**Data Science Fundamentals**

**Course Overview**

This 15-session course introduces you to data science, a growing and rapidly changing field that is becoming increasingly vital to business survival, job stability, and national security. Data science demands skilled professionals who possess the knowledge, skills, and ability to address the evolving threat landscape.

**Course Approach**

The content is laid out in a workshop format structured to provide a holistic learning experience leading to proficiency. This is not a self-paced course. This course also contains case study material based on real-life scenarios but does not reference any particular company or situation.

**Content Types**

There are three content types in this course:

**Workshop:** Main course content, typically in a slide deck or recorded, lecture-style format.

**Enrichment:** Additional content provided for the learning experience in the course. These are items that, while not required, may provide a bigger picture or more context around content presented in the course. These are content elements including (but not limited to) learning aids, journal articles, podcasts, whitepapers, webinars or links from other trusted sources.

**Labs (if available):** This course has a performance-based lab component that is highly recommended for learners to complete. Completion of the labs is in addition to the instructor led course and will reinforce the learning in a hands-on, skill building approach.

The Computing Fundamentals Certificate Exam assesses and affirms both knowledge and the ability to perform IT-related tasks that the real-world workplace demands. The exam includes multiple choice questions and specific skills that are assessed in a virtual lab environment. Access to the labs are available through the ISACA PERFORM learning experience platform.
Session 1 – Data Characteristics: Basic Concepts

Learning Objectives:

- Define the terms and concepts of data science.
- Describe the relationship between data science and statistics.
- Describe the classifications and characteristics of data.

Session topics:

- 1.1.1 What Is Data Science?
- 1.1.2 Defining Big Data
- 1.1.3 The Evolution of Big Data
- 1.1.4 What Is Data?
- 1.1.5 Raw Data vs. Contextualized Data
- 1.1.6 Difference Between Data Statistics and Analytics
- 1.1.7 Data Types
- 1.1.8 ASCII and Unicode

Enrichments:


Session 2 – Use of Data in Information Systems

Learning Objective:

- Explain the different types of data structures, flows and diagrams.

Session topics:

- 1.1.9 DIKW Pyramid
- 1.1.10 Metadata
- 1.1.11 Data Flows and Data Diagrams
- 1.1.12 Applicability of Data to Business

Enrichment:

Session 3 – Data Structures

Learning Objective:

- Explain the different types of data structures, flows and diagrams.

Session topics:

- 1.2.1 Characteristics of Data Structures
- 1.2.2 Linear Structures
- 1.2.3 Tree Structures
- 1.2.4 Index and Pointer Structures

Session 4 – Statistical Analysis

Learning Objectives:

- Use statistical analysis to gather populations and samples.
- Distinguish among sampling techniques.

Session topics:

- 1.3.1 Populations and Samples
- 1.3.2 Statistical Modeling
- 1.3.3 Key Performance Indicators (KPIs)

Session 5 – Types of Databases

Learning Objectives:

- Distinguish among different data storage and management systems.
- Describe the benefits of using automated processes to manage data.

Session topics:

- 2.1.1 Introduction
- 2.1.2 Operational Databases
- 2.1.3 Relational vs. Non-Relational Databases
- 2.1.4 Autonomous Databases

Session 6 – Data Management

Learning Objectives:

- Identify elements within a database management system.
- Explain the use of data in online and cloud-based applications.

Session topics:

- 2.1.5 Common Database Management Systems
- 2.1.6 Data Lakes
• 2.1.7 Data Warehouse
• 2.1.8 Data Management Platforms

**Enrichment:**


**Session 7 – Governance**

**Learning Objective:**

• Explain legal, regulatory and ethical considerations regarding use of data.

**Session topics:**

• 2.2 Governance
• 2.2.1 Data Governance
• 2.2.2 Legal and Regulatory Compliance

**Enrichments:**


**Session 8 – Data Governance Roles and Responsibilities**

**Learning Objectives:**

• Explain legal, regulatory and ethical considerations regarding use of data.
• Detail data governance roles and responsibilities.

**Session topics:**

• 2.2.3 Data Ethics
• 2.2.4 Data Roles and Responsibilities

**Enrichments:**

Session 9 – Access and Protection

Learning Objectives:
- Distinguish among data obfuscation, tokenization and encryption.

Session topics:
- 2.3 Access and Protection
- 2.3.1 Data Accessibility and Protection
- 2.3.2 Managing Permissions
- 2.3.3 Third-Party and Vendor Access and Management
- 2.3.4 Data Obfuscation
- 2.3.5 Tokenization
- 2.3.6 Encryption

Enrichments:

Session 10 – Data Discovery and Collection

Learning Objectives:
- Identify open and cross-industry standards used to process data.
- Describe techniques used to collect data.

Session topics:
- 3.1 Data Discovery and Goal Identification
- 3.1.1 Requirements and Resources
- 3.1.2 Formulation of Hypotheses
- 3.2 Data Collection
- 3.2.1 Database Queries
- 3.2.2 Data Collection Methods and Techniques
Session 11 – Data Classification

Learning Objectives:

• Explain activities performed to prepare data for analysis, categorization and modeling.

Session topics:

• 3.3 Data Classification
• 3.3.1 Data Cleansing
• 3.3.2 Data Clustering
• 3.3.3 Data Tagging
• 3.3.4 Data Governance Tools

Enrichment:


Session 12 - Data Processing Concepts

Learning Objectives:

• Identify methods to uncover relationships among data.
• Identify tools used to build, model and analyze data.
• Describe concepts related to business analytics.

Session topics:

• 3.4.1 Introduction
• 3.4.2 Exploratory Data Analysis
• 3.4.3 Model Development Tools
• 3.4.4 Statistical Analysis Tools
• 3.4.5 Business Analytics

Enrichment:

Session 13 – Data Processing with Machine Learning, Part 1

Learning Objectives:

- Distinguish among types of machine learning algorithms.

Session topics:

- 3.4.6 Machine Learning

Enrichment:


Session 14 - Data Processing with Machine Learning, Part 2

Learning Objectives:

- Distinguish among types of machine learning algorithms.

Session Topics:

- 3.4.6 Machine Learning

Enrichment:


Session 15 – Communication of Results

Learning Objectives:

- Distinguish among types of visualization and reporting tools.

Session Topics:

- 3.5.1 Reporting Techniques
- 3.5.2 Reporting Tools

Enrichments:

Practice Labs:

- Creating and Querying Databases with GUI Database Clients
- Using GUI Database Clients
- Data Cleansing
- Metadata
- Database Permissions
- Data Integrity
- File Hashing
- Data Management Systems