

3	Substantial / High
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### Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments
- Final Exam

### Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Lab Assessment	End Semester Examinations
CO 1	✓		✓	✓
CO 2	✓	✓	✓	✓
CO 3	✓		✓	✓
CO 4	✓	✓	✓	✓

## 11. DATA VISUALIZATION

Discipline	<b>COMPUTER SCIENCE</b>				
Course Code	UK3DSCCSC210				
Course Title	DATA VISUALIZATION				
Type of Course	<b>DSC</b>				
Semester	III				
Academic Level	2				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	3 hours	-	2 hours	5 hours
Pre-requisites	Basic Knowledge of visualization, Data and Image Models Design and Data Analysis is necessary.				

Course Summary	This course helps the student to visualize data using various techniques.

### Detailed Syllabus:

Module	Unit	Content	Hrs
<b>I</b>	<b>Value of visualization</b>		<b>12</b>
	1	What is visualization? Why create visualizations?	
	2	Conveying information to others– Telling stories with data – Data checking and verification.	
	3	Data Maps – Time series – Graphical excellence.	
<b>II</b>	<b>Data and Image Models</b>		<b>12</b>
	4	Visualization reference model – data: physical and abstract types– metadata, semantics.	
	5	Conceptual data – properties of images – conceptual model – relational data model – statistical data model.	
	6	Dimensions and measures – Roll-up and Drill- down	
	7	Visual encoding and sign systems - Multidimensional Data -Large design space.	
<b>III</b>	<b>Design of Visualization</b>		<b>12</b>
	9	Visual encodings, mapping data to image – Design criteria, expressiveness, effectiveness.	
	10	Data transformation –Presentation, titles, captions, annotations legend and grid lines- Testing designs.	
	11	Graphical integrity– Charting, Bar chart, Line chart, Dot plot, Tables	
	12	Heat-maps - Data-based grids – Multi-functioning labels	
<b>IV</b>	<b>Exploratory Data Analysis</b>		<b>12</b>
	13	EDA Vs Classical Data analysis – Goals of EDA	
	14	Assumptions– Data diagnostics – Statistical models into graphics	
	15	Confirmatory analysis – Hypothesis formulation	

	16	Testing procedure, significance – Graphical inference.	
<b>V</b>		<b>Flexi Module: Not Included for End Semester Exams</b>	<b>12</b>
	17	Text data; documents, SMS, tweets, logs, tags	
	18	Word clouds, word trees and tagclouds	
	19	Theme visualization – Topic modeling –Seriation, Quantification	

### Text Books

1. Tufte, E(2005). *Envisioning Information*, E. Tufte. Graphics Press,2005.
2. Tamara Munzner, *Visualization Analysis and Design*, CRC Press,2014.

### References

3. Nathan Yau, *Visualize This- The Flowing Data Guide to Design, Visualization, and Statistics*, Wiley, 2011.
4. Scott Murray, *Interactive Data Visualization for the Web*, O'Reilly,2013.
5. Colin Ware, *Visual Thinking for Design*, Morgan Kaufman,2008.

### LAB EXERCISES

1. Introduction to Matplotlib
2. Bar Chart Visualization
3. Scatter Plot Visualization
4. Histogram Visualization
5. Pie Chart Visualization
6. Box Plot Visualization
7. 3D Plot Visualization

### Course Outcomes

No.	Upon completion of the course the graduate will be able to	Cognitive Level	PSO addressed
<b>CO-1</b>	Differentiate between physical and abstract types	U	PSO- 1,2,3
<b>CO-2</b>	Use Visualization, data maps, time series and text visualization	Ap	PSO- 1,2,3
<b>CO-3</b>	Apply design for visualization	Ap	PSO- 1,2,3
<b>CO-4</b>	Compare different data and image models	U	PSO- 1,2,3

**R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create**

Note: 1 or 2 COs/module

Name of the Course: DATA VISUALIZATION

Credits: 3:0:1 (Lecture: Tutorial: Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	Differentiate between physical and abstract types	PO-3,6,7 PSO-1,2,3	Ap	F, C	L	
2	Use Visualization, data maps, time series and text visualization	PO-3,6,7 PSO-1,2,3	Ap	F, C, P	L	P
3	Apply design for visualization	PO-3,5,6,7 PSO-1,2,3	Ap	F, C, P	L	P
4	Compare different data and image models	PO-3,5,6,7 PSO-1,2,3	U	F, C	L	

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	3	-	-	3	3	-	2	1	2	-
CO 2	-	-	3	-	-	3	3	-	2	1	2	-
CO 3	-	-	3	-	1	3	3	-	2	1	2	-
CO 4	-	-	3	-	1	3	3	-	2	1	2	-

Correlation Levels: