



**El Camino College**  
**COURSE OUTLINE OF RECORD – Official**

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| <b>Subject:</b>                     | CIS                                                                                                                                                                                                                                                                                            |
| <b>Course Number:</b>               | 172                                                                                                                                                                                                                                                                                            |
| <b>Descriptive Title:</b>           | Data Visualization                                                                                                                                                                                                                                                                             |
| <b>Division:</b>                    | Business                                                                                                                                                                                                                                                                                       |
| <b>Department:</b>                  | Computer Information Systems                                                                                                                                                                                                                                                                   |
| <b>Course Disciplines:</b>          | Computer Information Systems                                                                                                                                                                                                                                                                   |
| <b>Catalog Description:</b>         | This course is an introduction to the effective presentation and communication of data. Students learn theory and techniques of data visualization. Students design and create static and interactive visualizations, data dashboards, and reports using standard data visualization packages. |
| <b>Prerequisite:</b>                | CIS 171                                                                                                                                                                                                                                                                                        |
| <b>Co-requisite:</b>                |                                                                                                                                                                                                                                                                                                |
| <b>Recommended Preparation:</b>     |                                                                                                                                                                                                                                                                                                |
| <b>Enrollment Limitation:</b>       |                                                                                                                                                                                                                                                                                                |
| <b>Hours Lecture (per week):</b>    | 2                                                                                                                                                                                                                                                                                              |
| <b>Hours Laboratory (per week):</b> | 3                                                                                                                                                                                                                                                                                              |
| <b>Outside Study Hours:</b>         | 4                                                                                                                                                                                                                                                                                              |
| <b>Total Course Hours:</b>          | 90                                                                                                                                                                                                                                                                                             |
| <b>Course Units:</b>                | 3                                                                                                                                                                                                                                                                                              |
| <b>Grading Method:</b>              | Letter Grade only                                                                                                                                                                                                                                                                              |
| <b>Credit Status:</b>               | Credit, degree applicable                                                                                                                                                                                                                                                                      |
| <b>Transfer CSU:</b>                | Yes                                                                                                                                                                                                                                                                                            |
| <b>Effective Date:</b>              | propose                                                                                                                                                                                                                                                                                        |
| <b>Transfer UC:</b>                 | Yes                                                                                                                                                                                                                                                                                            |
| <b>Effective Date:</b>              | propose                                                                                                                                                                                                                                                                                        |
| <b>General Education ECC:</b>       |                                                                                                                                                                                                                                                                                                |
| <b>Term:</b>                        |                                                                                                                                                                                                                                                                                                |
| <b>Other:</b>                       |                                                                                                                                                                                                                                                                                                |
| <b>CSU GE:</b>                      |                                                                                                                                                                                                                                                                                                |
| <b>Term:</b>                        |                                                                                                                                                                                                                                                                                                |
| <b>Other:</b>                       |                                                                                                                                                                                                                                                                                                |
| <b>IGETC:</b>                       |                                                                                                                                                                                                                                                                                                |
| <b>Term:</b>                        |                                                                                                                                                                                                                                                                                                |
| <b>Other:</b>                       |                                                                                                                                                                                                                                                                                                |

