Course Title	Course Code	Credit Hours
Data Analytics for Engineers	AE-495	2-1

Textbooks:

- Avrim Blum, John Hopcroft, and Ravindran Kannan, "Foundations of Data Science", Cambridge University Press
- EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", John Wiley and Sons

Reference Books/Materials:

- Jeffrey S. Saltz, and Jeffrey M. Stanton, "An Introduction to Data Science", SAGE Publications
- Charles Russell Severance, Sue Blumenberg, Elliott Hauser, and Aimee Andrion, "Python for Everybody: Exploring Data using Python 3", Charles Severance
- Cathy O'Neil, and Rachel Schutt, "Doing Data Science; Straight Talk from the Frontline", O'Reilly Media

Course Objectives:

This course teaches students to gather, analyze, and apply data using scientific methods to solve real-world problems. Students will master various data analytics techniques, understand their limitations, and use these skills to guide decision-making and provide valuable insights.

Course Outline:

- Fundamentals of Data Science and Analytics Overview.
- Understanding Big Data and The Hype Surrounding Datafication.
- Current Landscape and Necessary Tools in Data Science.
- Statistical Inferences: Differences Between Populations and Samples.
- Introduction to Statistical Modeling and Probability Distributions.
- Exploratory Data Analysis Techniques and Their Importance.
- Overview of The Data Science Process and Singular Value Decomposition.
- Basic Machine Learning Algorithms: Linear Regression.
- K-Nearest Neighbors (K-NN) Algorithm: Principles and Applications.

- K-Means Clustering: Methodology and Use Cases.

- Naïve Bayes Classifier: Fundamentals and Applications.

- Feature Generation and Selection Techniques in Data Science.

- Dimensionality Reduction and Principal Component Analysis (PCA).

- Mining Social-Network Graphs: Clustering Techniques.

- Direct Discovery of Communities Within Social-Network Graphs.

- Partitioning of Graphs for Social Network Analysis, Analysis of Neighborhood Properties in Graph Structures, Basic Principles of Data Visualization and its Importance

- Tools and Ideas for Effective Data Visualization.

Ethical Issues in Data Science: Privacy, Security, and Future Considerations.