Foundational Courses

Foundational

TEDA 1021 SQL Fundamentals **3 Credits / 90 Clock-Hours**

This course provides a comprehensive understanding of SQL's foundational principles tailored for data analysis within relational databases. Students develop expertise in constructing SQL queries for data retrieval, focusing on pulling, filtering, aggregating, and joining datasets. Through hands-on projects, they'll apply these skills, learning to extract, filter, and manipulate data effectively, gaining a solid foundation in SQL's role within the realm of data analysis.

Objectives:
• Discuss relational database design layout within a DBMS environment.
• Identify various parts and purposes of SQL queries and keywords.
• Interpret the anticipated output of query requests based on the SQL statement.
• Construct simple SQL queries to pull and filter data in a relational database.
• Execute complex SQL queries to aggregate and join data from multiple tables.

TEDA 1031 Python Fundamentals **3 Credits / 90 Clock-Hours**

This course teaches fundamental Python skills tailored for data analysis, encompassing Python's core syntax, data structures, and procedural programming techniques. Students perform data cleaning, data manipulation, and exploratory analysis using industry-standard libraries, fostering expertise in managing, analyzing, and visualizing data. Through practical projects, learners refine their abilities, gaining confidence to proficiently handle, analyze, and present data using Python. This course cultivates real-world application skills and sharpens proficiency in data project documentation, serving as a strong foundation for future data science endeavors.

Objectives:
• Describe core Python syntax, data structures, and procedural programming concepts within a Python Integrated Development Environment (IDE).
• Identify specific features and functionalities of the Python IDE, becoming proficient in executing tasks and optimizing workflows within the development environment.
• Clean, manipulate, and analyze data using industry-standard libraries within a Python IDE.
• Illustrate statistical analysis techniques by incorporating loops, joins, functions and decision-making skills.
• Characterize relevant business conclusions as revealed by the data using plots, data frames and aggregation.
• Document and present the project's findings using standard documentation practices.

TEDA 1051 Data Visualization Fundamentals **2 Credits / 60 Clock-Hours**

This course teaches students the core principles of data visualization essential for data analysis. With a focus on practical application using industry-standard tools, participants learn to translate complex datasets into compelling visual stories. Covering visualization design fundamentals, data cleansing, exploration of interactive dashboards, and consistent ethical considerations, learners cultivate aptitude essential for creating impactful visualizations. Through hands-on projects, individuals refine their skills, gaining the ability to extract insights effectively and drive informed decision-making across diverse industries.

Objectives:
• Summarize navigation and tools required to create dashboards in the visualization tool.
• Demonstrate fundamental data cleansing techniques when importing data into the visualization tool, encompassing handling missing values, outliers, and ensuring a standardized data structure.
• Produce a variety of visualizations incorporating bar charts, scatter plots and more within the visualization program.
• Layout visualizations using design best practices ensuring clarity and engagement in visual communication.

TEDA 2051 Data Analytics Capstone Project **2 Credits / 60 Clock-Hours**

This course teaches students to harness their data analytics skills by undertaking a comprehensive capstone project. Using various tools and techniques learned throughout the course of this program, students demonstrate their ability to identify business questions, collect, clean, and analyze data. The culmination of this project involves presenting their meaningful insights and findings through a visualization tool, class presentation and written report.

Objectives:
• Conduct an analysis encompassing the entire data analytics project cycle, from formulating questions to presenting insights.
• Demonstrate problem-solving skills by acquiring, cleaning, and analyzing data to propose actionable solutions for business problems.
• Communicate findings effectively through reports and presentations, employing data visualization for clear and compelling explanations.
• Manage time efficiently by establishing clear objectives and outlining project milestones to ensure effective project management.

Supplemental Courses Varies by Institution

Bridgerland

TEDA 1025 Advanced SQL 2 **2 Credits / 60 Clock-Hours**

The Advanced SQL course equips students with the skills to manage and query relational databases using advanced techniques. Through hands-on projects, students gain experience designing and interacting with multi-dimensional databases and managing large datasets. Students who complete this course will be able to efficiently retrieve, analyze, and manage data in complex database environments.