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| <b>Student Learning Outcomes:</b> | <ol style="list-style-type: none"><li>1. <b>Data Visualization Concepts:</b> Demonstrate an understanding of the fundamentals of data visualization.</li><li>2. <b>Data Visualization Application:</b> Apply the methods, techniques to create visualizations using a data visualization package.</li><li>3. <b>Dynamic Data Communication:</b> Communicate the results of data analysis through dynamic data visualization techniques, including methods such as drill-down, drill-through, and data dashboards; present and critique results.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Course Objectives:</b>         | <ol style="list-style-type: none"><li>1. Identify the theory and techniques used in data visualization.</li><li>2. Connect to data sources and prepare data for visualization.</li><li>3. Design and create visualizations using a data visualization package.</li><li>4. Understand and apply dynamic visualization techniques such as drill-down and drill-through.</li><li>5. Design and create data dashboards.</li><li>6. Communicate analysis insight through data visualization to an intended audience.</li></ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Major Topics:</b>              | <div><b>I. Introduction to Data Visualization (Lecture, 3 hours)</b><br/><br/><div>A. Data visualization description<br/>B. Exploratory and explanatory visualizations<br/>C. Principles of visual perception</div></div> <div><b>II. Introduction to Visualization Applications (Lecture, 9 hours)</b><br/><br/><div>A. Visualization application features<br/>B. Basic data objects<br/>C. Implementing common visualization types<br/>D. Visualization customizations</div></div> <div><b>III. Data Preparation (Lecture, 6 hours)</b><br/><br/><div>A. Importing and linking data<br/>B. Cleaning data<br/>C. Filtering data<br/>D. Data transformations for enhanced visualizations</div></div> <div><b>IV. Visualization Design (Lecture, 6 hours)</b><br/><br/><div>A. Storytelling with data<br/>B. Common graphical representations<br/>C. Selecting the right chart type<br/>D. Effective design techniques</div></div> <div><b>V. Developing Dynamic Visualizations (Lecture, 6 hours)</b><br/><br/><div>A. Comparison of static and dynamic visualizations<br/>B. Dynamic visualization best practices<br/>C. Creating interactive visualizations</div></div> |

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|  | D. Designing Data Dashboards                                                                                                                                                                                                                                   |
|  | <b>VI. Sharing Visualizations (Lecture, 3 hours)</b>                                                                                                                                                                                                           |
|  | <ul style="list-style-type: none"> <li>A. Customizing visualizations for the intended audience</li> <li>B. Publishing techniques</li> <li>C. Maintenance considerations</li> </ul>                                                                             |
|  | <b>VII. Real-World Applications and Considerations (Lecture, 3 hours)</b>                                                                                                                                                                                      |
|  | <ul style="list-style-type: none"> <li>A. Ethical considerations (data honesty, privacy, etc.)</li> <li>B. Design best practices</li> <li>C. Case studies from industry</li> </ul>                                                                             |
|  | <b>VIII. Introduction to Visualization Applications (Lab, 9 hours)</b>                                                                                                                                                                                         |
|  | <ul style="list-style-type: none"> <li>A. Application installation and configuration</li> <li>B. Basic data objects</li> <li>C. Implementing common visualization types</li> <li>D. Visualization customizations</li> </ul>                                    |
|  | <b>IX. Data Preparation (Lab, 12 hours)</b>                                                                                                                                                                                                                    |
|  | <ul style="list-style-type: none"> <li>A. Connecting to data sources</li> <li>B. Importing and linking data</li> <li>C. Cleaning and filtering data</li> <li>D. Metadata</li> <li>E. Calculated fields and parameters</li> </ul>                               |
|  | <b>X. Visualization Design (Lab, 6 hours)</b>                                                                                                                                                                                                                  |
|  | <ul style="list-style-type: none"> <li>A. Common graphical representations</li> <li>B. Selecting the right chart type</li> <li>C. Implementing visualization design techniques</li> <li>D. Customizing visualizations with tooltips and annotations</li> </ul> |
|  | <b>XI. Developing Dynamic Visualizations (Lab, 12 hours)</b>                                                                                                                                                                                                   |
|  | <ul style="list-style-type: none"> <li>A. Creating drilldowns and drill-throughs</li> <li>B. Implementing actions, dynamic filters, and parameters</li> <li>C. Building Data Dashboards</li> <li>D. Customizing dashboard layout</li> </ul>                    |
|  | <b>XII. Sharing Visualizations (Lab, 6 hours)</b>                                                                                                                                                                                                              |
|  | <ul style="list-style-type: none"> <li>A. Customizing visualizations for the intended audience</li> <li>B. Publishing and exporting</li> <li>C. Configuring and sharing published dashboards</li> </ul>                                                        |

