Southampton Data Science Academy

LLOYD'S

Fundamentals of Data Science (Non-Technical)

Course Syllabus and Learning Outcomes

🌐 **Lloyd's Courses**

2020

CONTENTS

Southampton
Data Science
Academy

Course Overview

Fundamentals of Data Science - Non-Technical

Duration: 8 weeks

Number of hours: 30 (includes tutorial support + self-study, assignments and peer discussions)

Assignments: Three practical assignments

This course equips you with the theoretical knowledge and both practical and technical skills to participate in the flourishing data revolution, helping you to contribute to and benefit from the new data-driven economy. The course emphasises a hands-on approach to learning data skills, offering a number of interactive, online exercises that will let you try out many of the techniques and concepts covered in the taught material against real examples.

The course is broken into four sections with content over eight weeks of learning.

Course Structure

Section 1

In Section 1, you will discover what Data Science is and key examples of Data Science in action. You will discover the overlap with data journalism and open data to look at how Data Science is changing the way we tell stories. You will discover the spectrum of data and the importance of understanding your rights to use different types of data. You will be able to collect more Data Science examples from the course forum discussions and look at the applications in your own domain.

Section 2

In Section 2, you will learn about the process of Data Science, from gathering to visualisation. You will begin your hands-on experience looking at the critical aspect of data management. The first assignment is based upon a real case study of hospital performance data in Tanzania and focusses on the importance of standards when collecting and organising data. This week also looks at the importance of data cleaning and the techniques to clean dirty data.

Section 3

The major case study of the course is introduced in Section 3. You will begin looking at a large piece of data analysis using up to date incident records from the London Fire Brigade. In 2014, 10 fire stations were closed in London amid protests and claims that this would put lives at risk. We look at the evidence to find out what has happened as a result and if more changes need to be made. This week looks at the data processing and analysis that can help reveal the answer.

Section 4

Data visualisation is the focus of Section 4. Choosing the right visualisation to communicate your findings to everyone is of critical importance. This week introduces many of the different types of visualisations available and looks at the use of aspects like colour to represent different dimensions in data. You will be challenged to spot when you are being deceived before being tasked with applying your knowledge to create a story using a visualisation from the fire station analysis in Section 3. You will also look at the future of Data Science in your discipline and how to overcome the cultural and management challenges in making more of data in your organisation.

Aims and Learning Outcomes

This course aims to provide you with the knowledge and expertise to work better with data and data scientists.

Having successfully completed this course, you will be able to:

- Explain the key concepts in Data Science and its real-world application

- Classify the different types of data available along with rights for usage

- Implement an effective data collection and management strategy

- Prepare data ready for analysis

- Analyse a large amount of data to reveal insight

- Create a number of data visualisations

- Start working with live data and understand the opportunities presented by cloud services

- Critically evaluate the challenges and opportunities of exploiting Data Science in your organisation

Hands-on Experience

Section 1 contains a data management assignment in a spreadsheet application using a real dataset from Tanzania.

Section 2 contains a data assignment involving downloading and cleaning a real world data set.

Section 3 contains a data analysis assignment in a spreadsheet application using a real dataset from the London Fire Brigade. You will need to apply your learning from Section 2 in order to complete this assignment.

Section 4 contains a data visualisation assignment where you will be asked to create a story from your data analysis in Section 3. You will be able to use any tool that suits your need and have two weeks to complete this assignment.

Technology Stack used for Exercises and Assignments

- Excel or other capable spreadsheet application (not Google Docs)
- OpenRefine
- Optional visualisation tools including Data seed app, D3, Qlik etc.

Modules

Section 1: Introduction to Data Science

TOPICS

- Welcome and introductions

- What Data Science is and why it is important

- Creating impact from Data Science

- Introduction to data storytelling

- Understanding your rights to use data

- The data spectrum

- Unlocking value from open data

- Gathering data

LEARNING OUTCOMES

- Define Data Science

- Explain the benefits of Data Science

- Identify opportunities to integrate Data Science within an organisation

- List scientific approaches to problem solving

- Fitting data to the data spectrum

- List the key skills of a data scientist

Section 2: Health Check: Cleaning and Visualising Hospital Data

TOPICS

- Organising data

- Cleaning data

- Choosing and designing schemas

- Annotating and describing data

- Open data and open standards

- Data formats and structures

- Data ethics

- Big data challenges

LEARNING OUTCOMES

- Evaluate applications of best practices and standards on data

- Identify problems with data collection and management

- Compare different data structures and formats for effective data management

- Understand the ethics around data use and application

- Manage data in a spreadsheet

- Clean, validate and perform quality checks on data

- Restructure and organise data

- Design a schema for data

- Use the data ethics canvas to evaluate your own data projects

Section 3: Data Analysis

TOPICS

- Filtering & pivot tables

- Introduction to quantitative data analysis

- Introduction to qualitative data analysis

LEARNING OUTCOMES

- Explain the advantages and disadvantages of using 'big data'

- Identify and evaluate the usability and trust of different sources of data

- Describe a number of ways to statistically analyse data

- Gather data from a number of different sources

- Explore datasets to establish quality and usability

- Perform basic statistical analysis

- Use pivot tables to analyse data

Section 4: Presenting the 'Data Story'

TOPICS

- Data visualisation formats

- Mapping open data

- Narrating your story

- Visual description

- Practical data visualisation

- Having a REST with API design

LEARNING OUTCOMES

- Describe a number of data visualisations and their usage

- Select an appropriate visualisation for telling a story with data

- Explain the characteristics of big data

- Identify instances of great data stories

- Apply appropriate visualisation theories, best practices and visual deception

- Create a data visualisation

- Write a narrative for a data visualisation

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