Objectives:
• Implement optimization techniques to improve query performance.
• Use advanced SQL functions.
• Retrieve data using complex JOIN operations using CTEs and subqueries.
• Apply normalization and denormalization concepts in database design.
• Design industry standard data schemas.

TEDA 1036 Introduction to Machine Learning **2 Credits / 60 Clock-Hours**

This course teaches the fundamental principles and practical applications of machine learning for data analysis. Students study essential topics including data preprocessing, exploratory data analysis, and the core concepts of supervised and unsupervised learning. Participants perform regression, classification, and clustering techniques using real-world data. This lays the groundwork to start building machine learning pipelines and approaching data science tasks.

Objectives:
• Produce datasets for machine learning through preprocessing data techniques in Python such as handling missing data, outlier treatment and encoding categorical variables.
• Distinguish between supervised and unsupervised learning techniques, like regression, classification, and clustering, using Python.
• Construct machine learning models using Python libraries with real-world datasets.
• Evaluate machine learning models using various validation techniques in Python to gauge their performance and potential limitations.
• Execute end-to-end machine learning projects in Python, encompassing data preprocessing, model construction, evaluation, and drawing insights.

TEDA 1041 Advanced Python for Data Analytics **1 Credit / 30 Clock-Hours**

The Advanced Python for Data Analytics course builds upon the principles learned in Python Programming. In this course, students learn to access remote databases using Python. Students then use the data they have pulled to create, manipulate, and filter data using multiple industry standard
libraries essential for data analytics. Students also learn to create ad hoc visualizations with Python ok, code. Students who complete this course are able to use a variety of Python libraries in the data analytics industry to collect, clean, analyze, and present data.

Objectives:
• Create data visualizations using Python code.
• Use filters and aggregations to understand data.
• Use critical thinking to perceive data analytics problems and find their solutions.
• Explain data types and functions for analysis and the use of data.

TEDA 1065 Manufacturing Analytics — 2 Credits / 60 Clock-Hours

The Manufacturing Analytics course provides students with experience working as a data practitioner in the field of manufacturing. Utilizing real-world situations, they gain experience with the types of tasks which are required of data practitioners working in manufacturing. Students go through the data cycle with multiple sets of data and different situations that can arise in manufacturing situations. Students optimize manufacturing data and practice predictive maintenance. They access a Programmable Logic Controller (PLC)-driven manufacturing system to a database and process that data as though in a live working environment utilizing data analysis programs and techniques. Students who complete this course are able to work with manufacturing data.

Objectives:
- Apply techniques learned throughout the program on datasets from the field of manufacturing.
- Analyze data from multiple real-world scenarios.
- Present findings using a visualization tool.
- Setup data transfer from a PLC-driven manufacturing system to a database using Kepware.
- Analyze data in a manufacturing optimization scenario.
- Analyze data in a manufacturing predictive maintenance scenario.

TEDA 1080 Advanced Spreadsheets Analytics — 2 Credits / 60 Clock-Hours

This course will teach students how to use spreadsheets for data analysis. Students will learn how to pull data from the web into a spreadsheet and what to do with that data afterward. This will include how to find and filter information and how to use basic data-related tools used in industry for data analytics.. Students will learn how to create visualizations and dashboards in spreadsheets. We will also go over custom functions and macros to automate repeated tasks.

Objectives:
- Source data from the web into a spreadsheet.
- Prepare a raw dataset for analysis using spreadsheets.
- Employ tools for data searching, merging, splitting, and indexing.
- Use spreadsheet functions to answer questions about a dataset.
- Use PivotTables to identify important data points.
- Create dashboards and visualizations to describe data.
- Use spreadsheets to create statistical calculations.
- Create custom tools and workflows with scripting and macros.

TEDA 1900 Externship **2 Credits / 90 Clock-Hours**

The Externship course gives students real-world experience in a work-based environment. Entry-level data practitioner skills such as data collection, data cleaning, data transformation, data visualization, and/or data storytelling are utilized in a non-simulated work environment. Students coordinate with faculty and business partners to define or analyze key goals and scope of the externship as well as stakeholder needs. At the end of their externship, students present an example of what they have completed within the time frame of the externship. Work-based activities will be provided by cooperating businesses. Students who complete this course have real world experience applying what they have learned throughout their time in the program.

