Ivey Business School

Coursework description

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Business Statistics

Program:

- Understanding, measuring and working with uncertainty
- Probability fundamentals
- Statistical inference
- Hypothesis testing
- Statistical modelling
- Data driven decision making
- Regression
- Statistics with R
- Combined applications

Causal Inference

Program:

- Causality
- Describing causal relationships
    - Structural equation models
    - Potential outcomes causal model
    - Directed Acyclic Graphs - DAG
- Causal identification
    - Average treatment effects
    - Estimators, estimands, and identification
    - Selection bias and heterogenous treatment effect bias
    - Confounders
- Experiments
    - Experiments and randomized treatment
    - Monte Carlo methods and uncertainty
    - Quantifying uncertainty
- Adjustments
    - Matching
    - Weighting
- Regression
    - Regression for causal inference
    - Fixed effects
    - Propensity scores
    - Backdoor criterion
    - Good and bad controls
- Natural experiments
    - Instrumental variables
    - Regression discontinuity designs
- Difference-in-Difference
    - Panel Data
    - DD Designs
        - Simple 2-period DD
        - Dynamic DD and event plots
        - Staggered treatment
- Double machine learning

Big Data Analytics

Program:

- Predictive modelling - Supervised Learning
  - Statistical classification models
    - Logistic regression
    - Neural networks
    - Naïve bayes classifier
  - Regression models
    - Generalized linear model
    - Neural networks
    - Decision Trees
    - Random forest
- Predictive modelling - Unsupervised Learning
  - Clustering models
    - K-Means clustering
    - K-Nearest-Neighbours clustering
    - Hierarchical cluster analysis
- Survival analysis
  - Life tables
  - Kaplan–Meier curves
  - Survival function
  - Hazard function
  - Cox proportional hazards regression
  - Parametric survival models
  - Exponential distribution
  - Weibull distribution
  - Gamma distribution

Art of Modelling

Program:

- Decision Analysis fundamentals
  - Decision trees
  - Information cost
  - Influence diagram
  - Analyzing sequential decisions
  - Data-driven decision making
  - Decision making under uncertainty
- Simulation fundamentals
- Modelling fundamentals
  - Model building
  - Spreadsheet modelling
- Optimization fundamentals
  - Simultaneous decision problems
  - Linear programming formulation
  - Sensitivity analysis
- Combined applications

Data Management

Program:

- Design high fidelity graphical data models
- Linear applications and matrix representation
- Convert data models into practical database structures
- Relational database software tools such as MySQL and phpMyAdmin
- Query structured relational databases using SQL and BI tools
- Explore unstructured "big data" datasets,
- Frameworks, concepts and tools such as Hadoop, NoSQL, MongoDB, Tableau and Python

Prescriptive Analytics

Program:

- Theory of optimization
- Model decision problems
- Mathematical formulation
- Linear Programming
    - Graphical and numerical solving
    - SIMPLEX matrix notation
    - Sensitivity analysis
- Integer Linear Programming
    - Branch and bound
- Implementation of optimization models using Python to call CPLEX Solver
- Managerial insights

Simulation and Risk Analysis

Program:

- Discrete simulation
- Continuous simulation
- Systems modelling
- Statistical input data analysis
- Output sensitivity analysis
- Queuing theory
- Time series
- Markov chain

Programming

Program:

- Programming skills related Coursera certificates
    - University of Michigan - Introduction to Data Science with Python
    - University of California, Davis - SQL for Data Science

Pricing and Revenue Analytics

Program:

- Introduction to revenue management
- Demand forecasting
- Capacity allocation & Overbooking
- Customer choice modeling
- Price optimization and markdown pricing
    - Dynamic pricing with constrained supply
    - Peak load pricing
    - Personalized promotions
    - Personalized pricing

Global Corporate Finance

Program:

- Investment decisions
    - Net present value
    - Internal rate of return
    - Terminal value
- Weighted average cost of capital
    - Capital structure and cost of debt
    - Cost of equity and other claims
    - Capital asset pricing model
- Modigliani-Miller
    - Optimal capital structure
    - Cost of equity and equity betas
- Corporate valuation
    - Discounted cash flow analysis
    - Comparables analysis
    - Adjusted present value
    - Past acquisitions
    - Raising equity