

## COURSE DESCRIPTION

Dept., Number	CS455	Course Title	Data Communications
Semester hours	3	Course Coordinator	Dr. Peng-Jun Wan, Associate Professor

### Current Catalog Description

Introduction to data communication concepts and facilities with an emphasis on protocols and interface specifications. Focuses on the lower four layers of the ISO-OSI reference model. Prerequisite: CS 450. (3-0-3) (T)

### Textbook

Halsall, Fred, Computer Networking and the Internet, Fifth Edition, Addison-Wesley, 2005.

### References

### Course Outcomes

Students should be able to:

- Understand the operation of multi-layered protocols, particularly the OSI and Internet models/architectures, and how standards evolve.
- Describe the difference between different network topologies, including packet and circuit switched, LANs and WANs, and identify and describe networks that apply to each network type.
- Understand the basic concepts of the Physical Layer, including physical media, encoding/modulation, multiplexing, error control, and their implementation in various commercial networks.
- Describe the basic operation of the Data Link Layer, including connection oriented versus connectionless protocols, retransmission algorithms, windows and flow control, and their implementations in various networks.
- Describe the basic operation of the network layer, including addressing and routing.
- Describe the basic operation of TCP/UDP, including connection establishment and release, buffered transfer, adaptive retransmission, and congestion and flow control.
- Describe LAN architectures and their implementations
- Introduce Application layer concepts, including commercial Internet protocols and client-server technologies.
- Introduce special issues, including security, performance, and quality of service from a technical and ethical viewpoint.
- Tie in all above concepts to describe the global data telecommunications network.

## Relationship between Course Outcomes and Program Outcomes

The following Program Outcomes are supported by the above Course Outcomes:

- a. An ability to apply knowledge of computing and mathematics appropriate to the discipline
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
- i. An ability to use current techniques, skills, and tools necessary for computing practices.
- j. 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

## Prerequisites by Topic

- CS455 is a senior course in Computer Science and as such expects from its students a reasonable level of mathematical and computing sophistication.
- Physical phenomena such as electrical signals are discussed but no background beyond high school physics is assumed.
- Discussion of the software aspects of data communications assumes a knowledge of: operating systems, data structures, and the organization of reasonably complicated programs.

## Major Topics Covered in the Course

1. Introduction to the course, layered protocols, and networks	4 hours
2. Physical layer	5 hours
3. LANs and Medium Access Control	5 hours
4. Data link layer	4 hours
5. Network layer (IP)	5 hours
6. Transport layer (TCP, UDP)	5 hours
7. Application layer	4 hours
8. Special issues	1 hour
9. A Complete Network Overview	3 hours
Midterm (Review, Test), Paper / Project(s) Description & Evaluation, Final Exam Review	9 hours
Final Exam	-
	45 hours

## Assessment Plan for the Course

End of every semester Course Objective Assessments by CS department. End of semester Course Evaluations by IIT. Reviewed every Spring semester by CS Undergraduate Studies Committee for possible updates in the following Fall. Once every 4-5 years a detailed review of all materials for the course is made by the CS Undergraduate Studies Committee.

How Data in the Course is Used to Assess Program Outcomes (unless adequately covered already in the assessment discussion under Criterion 4)

See the assessment discussion under Criterion 4

*For a computer science program*

Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
Algorithms			Software design		
Data structures			Concepts of programming languages		