

CSE 5245 (Approved): Introduction to Network Science

Course Description

Introduction to Network Science; Global and Local Network Measures; PageRank; Community Discovery Algorithms; Network Models; Understanding the role of network analysis in Web and Social network applications

Transcript Abbreviation: Intr Netw Science

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Senior, Masters, Doctoral

Course Offerings: Autumn, Spring, May

Flex Scheduled Course: Always

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: CSE 2331

Exclusions:

Cross-Listings:

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.0901

Subsidy Level: Baccalaureate Course

Programs

Abbreviation	Description
BS CSE	BS Computer Science and Engineering
MS CSE	MS Computer Science and Engineering
PhD CSE	PhD Computer Science and Engineering

Course Goals

Familiarity with network science as a discipline
Mastery over major macro- and micro- metrics used to describe various networks.
Mastery over key community discovery algorithms
Familiarity with generative models for networks and various network analysis tools.
Mastery of the role of network science in WWW and social network applications.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Motivation and Introduction to Basic Concepts	4.5							
Fundamentals of Network Theory: Representation, Measures and Metrics	10.5							
Graph Algorithms, Page Rank and Community Discovery	12.0							
Network Models	6.0							
The Web and Social Network Analysis: Putting It All Together	9.0							

Representative Assignments

Extracting and Constructing a Network from Raw Data
Understanding and Experimenting with various Network Measures
Understanding, Implementing, and Exploring Community Discovery Algorithms and PageRank
Understanding Network Models of Evaluation
Application Case Study Project

Grades

Aspect	Percent
Homeworks	20%
Project/Programming	25%
Midterm	25%
Final	30%

Representative Textbooks and Other Course Materials

Title	Author
<i>Networks, An Introduction</i> , Oxford University Press	Mark Newman
<i>Networks, Crowds, and Markets</i> , Cambridge University Press	D. Easley and J. Kleinberg

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
***	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
*	c	An ability to design a system, component, or process to meet desired needs.
*	d	An ability to function on multi-disciplinary teams.
***	e	An ability to identify, formulate, and solve engineering problems.
*	f	An understanding of professional and ethical responsibility.
**	g	An ability to communicate effectively.
**	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.

Course Contribution		College Outcome
*	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

BS CSE Program Outcomes

Course Contribution		Program Outcome
***	a	an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
***	b	an ability to design and conduct experiments, as well as to analyze and interpret data;
*	c	an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;
*	d	an ability to function on multi-disciplinary teams;
***	e	an ability to identify, formulate, and solve engineering problems;
*	f	an understanding of professional, ethical, legal, security and social issues and responsibilities;
**	g	an ability to communicate effectively with a range of audiences;
*	h	an ability to analyze the local and global impact of computing on individuals, organizations, and society;
**	i	a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;
*	j	a knowledge of contemporary issues;
**	k	an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
**	l	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
**	m	an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
*	n	an ability to apply design and development principles in the construction of software systems of varying complexity.

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