Objectives:
• Apply techniques learned throughout the program to collect, clean, transform, and analyze real world data.
• Present findings using a visualization tool.
• Utilize the data cycle in a live work-based environment.
• Use company defined programs and data to complete job duties within the scope of data analytics-related work.
• Demonstrate ability to follow reasonable employer directions and/or mandates.

TEDA 2902 Special Applications **2 Credits / 60 Clock-Hours**

The Special Applications course gives students the opportunity to expand their knowledge in a specific industry or skill. The student participates in defining how this information applies to data analytics and demonstrates how the skills learned within the Data Technology program relate to this knowledge or skill.
Students will also provide context and industry relevance to provide value to the experience. Students will compile a report on the data analysis opportunities observed throughout the course and how their data analytics knowledge affects their understanding of the situation. Students who complete this course are able to expand their knowledge in a specific industry or skill related to data analytics.

Objectives:
• Illustrate context of industry-relevance and data analysis opportunities.
• Define data analysis opportunities within a specific industry or skill.
• Report on observed data analysis opportunities.
• Identify the data analysis tool(s) best used within the scope of the course.

Mountainland

TEDA 1000 Introduction to Data Analytics **1 Credit / 30 Clock-Hours**

This course covers the basics of data analytics, utilizing spreadsheets, statistics, and exploratory data analysis. Students journey through the data analytics project cycle by defining the problem, preparing the information, analyzing the data, visualizing insights and presenting results. As they engage in this course, students organically develop problem-solving acumen and hone critical thinking skills essential for data analysis.

Objectives:
• Describe the data analytics project cycle.
• Explain the role of spreadsheets for practical data analysis.
• Practice gathering, cleaning, and examining data.
• Calculate descriptive statistics for numerical and categorical variables.
• Illustrate meaningful results and communicate them effectively through informative visualizations and presentations to peers.

TEDA 1011 Spreadsheet Fundamentals **2 Credits / 60 Clock-Hours**

This course teaches essential spreadsheet skills for data analysis while integrating basic statistical principles. Students become proficient in spreadsheet functionalities such as data entry, formatting, and formula use, progressing to techniques like identifying outliers, employing descriptive statistics, examining relationships between variables, and harnessing the power of pivot tables for comprehensive data summarization and analysis using spreadsheets. Through practical exercises and real-world case studies, students learn to navigate spreadsheet software effectively, analyze data sets, and derive meaningful insights, culminating in the ability to apply statistical concepts within spreadsheet environments for informed decision-making and analysis.

Objectives:
• Recognize basic functions and tools within a spreadsheet environment.
• Develop analytical reasoning by identifying and addressing data challenges methodically, applying statistical techniques to derive meaningful conclusions.
• Describe how to view, enter and edit data, including moving, copying and filling data.
• Demonstrate fundamental statistical concepts within spreadsheets, calculating descriptive statistics, and quantifying relationships between variables.

TEDA 1036 Introduction to Machine Learning **2 Credits / 60 Clock-Hours**

This course teaches the fundamental principles and practical applications of machine learning for data analysis. Students study essential topics including data preprocessing, exploratory data analysis, and the core concepts of supervised and unsupervised learning. Participants perform regression, classification, and clustering techniques using real-world data. This lays the groundwork to start building machine learning pipelines and approaching data science tasks.

Objectives:
• Produce datasets for machine learning through preprocessing data techniques in Python such as handling missing data, outlier treatment and encoding categorical variables.
• Distinguish between supervised and unsupervised learning techniques, like regression, classification, and clustering, using Python.
• Construct machine learning models using Python libraries with real-world datasets.
• Evaluate machine learning models using various validation techniques in Python to gauge their performance and potential limitations.
• Execute end-to-end machine learning projects in Python, encompassing data preprocessing, model construction, evaluation, and drawing insights.

TEDA 1052 Data Visualization Fundamentals II **1 Credit / 30 Clock-Hours**

This course teaches students the core principles of data visualization essential for data analysis. With a focus on practical application using industry-standard tools, participants learn to translate complex datasets into compelling visual stories. Covering visualization design fundamentals, data cleansing, exploration of interactive dashboards, and consistent ethical considerations, learners cultivate aptitude essential for creating impactful visualizations. Through hands-on projects, individuals refine their skills, gaining the ability to extract insights effectively and drive informed decision-making across diverse industries.

