CIS 8544 Distributed Computing

- **Catalog Description:**
  - Prerequisite: A high-level programming language, basic knowledge of architecture and operating systems, elementary discrete mathematics, or permission of the instructor.
  - We consider a distributed computer system that consists of multiple autonomous processors that do not share primary memory but cooperate by sending messages over a communication network. Discussion of special problems related to distributed control such as election and mutual exclusion, routing, data management Byzantine agreement, and deadlock handling. Some basics of parallel and distributed algorithms. Applications in distributed shared memory, database, file systems, web applications, and cloud.
- **Textbook:**
  - Distributed System Design
    Jie Wu, CRC Press, 1999.
- **References:**
  1. Distributed Algorithms
     Nancy A. Lynch, Morgan Kaufmann Publishers, Inc., 1996
  2. An Introduction to Parallel Algorithms
     Joseph JaJa, Addison-Wesley Publishing Company, 1992
  3. Distributed Systems: Principle and Paradigms
     Andrew S. Tanenbaum and Maarten Van Steen, Prentice Hall, 2002.
  4. Distributed Computing: Principles, Algorithms, and Systems
     Ajay D. Kshemkalyani and Mukesh Singhal, Cambridge, 2008
  5. Networks, Crowds, and Markets: Reasoning About a Highly Connected World
     David Easley and Jon Kleinberg, Cambridge University Press, 2010.
- **Instructor:**
  - Dr. Jie Wu, Chair and Professor of Computer and Information Sciences
    jiewu@temple.edu, www.cis.temple.edu/~wu

- **Goals:**
  - The student will get exposed to fundamental issues in distributed system design, recent development, and research trends in this area.
- **Class time:** Tuttleman Learning Center 403B
- **Office hours:** Monday: 3:00 pm - 5:00 pm, Wachman Hall 1040
- **Grading Policy:**
  - Homework: 25%
  - Midterm: 25%
  - Final: 25%
  - Project: 25%
- **Prerequisite by topic:**
  1. Basic concepts of computer architecture and operating systems
  2. Knowledge of a high level programming language
  3. Elementary discrete mathematics
- **Topics:**
  1. Introduction and motivation
  2. From map reduce to parallel algorithms
  3. Program languages and clock synchronization
  4. Event ordering and clock synchronization
  5. Election and mutual exclusion
  6. Byzantine agreement
  7. Distributed faults and termination detection
  8. Distributed data management
  9. Distributed operating systems: deadlock handling
  10. Distributed web crawling and pagerank
  11. Topics in distributed communication protocols: routing and broadcasting
  12. Topics in distributed shared memory, database, file systems, and cloud.