

# **CSIT 255**

## **Fundamentals of Data Science**

4 Credits

Community College of Baltimore County  
Common Course Outline

### **Description**

**CSIT 255 – Fundamentals of Data Science:** provides students with an overview of the fundamentals of data science using practical techniques, tools, and programming to analyze and manipulate data to solve problems. Students work with data using the programming languages of Python and R to analyze, visualize, model, acquire, and interpret data in various formats.

**Pre-requisites:** CSIT 154, CSIT 210, and MATH 153 or permission of the program director

### **Overall Course Objectives**

Upon completion of this course, students will be able to:

1. define concepts and terms related to data science;
2. identify data types, specific uses, and formats used for analysis;
3. demonstrate data analysis using Python libraries and R;
4. demonstrate data visualization using Python libraries and R;
5. perform data extraction and exportation of different file or data formats;
6. describe best practices for using Python libraries and R in the context of data science;
7. discuss the role of data science tools and techniques for decision making;
8. perform data cleansing and preprocessing;
9. demonstrate data modeling, exploration, and manipulation using Python and R;
10. extract trends through data analysis and transformation;
11. recognize potential bias, ethical concerns, or errors in data analysis;
12. compare functionality of Python and R; and
13. justify techniques and models used for data analysis.

### **Major Topics**

- I. Roles in data science
- II. Data organization and file formats
- III. Classification and clustering algorithms
- IV. Statistical analysis of data
- V. Working with different data types
- VI. Data importing and exporting
- VII. Fundamentals of Python libraries and R used in data science
- VIII. Acquiring data from various sources
- IX. Data cleansing and preprocessing
- X. Exploratory data analysis and manipulation
- XI. Data modeling
- XII. Basic data mining

The Common Course Outline (CCO) determines the essential nature of each course.  
For more information, see your professor's syllabus.

- XIII. Data analysis using Python and R
- XIV. Data visualization using Python and R
- XV. Dealing with error and bias

### **Course Requirements**

Grading will be determined by the individual faculty member, but shall include the following, at minimum:

- Six quizzes or assignments
- Six projects
- Two exams
- One comprehensive final exam and/or final project

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