BUSINESS TECHNOLOGY (BTEC)

BTEC 400. Responsible and Ethical Digital Innovation Project Practicum. 3 Units.

Digital innovation is one of the most important strategic topics in today's business. As our society continues to move deeply into a digital economy and companies are able to use more powerful algorithms and models to analyze detailed digital trace data from users, responsible and ethical considerations are no longer after-thoughts but should be the strategic focus of any firm that is trying to innovate with digital technology. This is a project-based course where students learn the practice of responsible and ethical digital innovations using the latest digital tools. Responsible and ethical digital innovations (REDIs) require the blend of five core skill sets: (a) technical skills in emerging digital technology (such as artificial intelligence, mobile and wearable technology, crypto computing, cloud-based micro-service architecture, and the Internet of Things), (b) an ability to gain deeper insights on user needs through human-centered design thinking and translate them into a set of design features, (c) a robust understanding on technical, legal, and business dimensions of responsible and ethical digital innovations, (d) an ability to design an innovative business model and build a robust financial model, and (e) an ability to lead an agile team of diverse members for continuous service delivery. Each of these skills needs to be supported through a set of digital tools and frameworks that are specifically designed to support to support responsible and ethical digital innovation practices. Any responsible and ethical digital innovation projects must begin with deep user research with ethnographic research methods, a careful analysis of the current value network, legal and technical analyses of ethical requirements of the key features, an agile development process of prototypes and experimentations to build a minimally viable product (MVP), and financial modeling of the business model based on robust market research. It requires collaborations across user research, UX design, front-end development for mobile and web, back-end development, cloud architecture, and increasingly mechanical engineering. In this course, students will have a unique learning opportunity to learn the actual contemporary digital innovation practice, working on real-world projects in a small agile multi-disciplinary team. The goal is to equip students with the necessary technical and managerial skills. The target audience is the students who want to become product strategists, product managers, product owners, agile scrum masters, UX designers, full-stack developers, or digital innovation consultants. All projects are client funded and students are primarily responsible to meet the client's requirements within a semester. Students will be assigned to a multi-disciplinary team of 6-8 students (following Amazon's two-pizza rule). Students are expected to spend 2 - 3 hours per week in regular team meetings and workshops. In addition, each student is expected to work 3 - 5 hours either individually or in a small team to complete their individual tasks. Students are led by co-instructors including a faculty member who has domain expertise for the project and an industry coach who manage the agile project. The faculty will serve as the project executive. The coach will serve as the project manager initially with a student apprentice who will play a larger role in managing the project. Students are expected to pick up necessary technical tools and resources, self-taught, and use it for the project. If necessary, xLab will provide technical support by connecting students to technical experts or online resources. In general, students have a basic understanding of the necessary technological frameworks so that they can learn specific tools that they are required to use for the project.

BTEC 412. Algorithmic Trading. 3 Units.

Finding the right algorithm to automatically and successfully trade in financial markets is the holy grail in finance. Not too long ago, Algorithmic Trading was only available for institutional players with deep pockets and lots of assets under management. Recent developments in the areas of open source, open data, cloud computing and storage, as well as online trading platforms, have leveled the playing field for smaller institutions and individual traders - making it possible to get started in this fascinating discipline being equipped with a modern notebook and an Internet connection only. Coding experience required or consent of instructor required. This course aims to: - Trace the evolution of quantitative trading strategies and hedge funds - Expose students to the landscape of datasets (both Reference Data and Market Data) - Discuss univariate time series models and multivariate time series models - Introduce select advanced ideas such as volatility models and optimal execution algorithms - Evaluate the performance of these trading strategies - Provide a comprehensive overview of news analytics Offered as BTEC 412, FNCE 412, and FTEC 412.

BTEC 420. Introduction to Programming for Business Applications. 3 Units.

