Govt. of India approved a new program titled Global Initiative of Academic Networks (GIAN) in Higher Education aimed at tapping the talent pool of scientists and entrepreneurs, internationally to encourage their engagement with the institutes of Higher Education in India so as to augment the country's academic resources, existing accelerate the pace of quality reform, and elevate India's scientific and technological capacity to global excellence.

### About IIT Patna

Indian Institute of Technology Patna, established in August 2008, is an autonomous institute of education and research in science, engineering and technology located in Bihra, 35 km from Patna. The new campus is spread over 500 acres of green land. As of today, IIT Patna has 10 academic departments that offer B.Tech, M.Tech, MSc and PhD programs. The faculties of this institute come with academic and research training from various institutes of excellence within the country and abroad. The recent publication records of the faculty with several practical constraints appear to be outstanding. It includes many reputed national and international journals.

### About CSE Department

The department has three major programs- B.Tech CS, M.Tech CS and PhD. Additionally, there is a M.Tech in Mathematics and Computing program jointly with Mathematics dept. The CSE department is equipped with several research labs. The faculty members of the department are engaged with various research, teaching and administrative activities. The department also has a liaison with reputed national and international Universities.

### Course Overview

Complex Network Analysis (a.k.a. Network Science) is a rapidly emerging area of interest for both theory and practice. With the phenomenal growth of the Internet, web, social networks, information on biological networks, etc., it is imperative that we need a course that covers the algorithms, techniques and tools to analyze such large-scale networks, visualize and extract useful information like communities in the networks, robustness to information diffusion, diameter of the network, etc.). Network Science deals with the analysis and visualization of large complex network graphs and the development of efficient algorithms to study the characteristics of networks involving hundreds and thousands of nodes.

### Course Objective

1. Analyze the characteristics of complex networks using graph theoretic metrics and paradigms;
2. Generate simulated networks from theoretical models and evaluate their characteristics in comparison with real-world networks;
3. Apply various centrality metrics and related algorithms to determine the topological significance of the nodes in a network;
4. Extract clusters of related nodes using efficient community detection algorithms and evaluate the effectiveness of the partitioning;
5. Use hands-on tools and spectral analysis techniques to analyze datasets corresponding to complex real-world networks.

### Topics To be covered

**20th- 24th November, 2017**

**This course will cover following topics:**

1. Graph Theory Fundamentals
2. Degree Distribution Analysis
3. Assortativeness and Maximal Matching
4. Degree and Shortest Path-based Centrality Metrics
5. Computationally-Light vs. Computationally - Heavy Centrality Metrics and Correlation Analysis
6. Hands on Exercises for Centrality and Correlation Analysis
7. Page Rank Algorithm
8. Spectral Analysis and its Applications
9. Modularity and Communities
10. Hands on Exercises for Spectral Analysis
11. Edge Betweenness Centrality and Neighborhood Overlap
12. Community Detection Algorithms
13. Hands on Exercises for Community Detection
14. Random Networks
15. Scale-Free Networks

### Who Can Attend?

- Executives, engineers and researchers from reputed industry and government organizations including R&D laboratories.
- Students at all levels (B.Tech/MSc/MTech/PhD) or Faculty from reputed academic institutions and technical institutions.

### How to Register

**Step 1: One Time Registration:** In order to register for any GIAN course, candidates will have to get registered at the GIAN Portal of IIT Kharagpur using the following steps:

1. Create login and password at [http://www.gian.iitkgp.ac.in/GREGN/index](http://www.gian.iitkgp.ac.in/GREGN/index)
2. Login and complete the registration form
3. Select course to be attended
4. Confirm your application and payment information.
5. Pay Rs 500 (one time, non-refundable) online through payment gateway
6. Download and print your “pdf file” of your enrollment application form for your personal records and copy of the same to be sent to course coordinator

**Step 2: Pay Institute Registration Fee:**

Institute registration fee:

- Participants from Abroad: USD 100
- Participants from Industry / Academic/ Research Organization: Rs 2000
- Students & Research Scholars: Rs 500

**Note 1:** Please mention the purpose of payment as “Registration Fees of GIAN Course: 171013D04”

**Note 2:** The course fee will be made half for SC/ST students.

**Account Details:**

- **Account Name:** Indian Institute of Technology Patna
- **Account No.:** 30957551934
- **IFSC Code:** SBIN0017154
- **Bank Name:** State Bank of India
- **Branch Name:** IIT Patna, Bihra Campus
- **MICR No.:** 801002005

**Step 3: Send the copy of transaction details:**

For Registration Confirmation:

- **Mr. Sanjeet Kr. Nayak:** (+91) 9473480414
- **Email:** sanjeet.pcs13@iitp.ac.in

**For Other Details:**

- **Dr. Somnath Tripathy:** (+91) 612 302 8036
- **Email:** som@iitp.ac.in