Program Overview

Big data is changing the way businesses operate. Driven by a new scale of data collection that provides massive levels of information, businesses are now able to analyse and gather data insights to make better-informed decisions.

Data scientists and business analysts are in high-demand as companies look to use data to improve their business operations.

In this Big Data MicroMasters® Program, you will learn tools and analytical methods to use data for decision-making, collect and organise data at scale, and gain an understanding of how data analysis can help to inform change within organisations.

You’ll develop both the technical and computational skills that are in high demand across a range of industries. You’ll develop critical skills in programming for data science, computational thinking, algorithm design, big data fundamentals, and data-driven analysis, with plenty of opportunities to apply and explore your new learnings through a range of case studies.

What you’ll learn

- How to design algorithms.
- Understand fundamental programming concepts including data abstraction, storage and structures.
- Understand computational thinking which includes decomposition, pattern recognition and abstraction.
- Understand key mathematical concepts, including dimension reduction and Bayesian models.
- Data-driven problem and algorithm design for big data.
- Interpretation of data representation and analysis.
- How to use analytical tools such as R and Java.

**Programming for Data Science**  
**ProgramX**

**Learning Objectives**

- Use ProcessingJS (*a visual language, giving learners immediate feedback as they develop their coding skills*) to create and control visualisations and use code to manipulate and visualise data.
- Carry out tests on your code and debug code examples.
- Create code examples using selection and iteration.
- Identify when arrays are needed, and use arrays to represent data.
- Understand how static and dynamic arrays can be best utilised.
- Transform a problem description into a complete working solution.

**Assessment Requirements**

- Quiz questions and practical activities at the end of each of the ten sections.

**Computational Thinking and Big Data**  
**CompX**

**Learning Objectives**

- Apply advanced core computational thinking concepts to large-scale data sets.
- Use industry-level tools for data preparation and visualisation, such as R and Java.
- Use R to describe variables with appropriate summary statistics and visualisation methods.
- Apply methods for data preparation such as data manipulation to reduce the number of variables or transform them to a simpler form for modelling.
- Organise data using data structures, apply hash functions, encode directed and undirected graphs in different data structures and execute basic algorithms on them.
- Interpret information from large data sets, and identify and illustrate relationships between them.
Assessment Requirements

- Quiz questions and practical activities at the end of each section.

**Big Data Fundamentals**

*BigDataX*

**Learning Objectives**

- Develop algorithms for the statistical analysis of big data.
- Design algorithms for a range of big data applications, including stream processing, PageRank algorithms, recommendation systems, and online greedy algorithms.
- Understand the social and ethical aspects of big data mining.

Assessment Requirements

- Quiz questions and practical activities throughout the course.

**Big Data Analytics**

*AnalyticsX*

**Learning Objectives**

- Develop algorithms for the statistical analysis of big data
- Apply models in predictive analytics, including probabilistic and statistical models.
- Determine the validity of a model and access its ability to predict.
- Differentiate between prediction and classification and be able to identify the correct methods to use for each.
- Build a deep learning classification model for image recognition.
- How ethical aspects of big data mining can impact society.

Assessment Requirements

- Quiz questions and practical activities throughout the course.
Big Data Capstone Project
BigDataCapX

Learning Objectives

• Demonstrate the knowledge acquired and apply the skills developed through the four preceding courses with a project-based assignment.

Assessment Requirements

• Completion of the four preceding courses within the MicroMasters program.
• Completion of an individual project to test and showcase your skills and abilities across the areas of Big Data that this program has explored.