This course will introduce students to the basics of programming logic utilizing the Python programming language and environment. The course will help students understand how to apply programming solutions and related algorithmic thinking to solve common business and decision problems. This class is a great introduction into programming logic, it just happens to use Python. This course will teach the fundamentals of programming logic, which could be applied to any programming language available today or into the future. Learning Objectives: Upon completion of this course students should have a foundational knowledge of how to use variables, operators, manipulate strings, loops, functions, and basic array manipulation all through Python programming language. The course will culminate with a final project where students will be divided into groups with each group solving a different small business problem. The final submission will require a joint white paper submission that demonstrates the following learned objectives: problem research, scope, architect, and design a potential solution using python environment. A sample of the implemented Python code that was used to solve this problem will be required for final submission. Each student must have access to a computer that can be brought to class. No programming experience is required. Downloading and installing Python is covered at the start of the course. Basic computer skills: surfing websites, running programs, saving and opening documents, etc. Offered as BTEC 420 and DESN 210. Counts as a Quantitative Reasoning course.

BTEC 493. Blockchains, Cryptocurrencies, and Cryptoventures. 3 Units.
It behooves today's business leaders to be well acquainted with blockchain technologies and AI, two seemingly disparate technologies that have the potential to fundamentally disrupt a wide range of businesses. The popularity of blockchain technologies has increased exponentially since the release of bitcoin in 2009. While bitcoins garnered a lot of attention during the initial days, the focus has shifted over time to the underlying technology: blockchain. This wildly innovative technology has made possible tasks that were hitherto deemed implausible: validate ownership in a digital asset, verify the true state of a transaction without relying on a costly intermediary etc. Accurate predictions and sound judgements are two critical ingredients of any decision making process. While the jury is still out on whether algorithms can make sound judgements, recent developments in a field called machine learning (and its sub-field, deep learning) have led to dramatic improvements in the accuracy of predictions made by these algorithms. Significantly, this gain in accuracy has been accompanied by a reduction in overall costs. These in turn have spurred the recent interest in AI. Organizations that have enabled AI at the enterprise level appear to be making more informed decisions and innovating new products. In this course, we will unpack these technologies and examine a wide range of relevant business use cases. Our objective is to provide a practical introduction to these key technologies and their business implications. We focus on business perspectives, rather than on the technical dimensions. Fittingly, this course is open to all graduate students of Weatherhead School (MBA and all specialty Masters). Students are not expected to have any specific programming background; however, a basic understanding of statistics is required to better appreciate the discourse on Artificial Intelligence. Offered as BTEC 493, FNCE 493 and FTEC 493. Prereq or Coreq: MBAC 504 or MBAP 405.

BTEC 494. Artificial Intelligence for Financial Modeling. 3 Units.
This is a hands-on course on Artificial Intelligence (A.I.) where the emphasis is not only on understanding the theoretical underpinnings of various AI models but also on building, evaluating, and critiquing A.I. models as they apply to the finance industry. This course begins with an introduction of Machine Learning models; various key ideas such as bias-variance tradeoff, cross-validation, regularization techniques are introduced with relevant examples from Finance. The course then proceeds to discuss Artificial Neural Networks and its relevance to Deep Learning. Foundational ideas such as back-propagation are discussed in sufficient detail; we also lay a lot of emphasis on evaluating the performance of all these models. A key objective of this course is help students build cutting-edge A.I. models that are ready for prime time, i.e., real-life applications. Fittingly, we work with several real-life datasets and case studies from banking and finance. We will work with three case studies, each of which span multiple sessions. -In the first case study, students use Machine Learning algorithms to understand how imbalanced datasets are handled in real-life. -In the second study, students use time series data and learn not only about the power of regularization techniques but also to highlight the prominence of A.I. in financial markets. -In the third case study, students learn how to use cutting-edge Deep Learning models to extract sentiments from disparate news sources; these are in turn used to generate trading strategies. By contrasting the effort that goes into and the payoff obtained from Machine Learning and Deep Learning models, students gain an intuitive appreciation of both these classes of models. Offered as BTEC 494, FNCE 494 and FTEC 494.