

# CDS - DATA SCIENCE

## CDS 2413 Programming for Data Science (2-2-3)

Building a strong foundation in data science programming skills, including data science lifecycle, question formulation, data collection and cleaning, exploratory data analysis and visualization, statistical inference prediction, and decision-making. Demonstrating skills in data engineering, such as writing correct code, working with version control tools, testing, and debugging. Emphasizing tackling real-world data science problems as found in the industry.

**Prerequisites:** (ICT 2013 or CIS 1603), CIS 1703

## CDS 2433 Business Process Modeling and Optimization (2-2-3)

Developing students' knowledge and skills to use a Business Process Modeling tool to initially implement and then to continuously evaluate techniques and tools that support the planning, design, analysis, operation, and monitoring of business processes. Also, students will be able to apply core models that guide the development of process-based systems: Business Process, Business Decision, Business Process Architecture, and Business Data Model.

**Prerequisites:** CIS 2113

## CDS 2443 Advanced Database Systems (2-2-3)

Applying theoretical and applied principles of relational database design to conceptualize, design and build a database free of data anomalies using stored procedures, functions, and triggers while securing the database. Describing how to maintain consistency and concurrency among data in a multi-user database environment and compare different concurrency modes' tradeoffs.

## CDS 3513 Data Mining Techniques (2-2-3)

Prepares and preprocesses data related to real business problems to derive predictive, descriptive, and prescriptive models. Identifies useful patterns in datasets using descriptive analytics tools and presents them in easy-to-interpret visualizations within dashboards for tactical decisions. Extracts hidden knowledge from datasets by applying suitable data mining algorithms for strategic planning decisions. Ensures compliance with data privacy and ethical principles. Utilizes data-driven methodologies, including SEMMA and CRISP-DM, to solve real business cases.

**Prerequisites:** CDS 2443, CDS 2413

## CDS 3523 Statistical Inference (2-2-3)

This course introduces statistical inference methods for numerical and categorical data. Students will gain knowledge and skills to infer the properties of a population by testing hypotheses and deriving estimates. Using practical techniques and statistical software, students will perform parametric and non-parametric statistical tests to interpret and report results for both categorical and numerical data.

**Prerequisites:** CIS 1703, (CIS 1603 or ICT 2013)

## CDS 3533 Big Data Analytics (2-2-3)

Equips students with skills to navigate and extract insights from extensive datasets through big data analytics. Investigates methodologies and tools for obtaining, preprocessing, and analyzing complex datasets via theoretical discourse and practical exercises. Covers big-data frameworks like High-Performance Computing (HPC), computing ethics, and sustainability. Assesses data analytics models' efficacy in real-world situations. Develops practical skills and understanding of big data analytics, preparing students for data-driven decision-making in various industries.

**Prerequisites:** CIS 1303 or CDS 2443

## CDS 3543 Data visualization for Decision making (2-2-3)

Utilizes visual representations to reveal the structure of large datasets, leveraging human visual perception. Emphasizes statistical data exploration, model fitting to produce specialized graphs, and detailed, statistics-oriented analysis. Employs tools such as Python, R, and Tableau for data visualization. Develops skills in presenting data comprehensively and aesthetically to support decision-making and convey compelling data narratives.

**Prerequisites:** CIS 1703, CIS 1603

## CDS 3613 Enterprise Solution Management (2-2-3)

Equips students with the knowledge and skills to integrate Enterprise Solution Management concepts with data science techniques. Covers fundamentals and their business applications, focusing on data-driven decision making. Analyzes organizational impacts and optimizes business processes using data science methodologies. Involves designing implementation plans with data science tools to enhance business efficiency. Through case studies and simulations, students gain practical experience in real-world scenarios.

**Prerequisites:** CDS 2433

## CDS 3623 Data Mining for Enterprise Solutions (2-2-3)

Builds upon foundational data mining concepts, utilizing state-of-the-art software to analyze data and extract valuable insights. Develops skills through hands-on projects and practical applications, enabling students to identify patterns, trends, and opportunities in business domains such as CRM and digital marketing. Enhances strategic decision-making and improves enterprise performance.

