**COURSE LEARNING OUTCOMES:**

COURSE NUMBER & NAME: CST-235 Data Visualization

LECTURE/LAB HOURS: 2 hours lecture and 2 hours lab

CREDITS:3 Credits

PREREQUISITES: MAT 143, MAT 144, CST 161, CST 206

COURSE DESCRIPTION: This course examines the principles and practices of data visualization equipping students with skills to effectively communicate insights from complex datasets. The course covers concepts in data visualization, including graphical perception, design principles, and the use visualizations tools. Students will gain hands-on experience creating a variety of visualizations.

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

1. Acquire a deep understanding data visualization technique encompassing dashboards, graphs, charts, and maps for big data sets.
2. Utilize exploratory data analysis techniques and implement transformations to uncover patterns and anomalies in the dataset.
3. Identify challenges and issues related to missing data.
4. Analyze the outcomes obtained through the utilization of data science techniques.
5. Demonstrate proficiency in conducting multivariate analysis to investigate and explore relationships among multiple variables.

**COURSE MATERIALS**:

Data Visualization: Exploring and Explaining with Data by Jeffer D. Camm, James K. Cochran, Michael J. Fry, Jeffrey W. Ohlmann 1st edition | Copyright 2022

ISBN:978-0-357-63134-8

Publisher: Cengage Learning

**COURSE REQUIREMENTS:** *(e.g., field trips, lab requirements, technology or special equipment requirements, extra expenses)*

* Internet access to login to Canvas LMS
* USB drive or cloud storage, such as Microsoft OneDrive or Google Drive to save all assignments.

UCNJ Union College of Union County, NJ does not discriminate and prohibits discrimination, as required by state and/or federal law, in all programs and activities, including employment and access to its career and technical programs.

**Experiential Learning:**

Students must complete an experiential learning activity that connects course content to career applications. This activity may be a content specific assignment or practical skill that is applied within a course assignment. This assignment supports the general education learning outcomes of scientific/critical thinking and quantitative reasoning; oral and written communication; and information literacy/technological competency.

**Americans with Disabilities Act (ADA):**

UCNJ Union College of Union County, NJ offers reasonable accommodations and/or services to persons with disabilities. Any student who has a documented disability and wishes to self-identify should contact the Director of Universal Accessibility Services and Veterans Affairs at (908) 709-7164, or email [accessibility@ucc.edu](mailto:accessibility@ucc.edu). Accommodations are individualized and in accordance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1992. In order to receive accommodations, students must be registered with Universal Accessibility Services. Students should register with the office as soon as possible. Accommodations are not official until the Faculty Accommodations Alert Form(s) are issued from the student to his/her instructor(s).

**Family Educational Rights and Privacy Act (FERPA):**

The FERPA Statement can be found at <https://www.ucc.edu/admissions/the-family-education-rights-and-privacy-act/>.

UCNJ Mission Statement:  **Transforming Our Community. . . One Student at a Time**

### Course Grades & Grading Policy:

|  |  |
| --- | --- |
| Evaluation Elements for \*\*\*\* Semester | |
| **Evaluation Element** | **Weight** |
| (3) Exams | 30% |
| (1) Final | 20% |
| Group Projects | 25% |
| Writing assignments/Labs | 20% |
| Class attendance & participation | 5% |

