Indraprastha College for Women
University of Delhi

Course Name:	B.Sc. (Hons.) Computer Science
Paper Title:	Social Network Analytics
Unique Paper Code:	
Semester:	VII
Faculty(s):	Dr. Manju Bala
Year:	2025-26

Work Plan

Unit No.	Learning Objective	Lecture No.	Topics to be Covered
1	Introduction	1-7	Graph theory, random walk, degree distribution, mapping of real world situations into networks, applications of SNA, types of networks
2	Network Measures	8-17	Centrality measures, PageRank, hubs & authority, assortativity, transitivity, reciprocity, similarity, structural equivalence

3	Network Models	18-27	Properties of real-world networks, random network model, small world model, preferential attachment model
4	Community Structure in Networks	28-37	Types of communities, community detection algorithms, evaluation of communities (disjoint only)
5	Information Diffusion in Social Media	38-45	Information cascades, diffusion of innovations, basic epidemic models

Syllabus

Unit	Contents	Contact Hours
I	Graph theory, random walk, degree distribution, mapping of real world situations into networks, applications of SNA, types of networks	7
II	Centrality measures, PageRank, hubs & authority, assortativity, transitivity, reciprocity, similarity, structural equivalence	10
III	Properties of real-world networks, random network model, small world model,	10

	preferential attachment model	
IV	Types of communities, community detection algorithms, evaluation of communities (disjoint only)	10
V	Information cascades, diffusion of innovations, basic epidemic models	8

References

1. Chakraborty T. Social Network Analysis, 1st edition, Wiley India Pvt. Ltd., 2021.

2. Barabási A. L., Pósfai M. Network Science, 1st edition, Cambridge University Press, 2016.

3. Zafarani R., Abbasi M. A., Liu H. Social Media Mining: An Introduction, 1st edition, Cambridge University Press, 2014.

Suggested Practical Exercises

1. Plot a weighted directed network such that the node size and edge width is proportional to the degree and edge weight respectively.
2. Compute and plot the degree distribution of a real-world network. Also compute local and global properties of the network.
3. Generate three networks of 1000 nodes each using Random Network Model, Small World Network Model, Preferential Attachment Model and compare their characteristics.
4. Compute different centrality measures to identify top-N nodes and compute rank correlation coefficient with the ranks obtained by PageRank method.
5. Apply various community detection algorithms on a small real-world network (e.g. Karate club) and plot the communities revealed with different colors. Compare using evaluation measures.
6. Simulate diffusion trends for different epidemic models and present results using visuals.