CIS C290: DATA SCIENCE AND MACHINE LEARNING

Item	Value
Curriculum Committee Approval Date	03/21/2025
Top Code	070800 - Computer Infrastructure and Support
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)

Course Description

This course introduces students to the core concepts and techniques of data science and machine learning, exploring their application across various industries. Through hands-on projects and technical assignments, students will gain practical experience in developing algorithms and applying data science methods. The course will also cover career opportunities and emerging trends in the field, helping students understand the evolving landscape of data science and machine learning. Enrollment Limitation: ICS C290; students who complete CIS C290 may not enroll in or receive credit for ICS C290. ADVISORY: ICS C165 and CIS C157 and CIS C270. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Describe data science and machine learning concepts.
2. Identify appropriate data science and machine learning models and algorithms for a given scenario.
3. Apply data science and machine learning techniques to relevant business situations.

Course Objectives

- 1. Understand the origins and practical application of data science and machine learning.
- 2. Describe how to match machine learning algorithms to data.
- 3. Explain data preprocessing techniques, such as handling missing values, encoding categorical variables, imputing data, and scaling features.
- 4. Present appropriate data science and machine learning models and algorithms as applicable to different situations.
- 5. Apply data science and machine learning processes to answer practical business questions.
- 6. Demonstrate the use of industry-recognized data science and machine learning applications across the data science lifecycle.

Lecture Content

Intro to Data Science Intro to Machine Learning Data Science Lifecycle Data Exploration Data Collection and Preprocessing Classification Models Regression Association Clustering Model Evaluation Text Mining Deep Learning Recommendation Engines Time Series Forecasting Anomaly Detection Feature Selection

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

This course will utilize a combination of lecture, hands-on guided assignments, classroom/discussion student interactions, problem solving, quizzes, tests, and troubleshooting assignments to achieve the goals and objectives of this course. All instructional methods are consistent across all modalities.

Reading Assignments

The Data Science Process Introduction to Machine Learning Data Science with R Machine Learning with R Managing and Understand Data Lazy Learning Probabilistic Learning Advanced Methods Forecasting Numeric Data Evaluating Models Specialized Machine Learning Topics

Writing Assignments

Portfolio Project Presentations using R-Project Machine Learning Course Reflections

Out-of-class Assignments

Comparing and contrasting data science and machine learning techniques Develop machine learning and data science processes using R-Project Data forecasting technical assignments with R-Project Evaluate different data modeling techniques Students will complete labs using a data science platform: Install the application Load data Execute classification models Perform cluster analysis Conduct regression analysis Complete a model evaluation Complete a time series analysis Perform text analysis Conduct a feature selection algorithm

Demonstration of Critical Thinking

Students will provide critical feedback for other's projects and well-known data science and machine learning techniques discussed in class.

Required Writing, Problem Solving, Skills Demonstration

Skills will be demonstrated during presentations throughout the course. Presentations include PowerPoint slides and portfolio presentations created by individual and student teams, presentations, and other visual demonstration of the materials they have created.

Eligible Disciplines

Computer information systems (computer network installation, microcomputer ...: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Computer science: Master's degree in computer science or computer engineering OR bachelor's degree in either of the above AND master's degree in mathematics, cybernetics, business administration, accounting or engineering OR bachelor's degree in engineering

AND master's degree in cybernetics, engineering mathematics, or business administration OR bachelor's degree in mathematics AND master's degree in cybernetics, engineering mathematics, or business administration OR bachelor's degree in any of the above AND a master's degree in information science, computer information systems, or information systems OR the equivalent. Note: Courses in the use of computer programs for application to a particular discipline may be classified, for the minimum qualification purposes, under the discipline of the application. Master's degree required. Computer service technology: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience.

Textbooks Resources

1. Required Kotu, V. Deshpande, B. Data Science: Concepts and Practice, 2nd ed. Morgan Kaufmann, 2018 Rationale: Low cost option and provides open-source data science applications.

Other Resources

1. Coastline Library 2. OER - Open Educational Resources