**Prerequisites:** CDS 2433, CDS 3513

## CDS 3633 Machine Learning for Business Analytics (2-2-3)

Equip students with a sound understanding of the principles of machine learning and a range of popular approaches, along with the knowledge of how and when to apply the techniques. This course focuses on machine learning as an integral tool for data science, including how to use data to automatically understand the world, make complex decisions, and even predict the future. Several algorithms will be introduced along with which language (Python or R) is better suited for which algorithm based on the particular goal in mind. Programming language(s) will be used.

**Prerequisites:** CIS 3413 or CDS 3513

## CDS 3643 Time Series Analysis and Forecasting (2-2-3)

Equip students with various forecasting techniques and knowledge on modern statistical methods for analyzing time-series data. Students will learn several important tools to provide trend analytics and forecasting based on past data and time series. Students will then be able to apply the tools and techniques of time series analysis to complex problems to reach effective solutions.

**Prerequisites:** CDS 3523

## CDS 4716 Apprenticeship I (1-20-6)

The Apprenticeship I course is a vital and engaging component of the HCT curriculum, integrating practical On-the-Job experience as a graduation requirement. Students are placed in carefully chosen Industrial Hosting Companies to gain real-world experience through a structured program. As a formal course, it requires each student to complete a minimum of 20 hours onsite per week throughout a regular semester.

**Prerequisites:** CDS 2433

**CDS 4723 Capstone Project I (1-3-3)**

Students form teams to explore new and innovative ideas and define their project. They apply their knowledge of the development life cycle, project management, development tools, and skills gained throughout the program to propose, plan, analyze, and design an innovative IS solution in response to an identified organizational or community need. Students complete project milestones and outcomes under supervision of a faculty and an industry mentor. Students are evaluated on each project phase and their ability to communicate, work in a team, and apply project management tools.

**Prerequisites:** CIS 3603, CDS 3513

**Corequisites:** CDS 4716

**CDS 4733 Business Process Automation (2-2-3)**

This work-integrated course equips students with the skills necessary to automate business processes using workflow automation tools. Students will gain hands-on experience in identifying repetitive tasks for automation, building robust workflows that seamlessly integrate with various applications and external data sources, and leveraging automation to enhance collaboration, improve decision-making through data analysis, and optimize resource allocation.

**Prerequisites:** CDS 2433

**Corequisites:** CDS 4716

**CDS 4816 Apprenticeship II (1-20-6)**

The Apprenticeship II course is a crucial part of the HCT curriculum, offering practical On-the-Job experience as a graduation requisite. Students engage in a structured program at selected Industrial Hosting Companies, completing a minimum of 20 hours onsite weekly for a semester. With guidance from both host organization staff and HCT mentors, students apply Data Science practices and skills from their studies in a real-world environment.

**Prerequisites:** CDS 4716

**CDS 4823 Capstone Project II (1-3-3)**

The Capstone project is carried forward from the previous semester with student teams moving to the development, testing, and implementation of their project designs. Students continue to complete project milestones under the supervision of faculty and an industry mentor. They are evaluated on their ability to develop solutions based on their design, test the proposed solutions, and implement them. Students are expected to demonstrate skills in knowledge integration, application/system development, entrepreneurship, communication, self-management, and collaborative teamwork.

**Prerequisites:** CDS 4723

**Corequisites:** CDS 4816

**CDS 4833 IT and Data Strategy and Governance (2-2-3)**

Develops the skills students need to conceive, execute, and oversee IT strategies aligned with organizational objectives. Utilizes a versatile online format, blending live sessions, case studies, discussions, and hands-on workplace apprenticeships. Covers key concepts, frameworks, and practices in IT strategy development and administration. Engages students in practical exercises to implement industry-proven frameworks and optimize best practices for comprehensive IT strategic planning.

**Prerequisites:** CDS 2433

**Corequisites:** CDS 4816