COMM 5940 (New Media Business Model and Innovation)

Course Description (*** Course Pre-requisite: COM5961 - Data Driven Product and Service Design)

In our present age of rapid technological disruption and business transformation, a sustainable innovation requires engaging user experience, robust technological infrastructure, and viable business model, the three critical factors for success. The purpose of this course is to prepare enrolled students in becoming data driven product/operation professional, digital marketing specialist, UX researcher/designer, and startup founder by helping them master the integration challenges of putting the three together.

Throughout the course, special emphasis will be given to new media project management in the context of lean startup, business model design and agile software development. As a sequel to com5961, the course will focus on the deployment of technology stack and back-end web services for supporting a cloud-based data driven product and business. This process will be guided by the SCRUM framework for iterative product releases and reviews.

Given the paradigm shift in computing, Machine Learning has become a core component in any data driven web service architecture. Building REST API backed by machine learning and deep learning models will also be a consideration to potential new media product or service. The CRISP-DM methodology introduced in com5961 will be used as a framework to guide data acquisition, exploration and modelling for supporting business innovation and new media product development.

Expected Learning Outcome

1) Master the SCRUM method for managing agile software development and preparing PRD (Product Requirement Document) and PRP (Product Release Plan).
2) Learn to use digital tools such as Airtable and Slack for agile project management.
3) Understand how the Lean Startup method, with its application of Minimum Viable Product (MVP) and Lean Canvas, can be integrated with Design Thinking and SCRUM for customer discovery and validation.
4) Identify the 9 types of business model and their metrics for tracking success and growth.
5) Master content production, community formation and conversion tracking in implementing the 2A3R (acquisition, activation, retention, referral, and revenue) growth strategy.
6) Learn essential SQL commands for executing CRUD (create, retrieve, update, and delete) operations and applying aggregate queries against a MySQL database.
7) Learn to build Python programs to support the CRISP-DM (Cross Industry Standard Process for Data Mining) process.
8) Learn to deploy REST API services enabled with authentication, authorisation, encryption and predictive analytic capabilities.
9) Learn to use popular Python packages for exploratory and predictive data analysis.
10) Understand various cloud computing models: SaaS, PaaS, and IaaS and review services provided by cloud services operators such as AWS, Azure, GCP and Aliyun for supporting full stack development.

Contact Information

Teacher ‘s Name	Prof. Bernard Suen
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Teaching Time & Venue:	Monday 6:30 to 9:30pm

Assessment Scheme	Description	Weight
A) Two project progress reports submitted by each group (minimum 5 pages + appendix)	Students will participate in user research and agile software development with project progress documented in SCRUM format.	20%
B) Final Group project: presentation and Report	Students organized into teams will present their final project in the form of a pitch deck (10 slides only) complemented with a MVP + written project progress report (with PRD and PDP) based on a real business problem (e.g. self-initiated Kickstarter-like project or business practicum project). Application of qualitative (usability study) and quantitative (A/B test and web analytic) methods to track and analyse user adoption and conversion, using the results as the basis for UX/Business Model validation and impact assessment.	40%
C) Group Project Management	Maintenance of project site with online documentation of project process, tasks, key milestones and deliverables.	10%
D) Group member assessment	Group participation points as assessed by other team members.	10%
E) 5 coding problem sets	Online video and coding problem sets.	20%

com5940

One Day Workshop in Python Programming (Sunday, January 19th 2020)

1. Introduction to Python programming
   a. Introduction to Python programming by using the Anaconda and Jupyter Notebook application suite.
   b. Why Python for code development and data analysis instead of other programming languages (e.g. node.js, Ruby, R, PHP, Java, C#) ?
   c. Data Types
   d. Variables and Operators
   e. Lists & Dictionaries
   f. Conditionals and Loop
   g. Modules and Functions
   h. Classes and Objects

2. Using Airtable Data in Jupyter Notebook
   a. Accessing Airtable data in Jupyter Notebook.
   b. Process Airtable data in Python List and Dictionary

Module 1 - Overview: Developing Entrepreneurial Mindset for Digital Innovation

1. What is the Lean Method? How can it be used in developing new media business model? What is a Business Model? What is its relationship to the Design Thinking method?
2. Master the use of MVP and Lean Canvas for customer discovery and validation.
3. The ABCD of our digital future: (A)rtificial Intelligence, (B)lockchain, (C)loud Computing, and Big (D)ata and how they will continue to disrupt our lives and the business world for both established corporations and startups.
4. Installation of the MAMP stack on Mac and PC for localhost development and testing.
5. Introduction to the Python Flask Framework for developing web applications and REST services.

Module 2 - Introduction to SQL and MySQL Database for Web Development

1. Introduction to SQL (Structured Query Language) and MySQL database.
2. Compare MySQL with Airtable for web application development.
3. Linking tables, looking up data, computing aggregates (average, count, sum, min and max) and completing basic CRUD (create, retrieve, update, delete) operations in MySQL.
4. Understand the rise of NoSQL database for handling non-structured data.
5. Sign up with PythonAnywhere free account service for Flask development.

