

**SOCIAL NETWORKS (Honors)****Course Objectives:**

1. Formalize different types of entities and relationships as nodes and edges and represent this information as a relational data.
2. Plan and execute network analytical computations
3. Use advanced network analysis software to generate visualizations and perform empirical investigations of network data
4. Interpret and synthesize the meaning of the results with respect to a question, goal, or task
5. Collect network data in different ways and from different sources while adhering to legal standards and ethics standards

**Course Outcomes:**

After completing the course student should:

1. Know basic notation and terminology used in network science
2. Be able to visualize, summarize and compare networks
3. Illustrate basic principles behind network analysis algorithms
4. Develop practical skills of network analysis in R programming language
5. Be capable of analyzing real work networks

**UNIT I**

Social Network Analysis: Preliminaries and definitions, Erdos Number Project, Centrality measures, Balance and Homophily.

**UNIT II**

Random graph models: Random graphs and alternative models, Models of network growth, Navigation in social Networks, Cohesive subgroups, Multidimensional Scaling, Structural equivalence, roles and positions.

**UNIT III**

Network topology and diffusion, Contagion in Networks, Complex contagion, Percolation and information, Navigation in Networks Revisited.

**UNIT IV**

Small world experiments, Small world models, origins of small world, Heavy tails, Small Diameter, Clustering of connectivity, The Erdos Renyi Model, Clustering Models.

**UNIT V**

Network structure -Important vertices and page rank algorithm, towards rational dynamics in networks, basics of game theory, Coloring and consensus, biased voting, network formation games, network structure and equilibrium, behavioral experiments, Spatial and agent-based models.

**Text Books:-**

1. S.Wasserman and K.Faust.“Social Network Analysis: Methods and Applications”, Cambridge University Press.
2. D.EasleyandJ.Kleinberg,“Networks,CrowdsandMarkets:Reasoningaboutahighlyconnected world” ,Cambridge UniversityPress,1stedition,2010

**Reference Books:-**

1. Maarten van Steen. "Graph Theory and Complex Networks. An Introduction", 2010.
2. Reza Zafarani, Mohammed Ali Abbasi, Huan Liu. "Social Media Mining: An Introduction". Cambridge University Press 2014.
3. Maksim Tsvetovat and Alexander Kouznetsov. "Social Network Analysis for Startups". O'Reilly Media, 2011.

**e-Resources:**

- 1) <https://www.classcentral.com/course/edx-social-network-analysis-sna-9134>
- 2) <https://www.coursera.org/learn/social-network-analysis>