms and apply AI responsibly in real-world business contexts [6-8]. This certificate stands out by demystifying AI through real-world projects, industry-aligned modules, and a strong focus on ethical considerations, such as algorithmic bias, transparency, and data privacy. By lowering the technical barrier to entry, the program provides a scalable model for preparing a broader, more diverse workforce to harness the power of AI in business.

Non-Credit Credentials

The curriculum of the non-credit courses to gain credentials proposed in this paper was crafted from the *AI Applications in Business Certificate* program, which was established in Fall 2023 at a large Midwestern university in the United States. The author of this paper played a role as a member of the strategic planning team at the business school responsible for drafting the *AI Applications in Business certificate*. The author was tasked with a 3-credit hour workload for a special project focused on designing and developing a non-credit offering of the certificate. The certificate is offered in an online format and is tailored for enrolled students from all majors, as well as working professionals seeking to acquire their AI application skills through real-world examples and experiential learning opportunities. The goal is to integrate technology, software, data, and analytics, empowering those learners to excel in data-rich environments and make well-informed, data-driven business decisions using a no-code approach.

Credit and non-credit courses, in general, are the two primary avenues through which students can engage with the curriculum. While credit courses serve as the cornerstone of degree programs in higher education, non-credit programs have demonstrated significant value by fostering positive engagement with students, alumni, advisory boards, workforces, businesses, and local communities [9]. Moreover, non-credit programs offer a cost-effective method to enhance students' qualifications and develop credentials, allowing them to stay flexible and competitive in the evolving marketplace. According to Fain [10], an increasing number of Americans seeking to change job fields prefer non-degree training. The popularity of non-credit learning through badges, boot camps, training courses, workshops, and other forms of education to attain certificates for new

skills is on the rise [11, 12]. In a recent graduating student survey conducted by Ellucian [13], a leading education company, found out that 62 percent of students enrolled in college to improve their job prospects but only 39 percent believe they will be very prepared for the workplace when they graduate.

Continuing education has now become the trend and almost 90 percent of those surveyed by Ellucian say they will seek more training after they complete their current educational program. The study concluded that the vast majority of those surveyed believe that earning an additional skill or credential on top of a degree will make them more specialized in their work. Employees have realized that it is critical to continually upgrade and/or expand their skills to thrive in the competitive marketplace. At the same time, this sentiment is strongly echoed by employers as well, and almost all recruiters in the Ellucian's study believe that additional credentials will gain importance in their recruiting efforts. They recognize the value of such experiences and are more supportive than ever in encouraging their workforce to pursue them.

Online Course Module Delivery

The non-credit course modules are offered in an online format for a large population of potential students and working professionals who cannot commit to either a full-time or location-based program to obtain the *AI Applications in Business certificate*. No programming or coding prerequisite is required to be admitted to the program. The certificate is open to all students and working professionals with diverse educational backgrounds. The certificate consists of 4 courses, with each course containing 5 modules to earn the credentials. Each course module, described in detail in the next section of the *Components of AI Applications in Business Certificate*, lasts for 75 to 90 minutes. Each student pays a fee of $250 to complete an individual course or $1,000 to attain the full certificate. Paying $250 per non-credit course is not only affordable for most students looking to enhance their AI credentials alongside their degree programs, but it also motivates employers to support their employees in improving their skills and boosting their performance in the workforce by reimbursing training costs.

Additionally, the fee charged in the certificate program will help generate revenue and incentivize faculty members to contribute to the development, delivery, and enhancement of course modules. A faculty member chosen to design and deliver a course in the certificate program will be awarded $10,500 in compensation and granted 5 years of Intellectual Property (IP) rights for the content. There is no official final exam for each course, but each module contains a quiz and/or assignment for students to complete. A student will pass a course if they reach 80 percent of the quizzes and/or assignment grades. They may only attempt to achieve the specified grade of eighty 80 percent three times to avoid retaking the course and paying the fee again.