Module 3 - Agile Project Management for Achieving Product-Market Fit

1. Introduction to Agile development in SCRUM for achieving product-market fit within the context of Lean Startup.
2. Design Thinking meets Lean Startup: Introduction to the Google Design Sprint method for rapid prototyping and testing.
3. Use of Lean Canvas and the 9 business model types for new product and venture growth
4. Use of business model summary, journey map, user stories, information architecture diagram, content production plan, and wireframes in preparing PRD (Product Requirement Plan) and product backlog, sprint backlog, testing plan, release timeline and budget in preparing PRP (Product Release Plan).
5. Use of PyMySQL and Flask for CRUD operations in Jupyter Notebook and PythonAnywhere.

Module 4 - Mobile App Development within a MVC Context

1. Web App, PWA (Progressive Web App), Hybrid and Native App: Pros and Cons for full-stack (front-end and backend) MVC application development.
2. Overview of popular JS frameworks such as Angular, Vue, React, Ionic, Framework7, and OnsenUI for front-end development
3. Use of Bootstrap, OnsenUI, jQuery and PhoneGap/Cordova for cross-platform development.
4. Leverage device dependant features (e.g. camera, accelerometer, compass, contacts) of Cordova/PhoneGap for rapid prototyping and mobile application development.
5. Overview of using Flutter, Kotlin, and React Native for high performance cross-platform development.

Module 5 - Introduction to REST API, User Authentication, Authorization and Encryption

1. Testing REST API in Chrome using POSTMAN.
2. Use of HTTP status codes in service responses.
3. Use of authentication, authorisation and encryption in developing web services.
4. Encoding HTTP header and body for making REST API CRUD service requests through HTTP methods (POST, GET, PUT and DELETE).
5. Learn to perform REST CRUD requests in Jupyter Notebook and develop a Flask based web application integrated with REST services.

Module 6 - Integrate JS Front-end with Flask RESTful API Back-end Services

1. Establish Flask endpoints for JS based front-ends to make REST API requests in obtaining authentication, authorisation and CRUD services.
2. Integrate C3JS, jQuery DataTables, and Leaflet into the Cordova/PhoneGap mobile framework.
3. Synchronization of IndexedDB for client-side data storage and Flask SQL Alchemy for providing ORM (Object Relation Mapping) support of server-side data storage in MySQL.
4. Testing (Unit Test, Integration Test, and User Acceptance Test) and deploying Cordova/PhoneGap apps across IOS and Android platforms.
5. Trends in deploying serverless application on cloud platforms with AWS Lambda as on example.

Module 7 - Cloud Infrastructure for Data Preparation, Analytics and Modelling

1. Data crawling, scrapping and wrangling with visual tools and codes.
2. Decompose the content production, community development, and conversion tracking components in system integration and platform development.
3. Cloud-Service models (SaaS, PaaS, IaaS) for supporting MVP (minimum viable product) development.
4. Understand the use of hypervisor/virtual machine (e.g. KVM) and Container technology (e.g. Docker) in application development.
5. Overview of trends in Blockchain, IoT, Big Data, and AI and their impacts on services provided by established cloud computing platforms (e.g. Azure, AWS, Google Cloud Platform, and Aliyun).

Module 8 - Data Preparation and Exploratory Data Analysis

1. Use of Descriptive Statistics in Exploratory Data Analysis.
2. Finding inconsistent, incomplete, and incorrect data by using Python pre-built modules such as Pandas, Matplotlib and Seaborn.
3. Use of Pandas and SQL for filtering, grouping and aggregating data.
4. Use of Matplotlib and Seaborn to discover visual patterns in datasets.
5. Use of Dimension Reduction in exploratory data analysis.

Module 9 - Overview of Machine Learning and Predictive Analytics

1. Overview of Supervised, Unsupervised and Reinforcement Learning.
2. Application of Machine Learning in finance, transportation, retail, healthcare, climate forecast, fraud detection, manufacturing, agriculture and business in general.
3. Use of CRISP-DM and methodology map in selecting and evaluating the appropriate analytic or predictive models for supporting application development.
4. Business implications of AI for developing a data-driven product and service.
5. Overview and demonstration of popular data-mining and machine learning tools (Orange3, Scikit-Learn and TensorFlow).

Module 10 - Regression and Classification Models in Supervised Learning

1. Labelling of Numerical and Categorical data for supporting supervised learning.
2. Separation of dataset into training and testing sets before building the model.
3. Use of regression or classification algorithms in training the model.
4. Model selection, training, testing, evaluation and deployment (as REST services)
5. Demonstration of regression and classification models in Orange3, Scikit-Learn and TensorFlow.

Module 11 - Business Goals and Conversion Funnel Design

1. Funnel design for customer life-cycle management
2. O-to-O as a strategy for digital marketing and business model development.
3. Essential ideas in growth hacking, marketing automation and conversion funnel tracking.
4. Content marketing, marketing automation (i.e. the automation of 2A3R), and e-commerce integration
5. Wire-frames and prototypes for project deliverables

Module 12 - Performance Metrics in Google Analytics and Dashboard Display

1. Use of burn rate and break-even analysis in metrics tracking.
2. Metrics tracking using Airtable, Google Analytics, and customised Python codes.
3. Preparation of datasets and content for seeding product launch.
4. Preparation of prototype for usability study and A/B test in Google Optimize.
5. Deliverables checklist: PRD, PRP, MVP and pitch deck.

Module 13 - Final Presentation

1. Final presentation

Learning Activities (Hours per Week)

Lecture	Interactive Tutorial	Discussion of Cases	User observations and interviews	Project	Web-based learning	Others
1hr/ week	1.5/week	0.5/week	> 5 times	1 Group project	5 hours/week	meetings with project sponsors