1.	Course title	Information Visualization
2.	Course number	1901457
3.	Credit hours (theory, practical)	3 both
	Contact hours (theory, practical)	(45 theory + practical)
4.	Prerequisites/corequisites	1901359 Computer Graphics
5.	Program title	B.Sc. in Computer Science
6.	Year of study and semester (s)	4th year (1st semester)
7.	Final Qualification	
8.	Other department (s) involved in teaching the course	
9.	Language of Instruction	English
10.	Date of production/revision	
11.	Required/ Elective	Required

12. Course Coordinator:

Dr. Jamal Alsakran
Office: 140 KASIT
Office hours: 12 – 1 Sun, Tues, and Thurs
Email: j.alsakran@ju.edu.jo

13. Other instructors:

14. Course Description:

This course is an introduction to key design principles and techniques for interactively visualizing data. The major goals of this course are to understand how visual representations can help in the analysis and understanding of complex data, how to design effective visualizations, and how to create your own interactive visualizations using modern web-based frameworks.

15. Course aims and outcomes:

A- Aims:

The Goal: the course aims to enable students to understand how the human visual system processes and perceives images, good design practices for visualization, tools for visualization of data from a variety of fields, and programming of interactive web-based visualizations using D3

Course Objectives: Enable students to
- **Critically evaluate visualizations and suggest improvements and refinements**
- **Use JavaScript and other tools to scrape, clean, and process data**
- **Use standalone visualization applications to quickly explore data**
- **Apply a structured design process to create effective visualizations**
- **Conceptualize ideas and interaction techniques using sketching**
- **Use principles of human perception and cognition in visualization design**
- **Create web-based interactive visualizations using JavaScript and D3**
- **Use storytelling principles to design coherent and clear visualizations**

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

A. Knowledge and Understanding: Students should …
A1) Understand how the human visual system processes and perceives images
A2) Understand the key techniques and theory used in visualization
A3) Understand complex data
A4) Learn how evaluate visualization systems
A5) Gain a background that will aid the design of new, innovative visualizations
B. Intellectual skills: with the ability to …
B1) Evaluate visualizations and suggest improvements.
B2) Analyze and compare key techniques in visualization.
B3) Conceptualize ideas and interaction techniques using sketching
C. Subject specific skills – with ability to …
C1) Apply a structured design process to create effective visualizations
C2) Create web-based interactive visualizations using JavaScript and D3
C3) Use storytelling principles to design coherent and clear visualizations
C4) Use standalone visualization applications to quickly explore data
C5) Use D3 to implement various visualization techniques
D. Transferable skills – with ability to
Dl) Analyze visualization techniques
D2) Discuss and work in a group in order to critically evaluate visualization techniques
D3) Discuss and work in a group in order to design new visualization techniques
D4) Demonstrate developed solutions and programs

16. Topic Outline and Schedule:

Topic	Week	ILOs	Program SOs[1]	TLA (teaching, learning and Assessment)
Introduction. What is visualization? Why is it important? Who are we? Course overview	1	A1		
Introduction to D3 Data Abstraction, Data Types	2 + 3	A1, C1, C3, C5		Hw1
Data loading, Data binding, Selections, Scales, Nesting Sketching and Prototyping I	4	A2,A3, B1,B2, C2, C5, D1, D3, D4		
The Visualization Alphabet: Marks and Channels Task Abstraction.	5 + 6	A3, B2, C2, C5, D3, D4		Hw2
Interaction	7	B1, B2, C1, D3		
Midterm	8	Measuring A1 A3, B1,B2, C1,C2, D1, D3- D4		
Designing your Visualization	9	B1, C5, D2,D3		Hw3
D3 and JavaScript Design Guidelines. Graphs Text & Documents	10 + 11	A4, B3, C3, C5, D3, D4		
Designing a multiple coordinated view system Visualizing spatial data: Volumes and Flows	12	A5, B4, C4, C5, D2, D3, D4		Hw4
Graphs Part II Maps	13	A2, A3		
Social Visualization Visualization and Arts	14	A2, A3, C4, C5, D3, D4		Hw5
Perception, Cognition, Color	15	A2, A3, D2, D3		
Review		All ILOs		Review
Final Exam		All ILOs		Two hours exam out of 50%

(Please mention instructors per topic if the course topics are being taught by more than one instructor)

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[1] The ABET outcomes

17. Evaluation Methods and Course Requirements (Optional):

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

Assessment (A) Methods: The assessment methods will include marks for homework, programming assignment, midterm exam and final exam; with the following weights:

25% Midterm Exam

25% Quizzes and Programming Assignments

50% Final Exam

Grading Scales:

Satisfactory completion of this subject requires a 50% pass in the end-of-semester examination.

18. Course Policies:

A- Attendance policies:

Consulate UJ policies in this regard.

B- Absences from exams and handing in assignments on time:

Consulate UJ policies in this regard.

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior:

The honor code applies to all work turned in for this course including exams and assignments. It is important that you understand the solutions to all problems, and the best way to gain an understanding is to work them out and write them up by yourself. Hence the policy is that you must submit your own work and clearly list your references. You may not share your work with other students, unless it is allowed as group. Violating the policy will be taken as a no submission state for the assignment. University regulations will be preserved at all times.

E- Grading policy + Weighting (i.e. weight assigned to exams as well as other student work)

0-49 F	50-53 D-	54-57 D	58-61 D+	62-66 C-	67-71 C
72-76 C+	77-81 B-	82-86 B	87-89 B+	90-93 A-	94-100 A

The grade may be given based on the average of all marks out of 100%.

F- Available university services that support achievement in the course:

Laboratory with D3 library + references available in the Library

19. Required equipment:

A laboratory with audio-video 40 computers and D3 library.

20. References:

A- Required book (s)-Text Book:
- Visualization Analysis and Design, Tamara Munzner, CRC Press (2014) – VAD
- Interactive Data Visualization for the Web, Scott Murray, O'Reilly (2013) - D3

B- Recommended books, materials, and media:
- Design for Information, Isabel Meirelles, Rockport (2013)

21. Additional information:

Date: ------------------------

Name of Course Coordinator: -------------------Signature: ------------------------

Head of curriculum committee/Department: ------------------------- Signature: --------------

Head of Department: ------------------------ Signature: ---------------------------------

Head of curriculum committee/Faculty: ------------------------ Signature: ---------------------

Dean: -- -Signature: ---------------------------------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File