Components of AI Applications in Business Certificate

AI has long been classified using Searle's [14] distinction between "weak" AI and "strong" for the past decades. Weak AI, also known as Narrow AI, refers to utilization of powerful tools to replicate activities once exclusively performed by humans, while strong AI, also known as Artificial General Intelligence (AGI), involves the development of machines capable of thinking and acting in a manner that matches or surpasses human intelligence. In general, weak AI (Narrow AI) represents AI systems with limited capabilities focused on specific tasks, while strong AI (AGI) represents a theoretical level of AI with human-like general intelligence. With the progression of machine learning and big data, AI has advanced into Strong AI or AGI, encompassing tasks such as understanding speech, decision-making, language translation, sentiment analysis, and even learning from experience. Tesla CEO Elon Musk recently predicted the development of AI surpassing the intelligence of the smartest human, likely within two years [15]. As the inaugural AI Applications in Business program, the certificate prioritizes essential AI skills in high demand. It is built upon three core pillars of AI: natural language processing, predictive analytics, and machine learning. To kickstart

the AI Applications in Business certificate, the curriculum comprises the following four courses:

1. *Introduction to Business Data, Analytics, and Artificial Intelligence*
2. *Natural Language Processing for Business*
3. *Predictive Analytics for Business*
4. *Machine Learning for Business*

Introduction to Business Data, Analytics, and Artificial Intelligence

This is the foundation course in the AI Applications in Business Certificate, designed to provide students with a working knowledge of business data, analytics, and AI. The goal is to equip them for more advanced AI topics in the subsequent three courses. This course covers basic concepts of data analysis and fundamental operations in analytics tools. Students will learn various aspects of data cleaning and transformation, apply basic data exploration techniques, create charts and dashboards, and conduct basic descriptive and inferential statistical analysis in spreadsheets. By engaging in hands-on exercises, students can actively apply relevant concepts and techniques, thereby acquiring insights into data analysis and AI applications, as well as understanding the significance of data visualization in real-world business scenarios. Excel and Tableau are the two software tools chosen to use in this course.

At the outset of the Introduction to Business Data, Analytics, and Artificial Intelligence course, students are introduced to data-driven decision making for using facts, metrics, and data to guide strategic business decisions. The first module covers data manipulation techniques including problem definition, data preparation, collection, classification, cleaning, and transformation. In Module 2 of the course, students will practice data functions covered by the Excel Certificate Test and learn descriptive and inferential statistics. Modules 3 introduces data visualization techniques using Excel PivotTable, PiviotChart, and Tableau. In Module 4, students gain practical experience through hands-on exercises, learning how to effectively present their data.

The course concludes by highlighting current industry demand for AI skills and engaging students in real-world projects focused on data analytics and AI applications. These projects not only reinforce technical competencies but also encourage critical thinking about how AI is used in practice. An integral part of this final module is the examination of ethical considerations surrounding AI, including issues such as data privacy, algorithmic bias, transparency, and the societal impacts of automation. By incorporating ethical reflection alongside technical practice, the course ensures that learners are not only equipped to implement AI solutions but also prepared to evaluate their implications responsibly. Table 1 outlines the course modules, detailing the content focus and the tools utilized in each module. Table 1 describes the course modules, their contents, and tools used in each module.

Natural Language Processing (NLP) for Business

Text and image data in unstructured form pose a distinct challenge for businesses seeking to leverage their data for analysis [16]. Natural language processing (NLP) is a crucial part of AI that delves into the structure and semantics of unstructured data. Through NLP applications, businesses can dissect text and image data to glean insights about individuals, locations, and occurrences, enhancing their grasp of customer interactions and sentiment. According to a recent study by International Data Corporation (IDC), it's projected that 80% to 90% of organizational data will be unstructured by 2025 [17]. The study indicates that by 2025, the global data sphere will grow to 163 zettabytes (equivalent to a trillion gigabytes), representing a tenfold rise from the 16.1ZB of data generated in 2016. All this unstructured data will unlock unique user experiences and a new world of business opportunities. Mean while, an overwhelming majority of businesses (90%) assert that analyzed unstructured data is pivotal to their innovation strategy today. Businesses can capitalize on natural language processing technology to derive insights from vast volumes of unstructured data.

