Modules for the Program in Business Analytics

M1. Fundamentals of Data Management Systems: Data is stored in databases that are structured using data models. This module provides an overview of the models used to store them, the languages used to describe the data, and the languages used to retrieve and manipulate the data. Primary focus will be on relational databases and SQL. The module will cover issues related to data redundancy, concurrent data access, security of data, access controls, and maintenance of data integrity. MySQL or another relational database will be used to demonstrate these principles. The module will also discuss the challenges of using databases for transaction systems, the need for data warehousing, and the problems related to managing unstructured data. (30 hours) Prereq: Basic understanding of computing fundamentals.

M2.Predictive Analytics Using Statistics: Advanced analytics requires the use of unstructured data. Uncertainty is a primary characteristic of unstructured data. Statistical methods that relate to correlating information, finding patterns, predictive modeling are essential in dealing comprehensively with data so that it can used as information to make decisions. This module will provide an overview of statistical methods relevant in the world of business analytics. This will be demonstrated through the use of case studies and statistical software. (30 hours)

M3: Building Web Applications Using Python: Python and other web application languages are used extensively to build software. This module will provide an overview of programming languages that are used for web applications. One of the more commonly used programming language environments like Python and Django will be presented in this module. Familiarity with another programming language like Java is expected. Integration with web servers and basic mobile application development will also be covered. (30 hours):

M4: Machine Learning and Data Classifiers: Finding patterns and relationships in large volumes of data are very useful in marketing, fraud detection, and national security among other applications. Artificial intelligence methods that can lend itself to patterns and relationships in data will be introduced in this module. Applications of classification and learning algorithms will be discussed. Integration of these algorithms to business analytics frameworks will be demonstrated using

real world examples. Different learning techniques like supervised and supervised learning, deep learning techniques, text analytics and recommender systems will be covered. (30 hours):

M5. Data Analytics for Structured Data: This module will provide an overview of dimensional data models (star schema) related to Business Intelligence and Data Warehouses.   Warehouses use backend processes to extract data from databases, transform the data to map into the dimensional models, and then clean the data before it is used for reporting. Front-end technologies deal with the retrieval of the data from warehouses and then presenting them using reporting and visualization tools. Both backend tools (ETL technologies e.g. Informatica) and front-end tools will be discussed (e.g. Cognos, Cliq, Tableau, Jaspersoft).   Applications of these technologies will be introduced in this module. (30 hours)

M6. Big Data Technologies for Unstructured Data: The web produces a very large volume of unstructured data that can be mined to obtain intelligence regarding the data. This can be used for various purposes including marketing, fraud protection, and national security. Traditional relational databases are unsuitable for handling such large volumes of data. This module will provide an overview and use of the new technologies that have evolved to handle Big Data. These technologies include Hadoop, Mongo Db, MapReduce and non-structured query languages like NOSQL. (30 hours)

M7: Social Marketing Analytics: One of the most successful applications of business analytics and big data is social marketing analytics. The web through social media, blogs, websites, and other media produce large volumes of information. Big data technologies can store large volumes of this data and using statistical methods, learning algorithms, and visualization techniques, valuable organizational information can be gleaned. This module will provide an overview of how social marketing analytics can be built, and applications of social marketing analytics will be demonstrated. This module is an integration of concepts learned in the other modules.

M8: Machine Learning Applications – IoT, Blockchain: There are a wide variety of machine learning applications. This course will focus on asking the right questions to decide which machine learning technique is applicable. This course builds upon techniques learned in C7 and applies them in various domains. The translation of machine learning techniques to problem solving is the primary focus. Use cases from Internet of things, fraud detection, data security, financial trading, bitcoins and other areas will be used to demonstrate the use of machine learning techniques. An important aspect of this course will be to learn how to integrate data sources to the learning algorithms so that the application is readily usable in practice. (30 hours)

M9: Big Data and Financial Services: The financial industry has initiated a move towards adopting big data technology to be more competitive and provide better

services to customers. This module will focus on how financial data can be used along with predictive analytics and machine learning to do credit risk management, fraud detection, regulatory compliance, bond ratings, portfolio management and other vital financial functions. Of great importance is the impact of blockchain technologies and big data on the financial industry. Additionally historical financial data can be used with big data technologies to improve customer engagement and retention. The impact of the public cloud on the financial industry will also de discussed.

M10. Building Innovative Systems Using Data Analytics (Capstone Project): We live in exponential times where confluence of a set of powerful converging and emerging technologies such as nanotechnology, cellular biology, information technology, Big Data, 3-D printing and internet of things is creating unprecedented opportunities and challenges. The pace of innovation and product introduction is fast-paced and increasingly global in nature. The inherent complexity associated with this hyper-Schumpeterian trend requires organizations to develop a culture of nimbleness and innovation to develop solutions to meet many challenges facing society. Our biggest challenge, especially in developing countries, is to meet the basic needs of people without degrading the earth's life support systems. Awareness and the need for sustainable growth is therefore a much-needed challenge that technology managers face today. This module focuses on the issues related to managing and using technology to spur innovation with a strong focus on sustainability and a culture of nimbleness to adapt and respond expeditiously to Black Swans-high impact, hard to predict, and rare events that are beyond the realm of normal expectations in history, science, finance and technology. (30 hours)