DSC2004: DATA VISUALIZATION

Effective Term
Semester A 2026/27

Part I Course Overview

Course Title
Data Visualization

Subject Code
DSC - Data Science
Course Number
2004

Academic Unit
Data Science (DS)

College/School
College of Computing (CC)

Course Duration
One Semester

Credit Units
3

Level
B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
SDSC2004 Data Visualization; GE2343 Data Visualization

Exclusive Courses
Nil

Part II Course Details

Abstract
Data visualization refers to the techniques used to communicate data or information by encoding it as visual objects (e.g., points, lines or bars) contained in graphics. The capability to interpret data in a visual way has become an essential skill.

Effective visualization helps users analyse and reason about data and evidence. It makes complex data more accessible, understandable and usable. This course introduces practical methods and tools to visualize data to communicate complex information clearly and efficiently. Students will learn how to present, visualize, and communicate data in various forms clearly and concisely. The ideas and principles in both aesthetic form and functionality will be emphasized.

The mainstream data visualization tools, including Python and Tableau, will be covered in this class. Students will become familiar with exploratory and explanatory visualization techniques for data storytelling. Additionally, students will work together on group projects to develop their creative and technical skills as well as to learn from their peers. The real-world data and applications will be used in this course.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the fundamental characteristics of effective graphical displays	10	x		
2	Discuss the type of diagrams and their functionality for expressing insights from the data.	20	x		
3	Explain design principles of data visualization	20	x	x	
4	Design effective visualization for diverse types of datasets by using the software	30	x	x	x
5	Apply data visualization tools to real big datasets for clear communication and efficient stimulation of users' engagement	20	x	x	x

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage in formal lectures to gain knowledge about data visualization	1, 2, 3, 4	39 hours/Semester including group projects.

2	Group project	Students will participte in groups to consolidate their learning as thy produce two reports (or text) integrating “storytelling” text and visualization, using Python and Tableau, respectively, and will actively engage as audience members during peers’ presentations in order to expand and develop their own knowledge.	2, 3, 4, 5	13 hours/Semester (included in the lecture hours)
3	Tutorial	Students will engage in tutorial activities to extend their use of computer software tools for data visualization.	2, 3, 4, 5	13 hours/Semester

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3, 4	30	-	Yes
2	Group project	2, 3, 4, 5	40	-	Yes

Continuous Assessment (%)

70

Examination (%)

30

Examination Duration (Hours)

2

Minimum Continuous Assessment Passing Requirement (%)

30

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

Note: To pass the course, apart from obtaining a minimum of 40% in the overall mark, a student must also obtain a minimum mark of 30% in both continuous assessment and examination components.

Assessment Rubrics (AR)

Assessment Task

Assignments

Criterion

Based on submitted written work to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Group projects

Criterion
Based on presentation and submitted written work to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
Significant

Fair (C+, C, C-)
Moderate

Marginal (D)
Basic

Failure (F)
Not even reaching marginal levels

Assessment Task
Examination

Criterion
Based on submitted written work to evaluate understanding of subject matter, evidence of knowledge base, capacity to analyse and synthesize, and evidence of original and critical thinking.

Excellent (A+, A, A-)
High

Good (B+, B, B-)
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Basic

Failure (F)
Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- Describing and summarizing data
- Data analysis, data analytics, big data analytics
- Principles of visual design, perception and color theory
- Basic charts and plots, multivariate data visualization, text rendering
- Examples of effective visualization for diverse datasets, including matrices, graphs, trees, scalar fields, vector fields, high-dimensional data, etc.
- Annotation in data visualization
- Applications and case studies of data visualizations
- Software:
    - Plotting data in Python: the use of library matplotlib and pandas
    - Creating visualization in Tableau with dashboards and stories

Reading List

Compulsory Readings

	Title
1	Lecture notes

Additional Readings

	Title
1	Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master By Ryan Sleeper (Author), Publisher: O'Reilly Media; 1 edition (April 30, 2018)
2	https://www.tableau.com/learnonline learning resource
3	Visualizing Data: Exploring and Explaining Data with the Processing EnvironmentBy Ben Fry, O'Reilly Media, 2007.
4	The Visual Display of Quantitative InformationBy Edward R. Tufte, 2001