Module	Content	Tools
1.1 Data Manipulation	• Define Problem • Data Preparation/Collection • Data Classification • Data Cleaning • Data Transformation	• Excel: PivotTable
1.2 Analytics on Spreadsheet	• Basic Functions (covered by Excel Certificate Test) • Descriptive Statistics • Inferential Statistics • ANOVA	• Excel: Data Analytics Toolpak
1.3 Data Visualization	• Chart Types • Visualization Strategies • Data Storytelling	• Pivot Chart • PivotTable • Tableau
1.4 Present Meaningful Data	• Getting Data Ready • Joins, Blends, Data Structure • Table Calculation • Data Presentation	• Tableau
1.5 Industry Demand	• Ethical Considerations • Current AI Applications/Trends • Explore real-world projects on Data Analytics & AI	

Table1: Introduction to Business Data, Analytics, and Artificial Intelligence Course Modules

This course encompasses basic hands-on exercises in utilizing NLP tools for data analysis. Microsoft Power BI Desktop has been selected as a key software tool to enable students to integrate, manipulate, and analyze data from various sources, allowing them to create interactive dashboards, reports, and extract insights from both structured and unstructured data. Students can acquire practical experience in processing unstructured data using AI Insights from Cognitive Services, accessible through Microsoft Power BI Premium Capacity.

The AI Insights within Cognitive Services comprise pre-trained machine learning models developed by Microsoft's science team. This enables students to bypass the steps of training, validating, and testing their datasets, offering a straightforward and viable approach to analyzing unstructured data. Table 2 describes the course modules, their contents and tools used in each module. Upon mastering Microsoft Power BI software in Modules 1 and 2, students can utilize its tools to detect languages, extract key phrases, and generate sentiment scores from unstructured text data in Module 3. In Modules 4 and 5, students can harness AI Insights for vision analytics on images, generate Smart Narrative, pose natural language questions about datasets using the Q&A visual object, and utilize the Decomposition Tree to analyze quantitative data. Additionally, they can identify Key Influencers for qualitative data. The second NLP tool, NodeXL, is also introduced in Modules 4 and 5. NodeXL is a popular network analysis and visualization software tool that is primarily used for analyzing and visualizing social network data. Like Power BI, NodeXL does not require coding skills to use its basic functionalities. It provides a user-friendly interface that allows users to import data, perform network analysis on community detection, and visualize results without writing code. Moreover, NodeXL offers both free and paid versions. The basic version of NodeXL, known as NodeXL Basic, is free for students to use and provides a range of essential features for social network analysis and visualization.

Module	Content	Tools
2.1 Power BI Introduction	• Data Models in PowerPivot • Data Importing, Transporting, Cleansing, Merging, and Shaping • DAX – Calculations/ Measures • Data Analysis	• Power BI Desktop
2.2 Data Presentation with Power BI	• Data Hierarchy • Interactive Dashboard Design • Interactive Report Design • Word Cloud Analysis	• Power BI Desktop
2.3 Sentiment Analysis on Text	• Language Detection • Key Phrases Extraction • Sentiment Score • Visualization and Analysis	• Power BI: AI Insights Toolpak
2.4 Sentiment Analysis on Image & Others	• Vision Analytics • Question & Answer (Q/A) Analysis • Smart Narrative Analysis • NodeXL for Social Media Data	• Power BI: AI Insights Toolpak • NodeXL
2.5 Social Media Analytics	• Quantitively Data – Decomposition Tree • Qualitive Data – Key Influencers • Social Network Sentiment Analysis (Twitter, Facebook, etc.) • Community Detection	• Power BI Desktop • NodeXL

Table2: Natural Language Processing for Business Course Modules

Predictive Analytics for Business

Predictive analytics is the use of historical data, statistical algorithms, and machine learning techniques to predict future trends and events. It involves analyzing existing data patterns to predict future outcomes. Predictive analytics has been known by many different names such as Data Mining, Knowledge Discovery in Database (KDD), Business Analytics, Information Harvesting, and Data Pattern Processing. It includes key steps of data collection, data preprocessing, model building, model validation, and deployment. In essence, predictive analytics serves as an extension of conventional data analysis and statistical methods which help business organizations in forecasting future trends and facilitating more informed business decisions [18]. It enables enterprises to gain deeper insights into their customers, products, and services, empowering them to craft more impactful marketing strategies, boost sales, and reduce operational expenses.

