UNIVERSITAS MATARAM
(University of Mataram)
FAKULTAS TEKNIK
(Faculty of Engineering)
PROGRAM STUDI TEKNIK INFORMATIKA
(Department of Informatics Engineering)

MODULE HANDBOOK DESCRIPTION

Network Analysis and Planning (P22B01)

Module designation	Network Analysis and Planning
Semester(s) in which the module is taught	*8 / fourth year*
Person responsible for the module	*Andy Hidayat Jatmika ST MT*
Language	*Indonesian*
Relation to curriculum	*Electives*
Teaching methods	*Lectures, Discussions, Project*
Workload (incl. contact hours, self-study hours)	Contact Hours every week, each week of the 16 weeks/semester including Evaluation ● 2 x 50 minutes lecturer/week ● 2 x 60 minutes class exercise/week ● Self Study hours = 120 minutes/week Total workload 340 minutes/week
Credit points	*2 (~ 3,2 ECTS)*
Required and recommended prerequisites for joining the module	-

Module objectives/intended learning outcomes	The learning outcomes of the Wireless Network course are: 1. Recognize and categorize real world networked data (social, financial, biological, transportation, information, etc.) and 2. Represent them using the appropriate network type (directed, weighted, signed, multigraph, bipartite, etc.). 3. Define, compute, and interpret basic network metrics such as distance, clustering, degree distribution, and centrality measures. 4. Describe several network generative models and understand the properties of the networks they generate. 5. Define, compute, and implement several measures that can be used for link prediction using real world data. 6. Articulate and implement the dynamics and assumptions of several information diffusion models and be able to implement. 7. Articulate the influence maximization problem and basic strategies and heuristics to solve it. 8. Articulate the community detection problem and understand its value in several applications. 9. Articulate and implement several approaches for community detection.
Content	This course will introduce students to network analysis techniques, with an emphasis on developing programming skills to manipulate and analyze real network data using Python. The course includes topics such as network evolution, link prediction, network centrality, models of information diffusion on networks, and community structure. This course contains important topics: 1. Real world networked data (social, financial, biological, transportation, information, etc.) and 2. Network type (directed, weighted, signed, multigraph, bipartite, etc.). 3. Definition, computation, and interpretation basic network metrics such as distance, clustering, degree distribution, and centrality measures. 4. Network generative models and the properties of the networks they generate. 5. Definition, computation, and implementation several measures that can be used for link prediction using real world data. 6. The dynamics and assumptions of several information diffusion models and be able to implement.

Examination forms	*Assignments, Quiz, Simulation, Project (Oral Presentation)*
Study and examination requirements	*Assignments 10%,* *Quiz 25%,* *Simulation 25%,* *Project 40%*
Reading list	1. Easley, David and Kleinberg, Jon. 2010. Networks, Crowds, and Markets: Reasoning About a Highly Connected World. Cambridge University Press, USA. 2. Newman, Mark. 2018. Networks. Oxford University Press, USA. 3. Liben-Nowell, David, and Kleinberg, Jon. 2007. "The link-prediction problem for social networks." Journal of the American Society for Information Science and Technology. 58(7): 1019-1031. 4. Kossinets, Gueorgi, and Duncan J. Watts. 2006. "Empirical analysis of an evolving social network." Science. 311(5757): 88-90. 5. Romero, Daniel M., Uzzi, Brian, and Kleinberg, Jon. 2016. "Social networks under stress." In Proceedings of the 25th International Conference on World Wide Web 9-20. 6. Kempe, David, Kleinberg, Jon, and Tardos, Éva. 2003. "Maximizing the spread of influence through a social network." In 7. Proceedings of the ninth ACM SIGKDD international conference on Knowledge discovery and data mining. 137-146. 8. Kim, D. A., Hwong, A. R., Stafford, D., Hughes, D. A., O'Malley, A. J., Fowler, J. H., & Christakis, N. A. 2015. Social network targeting to maximise population behaviour change: a cluster randomised controlled trial. The Lancet. 386(9989): 145-153. 9. Yang, Jaewon, and Jure Leskovec. 2015. "Defining and evaluating network communities based on ground-truth." Knowledge and Information Systems. 42(10: 181-213.