DASC 1003 Introduction to Data Science

Course Description

This course provides an overview and introduction to the essential elements of data science, including data collection and management; summarizing and visualizing data; basic ideas of statistical inference; predictive analytics, and machine learning. Students will gain hands-on experience using the specified programming language and web application.

Course Learning Objectives

Students should be able to:

• describe the data science analytics process

• apply critical thinking skills to open-ended problems

• demonstrate an understanding of the importance of ethics and privacy with data,

• demonstrate solving data science problems with spreadsheets

• list the steps involved in data science from data acquisition to insight and describe the role of each step

• distinguish different ways of collecting data and their impact on the conclusions that can be drawn from the data

• manage, summarize, and visualize data using the specified programming language and web application Python programming language and Jupyter Notebook

• explain the basic concepts of statistical inference and implement simulation-based inference methods

• apply predictive models and machine learning methods and assess the quality of predictions;

• communicate basic data science principles and methods to diverse audiences

DASC 2203 Database Management Systems

Course Description

This course focuses on the investigation and application of data science database concepts including DBMS fundamentals, database technology and administration, data modeling, SQL, data warehousing, and current topics in modern database management. This course will present database processing as an essential part of data science systems. General concepts and methods will be presented with examples in data science. Emphasis will be given to the database as the central repository and data warehouse for data science applications.

Course Learning Objectives

Upon completion of this course, the student will be able to:

Database Foundations

• Describe the advantages and disadvantages of the relational database approach

• Describe the components and architecture of relational database management systems (DBMS)

• Explain the differences between types of database architectures

• Describe the activities involved in database development and their relationship to Data Science

Intermediate/Advanced SQL

• Utilize SQL Data Definition Language (DDL) to create and maintain relational databases

• Utilize SQL Data Manipulation Language (DML) to create, read, update, and delete data in relational databases

• Construct SQL queries of moderate to high complexity to retrieve data from a database

Data Warehousing/ Dimensional Modeling

• Explain the fundamental concepts and need for data warehouses

• Create a Dimensional Model to represent data warehouse requirements, and implement the model in a relational DBMS

• Integrate data from multiple sources using an ETL tool to load data into a data warehouse

• Utilize Online Analytical Processing (OLAP) and SQL to visualize and analyze data contained in a data warehouse

Emerging Topics

• Describe the concept of in-memory computing, and explain the implications on database and data warehouse design and use.

• Explain data ethical responsibility with its components and be able to further develop an ethical approach to data science as a professional, specifically about data security and privacy)

• Describe how “big data”, relational databases, and data warehouses relate to data mining and data science/analytics.

CIST 1404 Programming I

Course Description

Programming I provide a semester-long introduction to basic concepts, tools, and languages for computer programming used by data scientists and other disciplines of Computer Science. This class will introduce students to computer programming and provide them with the basic skills and tools necessary to efficiently collect, process, analyze, and visualize datasets. Students will gain hands-on experience with de novo programming, finding and utilizing packages, and working in both interactive and non-interactive environments.

Course Learning Objectives

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

• Use basic data structures and concepts in computer programming;

• Tailor their choice of programming language and approach to a broad range of problems and

data types;

• Write and execute Python code in the Jupyter and Unix environments;

• Write and execute R code in the RStudio and Unix environments;

• Describe and use the directions and opportunities available to expand their expertise in

Python and R as well as the limitations of these languages;

• Communicate basic data science principles and methods to diverse audiences.

DASC 2213 Data Visualization and Communication

Course Description

Data Visualization and Communication is a seminar providing an essential element of data science: the ability to effectively communicate data analytics findings using visual, written, and oral forms. Students will gain hands-on experience using data visualization software and preparing multiple formats of written reports (technical, social media, policy) that build a data literacy and communication toolkit for interdisciplinary work. In essence, this is a course emphasizing finding and telling stories from data, including the fundamental principles of data analysis and visual presentation conjoined with traditional written formats.

Course Learning Outcome

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

• Design, build, and evaluate visualizations for different types of data, disciplines,

and domains.

• Use existing data visualization tools and techniques to analyze datasets.

• Evaluate a visualization solution based on quantitative metrics such as time and

error, as well as more complex and qualitative metrics.

• Combine visual and written forms of communication as inter-related data

analytics skills.

• Build an interactive website highlighting data analytics outcomes.

• Communicate basic data science principles and methods to diverse audiences.

DASC 1223 Intermediate Data Science

Course Description

This course provides an in-depth introduction to the essential elements of data science: data collection and management; summarizing and visualizing data; basic ideas of statistical inference; predictive analytics and machine learning. Students will continue their hands-on experience using the Python and R programming languages and Jupyter notebooks.

Prerequisite

CIST 1404 Programming I

Course Learning Outcomes

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

• list the steps involved in data science from data acquisition to insight and

describe the role of each step;

• distinguish different ways of collecting data and their impact on the conclusions

that can be drawn from the data;

• manage, summarize, and visualize data using R and/or Python programming

languages and Jupyter notebooks;

• explain the basic concepts of statistical inference and implement simulation-based inference methods;

• apply predictive models and machine learning methods and assess the quality of

predictions;

• communicate basic data science principles and methods to diverse audiences.

A.A.S Cybersecurity

Network Security

Course Description

This course introduces various topics of networking security. The course covers the basics of computer systems security infrastructure, cryptography, authentication and encryption, operating system security, malicious software, and viruses. This course will explore the International Standards Organizations Open System Interconnect (ISO OSI) network stack and discuss common security weaknesses, vulnerabilities, attack methods, and mitigation approaches. This course will provide a comprehensive list of security issues related to general networking design and development.

Course Learning Outcomes

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

- Explain information assurance as practiced in computer operating systems, distributed systems, networks, and representative applications.
- Apply prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.
- Describe cryptography, how it has evolved, and some key encryption techniques used today.
- Implement security policies (such as authentication, integrity, and confidentiality), as well as protocols to implement such policies in the form of message exchanges.