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 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 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 or FNCE 494.