EVALUATION METHODS: *(e.g., exams, essays, quizzes, portfolios)*

CLASS SCHEDULE**:**

|  |  |  |
| --- | --- | --- |
| Week | Unit/Content | Learning Activities |
| 1 | Course Introduction  Review Canvas  Data Visualization Overview | Read course syllabus.  Login to Canvas  Chapter 1 |
| 2 | Selecting a Chart Type Review | Read Chapter 2 in the book, selecting a Chart Type Review, and complete all the assignments described on Canvas |
| 3 & 4 | Data Visualization and Design | Read Chapter 3, in the Books, Data Visualization and Design, and complete all assignments described on canvas  Data Science Group Project 1 |
| 5 | Exam 1 | Chapter 1,2, and 3 |
| 5 & 6 | Purposeful Use of Color | Read Chapter 4 in the Books, Purposeful Use of Color, and complete all assignments described on canvas |
| 7 | Visualizing Variability | Read Chapter 5 in the Books, Visualizing Variability, and complete all assignments described on canvas |
| 8 | Exploring Data Visually | Read Chapter 6 in the Books, Exploring Data Visually, and complete all assignments described on canvas.  Group Project 2 |
| 8 | Exam 2 | Chapters 4, 5 and 6 |
| 8 & 9 | Explaining Visually to Influence with Data | Read Chapter 7 in the Books, Explaining Visually to Influence with Data, and complete all assignments described on canvas |
| 9 & 10 | Data Dashboards | Read Chapter 8 in the Books, Data Dashboards, and complete all assignments described on canvas |
| 11 | Exam 3 | Chapters8, 9, and 10 |
| 12 &13 | Telling the Truth with Data Visualization | Read Chapter 9 in the Books, Telling the Truth with Data Visualization, and complete all assignments described on canvas  Group Project 3 |
| 13 & 14 | Telling the Truth with Data Visualization and  Review | Read Chapter 9 in the Books, Telling the Truth with Data Visualization, and complete all assignments described on canvas  Group Project 3 |
| 15 | Final Exam |  |

SUGGESTED TEACHING METHODOLOGIES: (e.g. group presentations, research paper, lecture)

MAPPING COURSE LEARNING OUTCOMES

to LEARNING ACTIVITIES and EVALUATION METHODS

|  |  |  |
| --- | --- | --- |
| **Course Learning Outcomes (CLOs)** | **Learning Activities** | **Evaluation Methods** |
| Acquire a deep understanding data visualization technique encompassing dashboards, graphs, charts, and maps for big data sets | Assess students' mastery of data visualization techniques by assigning dashboard development projects and analyzing graph, chart, and map visualizations created for big datasets, evaluating the effectiveness, clarity, and insights derived from their visualizations. | Written: Tests, research paper, assignments.  Verbal: Discussion/Presentations, case reviews.  Peer Review.  Lab.  Capstone Project |
| Utilize exploratory data analysis techniques and implement transformations to uncover patterns and anomalies in the dataset. | Assign exploratory data analysis (EDA) projects where students implement data transformations and apply techniques to uncover patterns and anomalies in datasets, evaluating their depth of analysis, transformation effectiveness, and insights gained. | Written: Tests, research paper, assignments.  Verbal: Discussion/Presentations, case reviews.  Peer Review.  Lab.  Capstone Project |
| Identify challenges and issues related to missing data. | Facilitate projects where students analyze datasets with missing values to identify challenges and issues related to missing data, and implement data imputation techniques to address missingness, assessing their understanding and application of missing data concepts. | Written: Tests, research paper, assignments.  Verbal: Discussion/Presentations, case reviews.  Peer Review.  Lab.  Capstone Project |
| Analyze the outcomes obtained through the utilization of data science techniques. | Evaluate students through projects where they analyze real-world datasets or case studies, gauging their ability to apply data science techniques effectively, interpret the outcomes, and draw meaningful insights. | Written: Tests, research paper, assignments.  Verbal: Discussion/Presentations, case reviews.  Peer Review.  Lab.  Capstone Project |
| Demonstrate proficiency in conducting multivariate analysis to investigate and explore relationships among multiple variables. | Review students through projects and case studies where they apply multivariate analysis techniques to investigate relationships among multiple variables, evaluating their proficiency in analysis methods, interpretation of results, and ability to draw meaningful insights | Written: Tests, research paper, assignments.  Verbal: Discussion/Presentations, case reviews.  Peer Review.  Lab.  Capstone Project |

*Please note: all programs must integrate in one or more courses, discipline-specific course learning outcomes that reflect the College learning outcomes of scientific/critical thinking and quantitative reasoning, oral/written communication, and information literacy.*

REVISED: June 2022

**Academic Policies:**

**See College Catalog for more information:** [**http://onlinecatalog.ucc.edu/index.php**](http://onlinecatalog.ucc.edu/index.php)

**Equal Opportunity Statement**

UCNJ Union College of Union County, NJ does not discriminate and prohibits discrimination, as required by state and/or federal law, in all programs and activities, including employment and access to its career and technical programs.