BUSINESS ANALYTICS COURSE LIST 2019/20

Selected courses *(Course list remains subject to change)*

CODING 1: DATA MANAGEMENT AND ANALYSIS WITH R | This course builds introductory-level R coding skills as well as introduces methods and approaches, such as writing loops and functions in R, working with time-series, spatial and textual data, working with external data sources and creating reports and dashboards in R.

CODING 2: DATA MANAGEMENT AND ANALYSIS WITH PYTHON | This course provides a comprehensive introduction to programming with Python, starting from the basics. Beyond confidently using Python, the class focuses on solving problems around Data Processing and Analysis.The overarching goal is to equip students with enough programming experience to start working in any area of computation and data-intensive research. The course is fast-paced as it builds on active knowledge of R.

DATA ANALYSIS 1: EXPLORATION | About 80% of data science tasks are composed of managing data, from understanding and altering features of the dataset and variables, to combining various datasets. This course introduces the critical tasks of data collection and data wrangling, presentation and understanding of descriptive statistics and basics of visualization.

DATA ANALYSIS 2: FINDING PATTERNS WITH REGRESSIONS | Uncovering patterns in the data can be an important goal in itself, and it is the prerequisite to establishing cause and effect and carrying out predictions. The course starts with simple regression analysis. It builds on simple linear regression and goes on to enriching it with nonlinear functional forms, generalizing from a particular dataset to other data it represents, adding more explanatory variables, etc. We also cover regression analysis for time series data, binary dependent variables, as well as nonlinear models such as logit and probit.

DATA ANALYSIS 3: PREDICTION AND INTRODUCTION TO MACHINE LEARNING |
Data Analysis 3 covers the fundamentals of statistical prediction and predictive analytics. This course equips students with the knowledge and skills necessary to carry out and evaluate predictions in business and policy environments. This course starts with the fundamentals of predictive analytics and covers topics such as prediction from regressions, tree-based models (regression and classification trees to random forest), time series forecasting models and unsupervised learning algorithms.

DATA ENGINEERING 1: DIFFERENT SHAPES OF DATA | This course is a practical course presenting several business scenarios and the appropriate data solutions to support these scenarios. From the simplest relational cubes the course progresses to the "different shapes of data", the immense variety of new technologies and data concepts all meant to support a new world of information. The focus of the course is primarily on complete data processes, from the acquisition of the data until the birth of the business value.

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DATA ENGINEERING 2: BIG DATA AND CLOUD COMPUTING | Current Data Analytics Architectures often work with an amount of data that cannot be fit on a single computer. Even companies that work with reasonably small datasets are expecting rapid growth, so they prefer to use data analytics solutions that are easy to distribute and scale. In this course you will get an overview and hands-on experience with modern distributed data-analytics (a.k.a. Big Data) systems. You will see how cloud computing can help you scale your data analytics infrastructure and how it can help you reduce operational costs.

DATA ENGINEERING 3: INFRASTRUCTURE APPLICATIONS | In this course, you will learn what components make up a data architecture in production and which technologies are required for different use-cases. The course covers different data processing and database technologies and see how they can be used for solving a variety of problems, primarily via Amazon Web Services (AWS). The course shows how to tackle real-world business analytics problems using these technologies and how to deploy business rules implemented in R into production as part of cloud-based stream-processing engines, dashboards or scoring APIs.

DATA VIZUALIZATION 1: INTRODUCTION TO DATA VISUALIZATION WITH TABLEAU
BI and Data Visualization are core components of the Business Analytics skill set. This course provides an introduction to the main concepts in DV (reports, dashboards, data visualizations), together with hand-on intro to Tableau, a leading self-service BI and Data Visualization tool. Each session consists of a lecture and a hands-on Tableau seminar. A few guest speakers will also be invited to speak about the applications of BI and Data visualization in their respective industries.