Objectives:
• Implement interactive features and design dashboards or reports that facilitate user engagement, enabling intuitive exploration and understanding of data.
• Extract meaningful insights and build visualizations to solve real-world data challenges within the tool to address specific business or analytical needs.
• Ensure ethical data handling and transparent communication of insights, maintaining accuracy and adhering to ethical standards while conveying findings to diverse stakeholders.

TEDA 1071 R Fundamentals **2 Credits / 60 Clock-Hours**

This course equips students with essential R programming skills for effective data analysis. Beginning with foundational R syntax and data structures, learners progress to topics such as data cleaning, data manipulation, and exploratory data analysis through relevant statistical packages. Engaging in hands-on projects, students become capable in data handling, analysis, and visualization techniques using an IDE.

Objectives:
• Describe core R syntax, data structures and programming concepts.
• Identify specific features and functionalities of the R IDE.
• Clean, manipulate, and analyze data using industry-standard libraries within an R learning environment.
• Practice incorporating statistical analysis techniques including calculating descriptive statistics, performing hypothesis tests and linear regression.
• Articulate and present the project's analysis and findings effectively using data visualization skills and clear documentation.

TEDA 1090 Introduction to Database Design **2 Credits / 60 Clock-Hours**

This course familiarizes students with practical techniques in designing, constructing, and managing database systems. Through exploration of database design, development, and management, students explore strategies that optimize stored data, ensuring its integrity and maximizing its value. By learning these skills, students gain proficiency in creating, implementing, and maintaining databases crucial for efficient information systems.

Objectives:
• Apply essential database design principles, including normalization, within a DBMS environment on a sample database.
• Implement, manage, and modify databases using SQL in a DBMS, ensuring data integrity and structure.
• Modify database efficiency within a DBMS by refining queries and structures.
• Troubleshoot and address database-related issues within a DBMS setting.

TEDA 2052 Data Analytics Capstone Project Elective **2 Credits / 60 Clock-Hours**

This course teaches students to harness their data analytics skills by undertaking a comprehensive capstone project. Using various tools and techniques learned throughout the course of this program, students demonstrate their ability to identify business questions, collect, clean, and analyze data. The culmination of this project involves presenting their meaningful insights and findings through a visualization tool, class presentation and written report.

Objectives:
• Conduct an analysis encompassing the entire data analytics project cycle, from formulating questions to presenting insights.
• Demonstrate problem-solving skills by acquiring, cleaning, and analyzing data to propose actionable solutions for business problems.
• Communicate findings effectively through reports and presentations, employing data visualization for clear and compelling explanations.
• Manage time efficiently by establishing clear objectives and outlining project milestones to ensure effective project management.

TEAM 1590 Introduction to Statistical Process Control **1 Credit / 30 Clock-Hours**

Statistical Process Control is an introduction to statistical process control (SPC) for students interested in semiconductor careers, as well as those who wish to gain an overview of basic SPC practices. Semiconductor focused students will gain basic knowledge to maintain control of critical manufacturing processes. Course material includes overview and benefit, common cause vs. special cause variation, distributions and histograms, basic statistics, process capability, standard deviation, sigma, and control chart basics.

Objectives:
• Define and use basic statistics such as mean, median, standard deviation, normal (bell curve) vs. skewed distributions.
• Identify difference between control and spec limits.
• Process capability.

TEAM 1840 Introduction to Semiconductor Manufacturing **2 Credits / 60 Clock-Hours**

Introduction to Semiconductor Manufacturing is a course for students interested in semiconductor careers, as well as those who wish to gain an overview of basic semiconductor processing. Semiconductor focused students will gain basic knowledge of overall process flow and logic gate device functionality. Course material includes definition of a semiconductor, n-type and p-type doping, geometries and units of measure, basic semiconductor manufacturing, process module overviews, clean room overview and protocols, and automated material handling system (AMHS) overview.

Objectives:
• Identify semiconductor basics.
• Define N-type, P-type doping, PN junction.
• Identify MOSFET/CMOS structure and logic gate function.