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|                                                               | <b>XIII. Real-World Applications and Considerations (Lab, 9 hours)</b><br><br>A. Creating a dashboard based on a real-world dataset<br>B. Presenting projects and providing feedback                                                                                                                                                                                               |
| <b>Total Lecture Hours:</b>                                   | 36                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Total Laboratory Hours:</b>                                | 54                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Total Hours:</b>                                           | 90                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Primary Method of Evaluation:</b>                          | 2) Problem solving demonstrations (computational or non-computational)                                                                                                                                                                                                                                                                                                             |
| <b>Typical Assignment Using Primary Method of Evaluation:</b> | Use one of the provided datasets, create a dashboard project using the techniques from the course. Your project should address data preparation, story design, visual design of individual elements, and appropriate uses of interactive techniques such as drilldown, drill-through, etc.                                                                                         |
| <b>Critical Thinking Assignment 1:</b>                        | Given a group of datasets, determine the recommended visualization type for the dataset. Provide reasons for the selection based on the visualization design principles of the course.                                                                                                                                                                                             |
| <b>Critical Thinking Assignment 2:</b>                        | The dataset provides U.S. Census data from 1900 and 2000, in CSV form. Complete the following tasks: (1) choose a question that you would like a visualization to answer; (2) design and implement a static visualization that effectively answers that question and use your question as the title of your visualization; (3) provide a write-up of your design (3-4 paragraphs). |
| <b>Other Evaluation Methods:</b>                              | Homework Problems, Laboratory Reports, Objective Exam, Quizzes, Written Homework                                                                                                                                                                                                                                                                                                   |
| <b>If Other:</b>                                              |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Instructional Methods:</b>                                 | Demonstration, Discussion, Group Activities, Lecture, Multimedia presentations                                                                                                                                                                                                                                                                                                     |
| <b>If other:</b>                                              |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Work Outside of Class:</b>                                 | Answer questions, Problem solving activity, Required reading, Skill practice, Study                                                                                                                                                                                                                                                                                                |
| <b>If Other:</b>                                              |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Up-To-Date Representative Texts:</b>                       | Wilke, C. Fundamentals of Data Visualization. O'Reilly Media, 2019. (Discipline Standard)<br><br>Dougherty, J and Ilyankou, I. Hands-On Data Visualization. O'Reilly Media, 2021.<br><br>Camm, J and Cochran, J and Fry, M. Data Visualization: Exploring and Explaining with Data. Cengage, 2022.                                                                                 |
| <b>Alternative Texts:</b>                                     |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Required Supplementary Readings:</b>                       |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Other Required Materials:</b>                              |                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Requisite</b>                                              | Prerequisite                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Category</b>                                               | sequential                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Requisite course:</b>                                      | CIS 171                                                                                                                                                                                                                                                                                                                                                                            |

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| <b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>                     | <p><b>Understand basic concepts of data analytics. Skill with basic data analytics techniques such as data preparation, manipulation, and presentation.</b></p> <p>CIS 171 - Describe data analytics and its applicability to business decision-making.</p> <p>CIS 171 - Apply basic data analytics methods to business decision-making.</p> <p>CIS 171 - Describe and perform data collection, manipulation, and preparation using standard data analytics software.</p> |
| <b>Requisite Skill:</b>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Requisite Skill and Matching skill(s): Bold the requisite skill(s). if applicable</b>                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Requisite course:</b>                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Requisite Skill:</b>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). if applicable</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Enrollment Limitations and Category:</b>                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Enrollment Limitations Impact:</b>                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Course Created by:</b>                                                                                                                          | R. DELLACA                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Date:</b>                                                                                                                                       | 11/01/2023                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Original Board Approval Date:</b>                                                                                                               | 01/21/2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Effective Term:</b>                                                                                                                             | FALL 2026                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |