Course Title: **Data Analysis and Visualization (3 Cr.)**
Course Code: **CACS455**
Year/Semester: **IV/VIII**
Class Load: **5 Hrs. / Week (Theory: 3Hrs. Practical: 2Hrs.)**

Course Description
This course introduces to extend student's knowledge and practice in data analysis and visualization, software, and applications. It provides the board overview of techniques of the visualization process, detailed view of visual perception, the visualized data and the actual visualization, interaction and distorting techniques.

Course objectives
Upon completion of this course, students should be able to 1. Explain the concept of visualization in the processing and analysis of data. 2. Develop visualization methods and visualization systems using software applications. 3. Perform creative work in the field of visualization.

Course Contents

	Hours
Unit 1: Introduction to visualization Introduction of visual perception, Visual representation of data, Data Abstraction, Visual Encodings, Use of Color, Perceptual Issues, Information overloads	6
Unit 2: Creating visual representations Visualization reference model, Visual mapping, Visual analytics, Design of Visualization applications.	7
Unit 3: Non spatial data visualization Visualization of one, two and multi-dimensional data, Tabular data, quantitative values (scatter plot), Separate, Order, and Align (Bar, staked Bar, dots and line charts), Tree data, Displaying Hierarchical Structures, graph data, rules for graph drawing and labeling, text and document data, levels of text representation, visualizations of a single text document, word cloud, flow data Time series data, characteristics of time data, visualization time series data, mapping of time	15
Unit 4: Spatial Data Visualization Scalar fields, Isocontours (Topographic Terrain Maps), scalar volumes, Direct Volume Rendering(Multidimensional Transfer Functions) , Maps (dot, pixel), vector fields Defining Marks and Channels	10
Unit 5: Software tools and data for visualization The iris data set, The Detroit Data Set, The Breakfast Cereal Data Set, The Dow Jones Industrial Average Data Set (time series), MS spread sheet, Python, Matlab, Java, Tableau	10

Evaluation

Evaluation Scheme

Internal Assessment		External Assessment		Total
Theory	Practical	Theory	Practical	
20	20 (3 Hrs.)	60 (3 Hrs.)	-	100

Laboratory Work

Laboratory work should be done covering all the topics listed above and a small project work should be carried out using the concept learnt in this course using any one software tools mention in unit 5.

Text Books:

3. Fry, Visualizing Data. O'Reilly Media, 2008, ISBN 0596514557
4. Ware, Information Visualization: Perception for Design, 3rd ed. Morgan Kaufmann, 2012,

Reference Books:

5. Telea, Data Visualization: Principles and Practice. A. K. Peters, Ltd, 2007, ISBN 1568813066.