The Predictive Analytics for Business course uses the data warehouse (dimension and fact tables) as the source of information for data discovery through an amalgam of AI and statistics-related modeling technique to find associations, sequences, classifications, clusters, and forecasts. Thus, the course utilizes various statistical algorithms, such as regression analysis, decision trees, neural networks,

and others to reveal concealed data patterns and make predictions. Specifically, Microsoft SQL Server Analysis Services (SSAS), Excel PowerPivot, and SAP Analytics Cloud are the three chosen software tools for this purpose. Students can freely utilize Microsoft software under the university's academic license agreement. The university's membership in the SAP Universities Academic Alliances program also grants enrolled students access to SAP Analytics Cloud. Module 1 of the course introduces the fundamental concepts of data warehousing, including its distinctive modeling structures. It also covers data mart design using dimensional data models, as well as star and snowflake schemas. In hands-on exercises, students build tabular data models and query data using Excel and Power BI. Module 2 allows students to explore tabular models in detail using both SSAS and PowerPivot. Module 3 enables students to utilize the built-in statistical algorithms in SSAS for applying decision tree, naïve bayes, segmentation, and association analysis to discover data patterns and make predictions. SAP Analytics Cloud is used in Module 4 to allow students to explore predictive analytics on regression, smart discovery, smart insights, and classifications. The course concludes with a project on predictive analytics. Table 3 describes the course modules, their contents, and tools used in each module.

Module	Content	Tools
3.1 Data Warehousing	• Data Warehouse/Data Mart • Dimension vs Fact Tables • Star/Snowflake Schema • Multidimension vs Tabular Models • Query Tabular Models with Excel and Power BI	• SQL Analysis Services • Excel • Power BI
3.2 Tabular Modeling Techniques	• PowerPivot • Data Calculations in DAX • Unique features of PowerPivot • Data Modeling in PowerPivot	• SQL Analysis Services • PowerPivot
3.3 Statistical Algorithms (1)	• Classification - Decision Tree • Classification – Naïve Bayes • Clustering - Segmentation • Association Rule Analysis	• SQL Analysis Services
3.4 Statistical Algorithms (2)	• Smart Discovery • Smart Insights • Simple Liner Regression • Multiple Liner Regression • Classifications	• SAP Analytics Cloud
3.5 Predictive Analytics Project	• Current Applications/Trends in Predictive Analytics • Select a real-world project on Predictive Analytics	

Table 3: Predictive Analytics for Business Course Modules

Machine Learning for Business

While the domains of machine learning (ML) and its statistical analysis on large-scale datasets often intersect with predictive analytics, machine learning has a distinct emphasis on empowering computer systems to learn without explicit programming. Positioned within the broader field of AI, machine learning leverages *Supervised, Unsupervised, and Reinforcement* methodologies to enable computer systems capable of learning from past experiences [19, 20]. In supervised machine learning, the computer learns from labeled training data, where each data point is associated with corresponding inputs and outputs. By analyzing these pairs, the system derives general rules to accurately map new or unseen inputs to their respective outputs. Supervised learning is frequently employed in scenarios requiring classification of unknown data. Conversely, unsupervised learning operates on data lacking explicit input-output pairs to identify inherent structures and patterns within the dataset. One prominent application of unsupervised learning is

grouping or clustering data based on shared characteristics. Reinforcement learning involves trial-and error learning to complete a task by gaining rewards and avoiding penalties. The Machine Learning for Business course focuses on supervised and unsupervised learning, excluding reinforcement learning.

Deep learning is also presented in the course. Deep learning is a growing subfield of unsurprised learning that focuses on training artificial neural networks to learn from data and make predictions or decisions [21]. It's called *deep learning* because it involves neural networks with many layers (deep), allowing them to learn hierarchical representations of data. Deep learning has achieved remarkable success in various AI applications, including image and speech recognition, natural language processing, and even playing strategic games like AlphaGo. Deep learning is capable of automatically learning intricate patterns and representations from large amounts of data. It is a powerful tool in solving complex real-world problems.

Students are introduced to the ML Workflow, outlining the steps involved in addressing a business problem in ML in Module 1. This workflow encompasses formulating the problem, collecting and preparing the necessary data, training the ML models, evaluating their performance, deploying the models, and continuously monitoring and improving them. Model performance assessment is explained ensuring that students understand the importance of setting training, validation, and testing datasets, as well as establishing a threshold for testing to determine how "certain" a model must be before classifying or predicting something for their business problem. Upon completing the module, students will be presented with no-code AI platforms such as BigML and Microsoft Azure Machine Learning Studio. They employ intuitive graphic user interfaces to seamlessly drag and drop objects, facilitating the implementation of the ML Workflows. This module provides them with the confidence to explore machine learning in the subsequent modules without requiring coding skills.

A hands-on exercise on Principal Component Analysis (PCA) is presented in Module 2 of the course. PCA is commonly used for dimensionality reduction and feature extraction in machine learning workflows. By using Azure Machine Learning Studio, students don't need to write any code to perform PCA analysis. Azure ML studio is also used in Module 3 for time series analysis. Students can perform basic time series tasks such as data preprocessing, feature engineering, and modeling using algorithms like MA (Moving Average), AR (Autoregressive), ARIMA (AutoRegressive Integrated Moving Average) or LSTM (Long Short-Term Memory) networks. At the conclusion of the time series analysis, students will evaluate the performance of their time series model using metrics like Mean Absolute Error (MAE) and Mean Squared Error (MSE). Image processing is introduced in Module 4 using Azure ML Studio. Azure ML Studio supports deep learning models for image classification, object detection, and segmentation. Students can then use the convolutional neural networks (CNNs) to train and test models on the image data. The course concludes with web scrapping using BeautifulSoup to find data structures or patterns in webpages. Table 4 describes the course modules, their contents, and tools used in each module.

Module	Content	Tools
5.1 Introduction to Machine Learning (ML)	• Supervised/Unsupervised ML • Predictive/Prescriptive ML • ML Workflow • Model Performance Assessment • No-Code AI Platforms	• BigML • Azure ML Studio
5.2 Principal Component Analysis (PCL)	• Define a Use Case • Data Collection and Preparation • ML Model Training with Azure ML Studio • PCL Introduction • Eigen Analysis	• Azure ML Studio
5.3 Time Series	• Training/Testing Datasets • Moving Average (MA) Model • Autoregressive (AR) Model • AR Integrated MA (ARIMA) Model • Time Series Case Study	• Azure ML Studio
5.4 Image Processing	• Deep Learning Models • Convolutional Neural Network • Model Training and Deployment • Image Processing Case Study	• Azure ML Studio
5.5 Web Scraping	• Interacting with webpages with APIs • BeautifulSoup for web scraping • Integrating Azure ML Studio with BeautifulSoup • Web Scraping Case Study	• BeautifulSoup • Azure ML Studio

Table 4: Machine Learning for Business Course Modules

Conclusions

As outlined in the introduction of this paper, AI is reshaping industries and occupations, prompting business organizations to seek AI credentials among their employees to enhance productivity and maintain competitiveness. In response to this demand, many higher education institutions have introduced new degree programs, such as data science, data analytics, and business analytics, to bridge the skills gap. Given the complexity of AI technologies, encompassing mathematics, algorithms, programming, machine learning, and natural language processing, these degree programs generally attract students with a scientific background, notably from computer science and engineering disciplines. However, there is often less focus and effort dedicated to instructing students from non-technical backgrounds. Furthermore, continuing education has become commonplace across industries, with many employees seeking non-credit training even after completing their degree programs. Hence, the AI Applications in Business Certificate program outlined in this paper offers a distinctive approach and comprehensive package designed to attract current students and working professionals from diverse educational backgrounds, enabling them to acquire skills in predictive analytics, natural language processing, and machine learning. This paper contributes to the development of AI credentials training within higher education institutions, especially in business schools, by filling a gap in the current literature. While existing research has explored curriculum design for individual AI courses, there is a noticeable lack of studies on comprehensive AI programs designed for learners without scientific or technical backgrounds. This certificate program helps fill that gap by offering an accessible and structured learning pathway tailored to a broader audience. Although there may be differing views regarding course selection, topic coverage, module duration, and software tools, the program offers a valuable framework for institutions aiming to expand AI education beyond traditional STEM fields. Its modular design and flexible delivery approach make it adaptable to various educational contexts. With appropriate customization, this model has strong potential for scaling or replication across institutions, supporting broader efforts to enhance AI literacy and prepare a more inclusive, future-ready workforce.

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