

BMS5013: STORYTELLING OF HEALTH SCIENCE DATA WITH ANALYSIS AND VISUALIZATION

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Storytelling of Health Science Data with Analysis and Visualization

Subject Code

BMS - Biomedical Sciences

Course Number

5013

Academic Unit

Biomedical Sciences (BMS)

College/School

College of Biomedicine (BD)

Course Duration

One Semester

Credit Units

3

Level

P5, P6 - Postgraduate Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Additional Information

Nil

Part II Course Details

Abstract

This course provides a comprehensive introduction to story telling techniques for health science data analysis and visualization. Students will: (1) develop foundational programming skills in Python, (2) efficiently manage and manipulate tabular data (e.g., Excel files) using structures such as dataframes, arrays, matrices, graphs, and trees in Python, (3) analyze data for meaningful insights using Python, (4) design and create compelling and interactive visualizations in Python, and (5) craft effective data-driven stories through the analysis and visualization. Emphasizing practical, hands-on experience, the curriculum integrates real-world health science examples and projects to help students critically analyze data, present insightful visual narratives, and develop story telling skills in health science management.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	To understand the importance and the key approaches in health science data analysis and visualization.	20	x	x	
2	Understand the principles of effective visualization design to enhance storytelling and data communication.	20	x	x	
3	To gain hands-on experience and develop storytelling skills through analyzing and visualizing real-world health science questions using Python.	60	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	Lectures	Introduction of Python programming, data structures, data analysis, and visualization design.	1, 2	2 hours/week
2	Tutorials	Explore real-word health science datasets and gain hands-on experience in data analysis and visualization using Python. Practical guide for assignments and final group project.	1, 2, 3	1 hour/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3	25	GenAI can be used for literature searches and language refinement. In student's submission, it should be stated where and how GenAI has been used. GenAI can be used to learn and debug programming code, and students will be evaluated on whether or not they fully understand the submitted code.	Yes
2	Mid-term Examination	1, 2, 3	25	-	No
3	Final group project presentation	1, 2, 3	20	GenAI can be used for literature searches and language refinement. In student's submission, it should be stated where and how GenAI has been used. GenAI can be used to learn and debug programming code, and students will be evaluated on whether or not they fully understand the submitted code.	Yes

4	Final group project report	1, 2, 3	30	GenAI can be used for literature searches and language refinement. In student's submission, it should be stated where and how GenAI has been used. GenAI can be used to learn and debug programming code, and students will be evaluated on whether or not they fully understand the submitted code. GenAI ratios of the submitted report will be examined by the CityU Turnitin Feedback Workshop, and reported GenAI ratios must be less than 20%.	Yes
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Continuous Assessment (%)

100

Assessment Rubrics (AR)**Assessment Task**

Assignments (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Can run and demonstrate the analysis/visualization codes and results successfully in tutorials.

Excellent

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

Good

(B+, B, B-) Substantial performance on all CILOS. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

Fair

(C+, C, C-) Satisfactory performance on the majority of CILOS possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

Marginal

(D) Barely satisfactory performance on a number of CILOS. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course

Failure

(F) Unsatisfactory performance on a number of CILOS. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature.

Assessment Task

Mid-term Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Can analyse, state and apply the principles and subject matter learnt in the lectures.

Excellent

(A+, A, A-) Outstanding performance on all CILOS. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

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Assessment Task

Final group project presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

- (1) Can clearly present project works in English with good story-telling skills and compelling interactive visualizations.
- (2) Can answer to questions comfortably and actively raise questions in others' demonstration.

Excellent

(A+, A, A-) Outstanding performance on all CILOS. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base

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Assessment Task

Final group project report

(for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

- (1) Can select and state a health science problem, its datasets and analysis and visualization approaches.
- (2) Can provide the runnable codes for the selected analysis and visualization on selected datasets.
- (3) Can present the analysis and visualization results with good story-telling skills.
- (4) Can make critical thinking on the pros and cons of the analysis and visualization results in discussion.
- (5) Can present the report with a clear, concise, and academic way.

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Assessment Task

Assignments (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Can run and demonstrate the analysis/visualization codes and results successfully in tutorials.

Excellent

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Final group project report (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

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Part III Other Information**Keyword Syllabus**

- Python Programming
- Data Structure
- Big Data Analysis
- Interactive Data Visualization
- Visualization Design
- Story-Telling Skills

Reading List**Compulsory Readings**

Title	
1	Nil

Additional Readings

Title	
1	"Python for Data Analysis"; 2nd edition; by Wes McKinney; O'Reilly Media 2017 An essential guide to using Python (and Pandas) for data manipulation and analysis
2	"The Visual Display of Quantitative Information"; by Edward R. Tufte; Graphics Pr 2001 A classic text outlining the principles of effective data visualization.
3	"The Functional Art: An introduction to information graphics and visualization"; 4th Edition; by Alberto Cairo; New Riders Press 2012 Offers insights and best practices for designing clear, impactful visualizations

4	"Storytelling with Data: A Data Visualization Guide for Business Professionals"; by Cole Nussbaumer Knaflic; Wiley 2015 Focuses on how to craft a narrative around your data to engage and inform your audience.
5	"Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures"; by Claus Wilke, O'Reilly Media, 2019 Provides practical guidance for designing visualizations that are both informative and visually appealing.