

<b>Course name (English)</b>	<b>Complex Dynamical Networks</b>		
<b>Course ID:</b>	-	<b>No of units:</b>	3
<b>Prerequisites:</b>	-	<b>Program:</b>	Graduate
<b>Co-requisites:</b>			
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## Outline

- Introduction to dynamical networks
- Network measurements
- Network metrics
  - Average path length
  - Clustering coefficient
  - Bridge
  - Closure
  - Homophily
  - ...
- Spectral analysis
- Motif structure in networks
- Centrality measures
- Hierarchy and clustering in networks
- Random walks and random networks
- Small-world networks
- Scale-free networks
- Network evolution
- Search in networks
- Signed networks
- Social balance
- Social dynamics
- Cooperation in networks
- Robustness and resiliency in networks
- Cascading behavior
- Information spreading
- Epidemics spreading
- Introduction to dynamical systems
- Synchronization

## References

- Newman, M., A.-L. Barabasi, et al. (2006). *The structure and dynamics of networks*, Princeton University Press.
- Osipov, G. V., J. Kurths, et al. (2007). *Synchronization in Oscillatory Networks*, Springer.
- Albert, R. and A.-L. Barabasi (2002). "Statistical mechanics of complex networks." *Reviews of Modern Physics* **74**(1): 47-97.
- Boccaletti, S., V. Latora, et al. (2006). "Complex networks: structure and dynamics." *Physics Reports* **424**: 175-308.
- Newman, M. E. J. (2003). "The structure and function of complex networks." *SIAM Review* **45**(2): 167-256.