DATA SCIENCE 1: MACHINE LEARNING CONCEPTS | After a brief overview of the data science landscape, this course focuses on basic aspects of machine learning. The course will introduce the main and fundamental concepts in machine learning: from supervised learning: regression and classification, training, scoring, accuracy measures, testing, cross-validation, hyperparameter tuning, grid and random search, a basic understanding of model complexity and overfitting, regularization, ensembles. From unsupervised learning the course will cover clustering and principal component analysis.

DATA SCIENCE 2: MACHINE LEARNING TOOLS | This course will build on the Data Science 2. course, which introduced the basic concepts in machine learning and will discuss state-of-the-art algorithms used in science and in the industry, such as linear models, lasso and ridge regressions, decision trees, random forests, bagging, boosting, neural networks, support vector machine, deep learning. A large part of the course is dedicated to getting hands-on experience in machine learning and to understanding models used by practitioner data scientists, e.g. various high-performance R packages and xgboost.

WEB SCRAPING WITH R | Data is the new oil. We can hear that in every conference related to data science. This course will teach you how to mine the oil. Every website showed up in our browser is downloadable. The course aims at understanding the basic communication of custom webserver and the browser and looking for solutions to download any webpage and process the data on the selected webpage. The course uses R.

DATA SCIENCE 3: UNSTRUCTURED TEXT ANALYSIS | Text is ubiquitous. Humans have been storing information in written form for over 5000 years, and unfortunately the information in this information has defied principled quantitative analysis for much of that time. Unlocking skills and techniques to take text and derive sense and sentiment enables exploratory analysis and modeling on human communication. During the course R packages are used such as ggraph, tidytext, dplyr and topicmodels to manipulate and understand a number of document collections..

MASTERING R SKILLS | This class focuses on actual programming questions and problems related to R that will help you write more elegant, reliable and performant R applications. The course is focused on how to use R as an interactive scripting language for various data analysis tasks, covering topics like writing and documenting R functions, debugging and profiling R scripts and functions, refactoring R scripts, developing R packages, writing unit tests and running those in an automated way, and logging, database connections

MASTERING DEEP LEARNING IN R | Machine learning has made significant progress in the last decade. Deep learning may be the single most overhyped technology of the decade, however there's no denying that the techniques it introduces and the capabilities it unleashes have already revolutionized the world. At the core of many of these advances, is Google's open source package Tensorflow. In this course we use the R keras package. This package provides an interface into Keras, allowing the user to build models, explore them, and to operationalize them inside of the familiar R programming language.

MASTERING PRODUCT ANALYTICS | Most companies today are building digital products. Mobile apps and enterprise software are clearly products, but we can also consider a newsletter, eBook, podcast, and even the company's website as a digital product. These products provide some value to the users in a scalable way and may (or may not) generate revenue for the company. As soon as a digital product is having more than a handful of users, analytics can help to improve and optimize the experience and grow the user base. This course provides the foundations and best practices for analyzing digital products.

USE CASE SEMINARS 1 | In this course you will be able to see presentations of industry data engineering experts and data team leaders. The aim of these lectures is to have the students understand how data infrastructures are implemented in the industry. Through these talks and discussions students will take a closer look on how the concepts that were presented in the Data Engineering classes can be applied in real-world scenarios. Every week two industry experts (6 in total) are invited to deliver a case study followed by a Q&A.

USE CASE SEMINARS 2 | This class is a series of guest talks from industry experts followed by Q&A sessions, where you can learn about real-world data-science questions and problems, then the related solutions, products and teams -- right from the trenches, featuring senior data scientists, data engineers and data team leads from startups and enterprises as well. We invite 1-2 experts each week to deliver a case study of a real data science problem and solution, followed up by Q&A and then R exercises related to the discussed case studies.

DATA SECURITY AND GDPR | The main objectives of Data Security and GDPR course may be summarised as giving an overview about the philosophy of security, giving an overview about the role of CISO (Chief Information Security Manager), helping to ensure compliance with the IT security standards, explaining the role of the GDPR, understanding the paradigm shift, showing the complexity of the GDPR (ethical hacking, ISO, BPR, governance) and teaching how to prepare (in practice) your company to be GDPR proof.

