



Course Specification

(Bachelor)

Course Title: **Data Visualization Design**

Course Code: **HCI 3401**

Program: **BSc in Human Computer Interaction**

Department: **Software Engineering**

College: **College of Computing**

Institution: **Umm Al Qura University**

Version: **1.0**

Last Revision Date: **22/04/2025**



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A. General information about the course:

1. Course Identification

1. Credit hours: (4)

2. Course type

A. University College Department Track Others
 B. Required Elective

3. Level/year at which this course is offered: (3rd year/ 5th level)

4. Course General Description:

This course focuses on the principles and techniques of designing effective data visualizations within the context of Human-Computer Interaction (HCI). Students will learn how to represent complex data in intuitive and interactive ways, leveraging design principles, cognitive psychology, and visualization tools. Topics include visual perception, storytelling with data, and creating user-centered visual interfaces to enhance decision-making and user experience.

5. Pre-requirements for this course (if any):

HCI2203 - User Research
 DS2201 - Introduction to Database

6. Co-requisites for this course (if any):

None

7. Course Main Objective(s):

The main objective of the course is for the students to:

- Understand and apply foundational principles of data visualization, including visual perception and cognitive psychology.
- Design and implement user-centered data visualizations that are intuitive, accessible, and engaging.
- Utilize modern tools and technologies to create interactive and dynamic visual representations of complex data.
- Critically evaluate the effectiveness and ethical considerations of visualizations in diverse contexts.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	90	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		





No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	60
3.	Field	-
4.	Tutorial	-
5.	Others (specify)	-
Total		90

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding			
1.1	Demonstrate foundational knowledge of visual perception and HCI principles, explaining how these inform user-centered visualization design.	K1	Discussions, Case Studies	Assignments/ Exams
1.2	Analyze complex data and determine appropriate visualization techniques to represent it effectively.	K2	Demonstrations, Case Studies	Assignments / Project
1.3	Explain the importance of inclusive and accessible visualization design, recognizing diverse user needs and cultural contexts.	K3	Discussions, Case Studies	Exams / Project
2.0	Skills			
2.1	Leverage modern visualization tools and technologies to create interactive, dynamic, and user-centered visual interfaces.	S1	Demonstrations, Experimentations	Assignments / Project
2.2	Communicate effectively about visualization design choices and their alignment with user and stakeholder needs.	S3	Discussions, Design Critiques	Presentations / Project



Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
2.3	Apply iterative design and prototyping methods to refine visualizations based on user feedback and usability testing.	S4	Experimentations, Demonstrations	Assignments / Project
3.0	Values, autonomy, and responsibility			
3.1	Demonstrate professional responsibility and ethical judgment in designing truthful and unbiased data visualizations.	V1	Case Studies, Discussions	Assignments/ Exams
3.2	Advocate for inclusivity by designing data visualizations that are accessible and equitable for all users.	V2	Case Studies, Discussions	Exams / Project

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to Data Visualization	6
2.	Principles of Visual Perception	6
3.	Designing with Data	12
4.	Visualization Tools and Technologies	12
5.	Storytelling with Data	6
6.	Interaction and Animation in Visualizations	6
7.	Evaluation and Testing of Visualizations	6
8.	Accessibility in Visualization Design	6
9.	Advanced Topics in Visualization	12
10.	Ethics in Data Visualization	6
11.	Trends in Data Visualization	6
12.	Synthesis and Review	6
Total		90

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Assignments	3-14	10
2.	Project	3-14	30



3. Midterm	7-8	20
4. Final Exam	16-17	40

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Interactive Data Visualization for the Web: An Introduction to Designing with D3 (2nd Edition) by Scott Murray (2020)
Supportive References	<ul style="list-style-type: none"> • Data Visualization: A Practical Introduction by Kieran Healy (2019). • The Truthful Art: Data, Charts, and Maps for Communication by Alberto Cairo (2016)
Electronic Materials	
Other Learning Materials	

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Traditional Classroom
Technology equipment (projector, smart board, software)	Multimedia Projector
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct: Survey at the end of the course
Effectiveness of Students assessment	Instructor and quality assurance committee	Indirect: Course Report
Quality of learning resources	Instructor and quality assurance committee	Direct: Survey at the end of the course
The extent to which CLOs have been achieved	Instructor and quality assurance committee	Indirect: Course Report
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify))

Assessment Methods (Direct, Indirect)





G. Specification Approval

COUNCIL /COMMITTEE	SOFTWARE ENGINEERING DEPARTMENT COUNCIL
REFERENCE NO.	THE 17TH MEETING FOR THE ACADEMIC YEAR 1446H
DATE	22/04/2025