ETHICS OF BIG DATA | This course provides a forum for discussion on a selection of topics on the ethical and legal aspects of Big Data through mainly contemporary literature in ethics, developments in law, and advances in Big Data technology. Topics discussed will include the correlation vs causation in data analysis, identity, privacy, and mass surveillance. Principles and problems discussed will include the doctrine of double effect, doing vs. allowing harm, theories of personal identity, and aspects of liberal morality. We will also develop a framework to handle ethical and legal questions in the context of Big Data for individuals, companies and states.

MASTERING DATA SCIENCE PROJECTS | In this course students will gain an overview of the different phases of an agile data science project, starting from the preparation – which is usually refers to writing (internal or external) proposals, presales activities and gaining momentum inside of the organization. To practice the accumulated knowledge, it is important to use case studies to simulate real-life situations based on business experience. Students will have the possibility to elaborate their own solutions, suggestions, after getting to know the business and technological situation described in each case study.

MASTERING THE PROCESS OF DATA SCIENCE | The data science processes contain several steps that are usually less highlighted but are crucial success factors. During the course we go through example use cases, discuss the business needs and the main steps needed to fulfil all requirements and generate real business improvements. The course goal is to discuss the details of the main steps of data science processes using example use cases, showing how a business question is translated into actionable questions, how to handle different data quality issues, how to prepare the data into the proper format, and how to ensure good quality result.

AGILE PROJECT MANAGEMENT 1 | The course focuses on familiarizing students with the Agile project management techniques. Since the publication of the Agile Manifesto in 2001, the Agile movement has revolutionized software product development and following a consolidation period has been adopted by other more traditional industries. At present, Agile techniques are widely utilized from construction to car manufacturing, offering a viable alternative to traditional management methods.

AGILE PROJECT MANAGEMENT 2 | This course is the continuation of Agile Project Management 1. While the first part is focusing on introducing the essential terms providing a solid theoretical foundation, the second part is aiming to deep dive in a particular framework, namely SCRUM. Through group activities, role playing and real-life examples we will exercise each SCRUM event (Sprint, Sprint Planning, Daily Scrum, Sprint Review, Sprint Retrospective) we will build an imaginary project's Product Backlog, Sprint Backlog and Increment.

DEVELOPING DIGITAL ORGANIZATIONS | Sometimes complex business change does not happen, not because the lack of resources, technology or other hard factors. Multiple independent surveys show the decisive importance of organizational elements, like culture, structures or skills. The course aims to strengthen the capabilities of participants to use disruptive business models to design innovative and viable organizations, culture, structure and processes, enhanced by capable teams and digital savvy individuals. As this is a very hot business issue as we talk, with lots of experimentation ongoing, we look at cases and practices to conclude on emerging solutions and predicting future directions.

DIGITAL TRANSFORMATION | This course will be made up of interactive conceptual presentations and a workshop series covering topics from all across the industries. The aim of this course is to give students business insights based on current and future technology trends and to raise the awareness of the audience about the rapid evolution of Technology by building up thoughts around ways how to adapt them in our everyday life. The main objective of the course is to share practical knowledge and to help the audience understand the managerial and non-technical challenges of disruption in all levels in order to use the technology successfully.

BANKING IT AND FINTECH: BANK TO THE FUTURE | This module introduces students to the various dimensions of banking IT operating model: infrastructure, application and data landscape, organization, business-IT interface, and key IT processes as well as the major challenges arising from the technology native FinTech world. In the process, you will gain critical new insight into the operational problems that today's banks face and what are the typical responses to those. Understanding the problems covered in the module will be helpful to everyone seeking a career in banking, on either the business/analytics or the operations /IT side.

FINANCIAL TRADING DESIGN AND TECHNOLOGY | The course provides an introduction to the art and science of trading. Various timeframes, markets, instruments and analytical methods will be discussed. Success factors of automated and semi-automated trading strategies will be explored. Students will, in groups, design, backtest and forward-test their own trading strategies, and will trade them, in simulation mode, on the Chicago Mercantile Exchange.

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economics.ceu.edu/program/master-science-business-analytics